Hubbard

MONOGRAPHS
OF
THE ACADEMY OF NATURAL SCIENCES
OF PHILADELPHIA

NUMBER 14

THE CATHERWOOD FOUNDATION PERUVIAN-AMAZON EXPEDITION

VI — EPHEMEROPTERA NYMPHS

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Published December 12, 1966

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INTRODUCTION

As is the case with most of the South American aquatic insects, the mayfly nymphs are rather poorly known. There are only two moderately comprehensive works on the South American nymphs. These are Needham and Murphy (1924) and Traver (1944). The former, though a fairly comprehensive work, is so marred by errors as to vitiate its usefulness. Traver offers a good key to the genera of the South American mayfly nymphs, but she omits the Chilean forms. Determination of the mayfly nymphs to species is impossible and even generic placement of some of the nymphs is difficult.

In all, 57 species representing 25 genera were taken, with the Leptophlebiidae and Baetidae predominating. The four intensively collected head water rivers (Tulumayo, Rondos, Bella, Puente Perez) were close in the number of species found at each (see Table 1). This condition prevailed in many of the other orders. The Huallaga and Monzón near Tingo Maria were only briefly visited as was the Penitencia which enters the Huallaga a few miles west of Tingo Maria.

The classification used is that of Demoulin (1958). Unless otherwise indicated, all specimens are in the collection of the Academy of Natural Sciences of Philadelphia.

The insect traps are wire baskets filled with wood and debris and allowed to remain in the water for about 30 days. They are then pulled up and all the insects found are preserved. For data on the description of stations and their locations see the limnological section by Patrick (Part I). The chemical data for the stations is given in the chemical section by Swabey (Part II).

The preparation of this paper was aided by a grant (2792) from the Penrose Fund of the American Philosophical Society.

SYSTEMATIC SECTION

EUTHYPLOCIIDAE

EUTHYPLOCIA Eaton

The single species of this genus collected in Peru was very common in the Puente Perez. It is a sprawler, found on the under sides of flat stones in slow to fairly rapid water. The elongate mandibles, as the author can attest, are capable of inflicting a moderately painful bite. Ulmer (1921) has described

Submitted May 1962

TABLE 1. — Species of each family at each station and total genera and species of each family taken.

Family	Tulumayo	Rondos	Bella	Puente Perez	Monzón
Euthyplociidae	0	0	0	1	0
Polymitarcidae	1	0	0	0	0
Baetidae	6	5	6	4	1
Oligoneuriidae	1	0	0	0	1
Leptophlebiidae	6	6	7	9	2
Tricorythidae	5	4	3	2	1
Caenidae	0	0	0	0	0
Total	19	15	16	16	5

Family	Huallaga	Penitencia	Amazonas	Nanay	Genera	Species
Euthyplociidae	0	0	0	0	1	1
Polymitarcidae	0	0	0	2	2	3
Baetidae	2	2	2	1	9	21
Oligoneuriidae	1	0	0	0	1	2
Leptophlebiidae	1	0	1	4	9	23
Tricorythidae	2	0	0	0	2	7
Caenidae	0	0	1	0	1	1
Total	6	2	4	7	25	57

the nymphs of three species of *Euthyplocia* from Argentina. The species below appears to be herbivorous as an examination of intestinal contents revealed only sand, debris, fungi, and plant particles.

Euthyplocia sp. Plate II, Figs. 19-26

Mature female 35.0 mm, exclusive of mandibles and cerci; head brown with darker markings, antennae longer than mandibles, head and mandibles, Fig. 21; labrum, Fig. 24, vertical, concealed by clypeus, covers base of mandibles; mouth parts horizontal, Figs. 25, 26; pronotum and mesonotum brown with black-brown pigment; wing pads purplish-black; legs brown; femora expanded; foretibia with spur, Fig. 19; claw preapical; meso and metathoracic claws apical; legs, especially foreleg, strongly haired; abdomen brown with median longitudinal light streak; tergites caudally with some purple; gill 1, Fig. 23, small single; gills 2-7, Fig. 20, extend laterally from body; bilamellate, deeply fringed; purplish in color; cerci about 20 mm; light brown with traces of purple, especially on basal segments.

Material examined. — PUENTE PEREZ — 4 ♂, 14 ♀.

POLYMITARCYIDAE

CAMPSURINAE

This subfamily is well represented in the Neotropical region. Needham and Murphy (1924) list 15 known and 12 new species of *Campsurus,* and Burks (1953) states that there are 50 species of *Campsurus* and *Tortopus*

in South and Central America. These latter genera are the only *Campsurinae* (4 species) which extend up into the United States. With the exception of one very immature nymph from a side pool of the Tulumayo, all the campsurines taken came from the Nanay.

CAMPSURUS Eaton

This genus is primarily Neotropical, but does extend up into south-central United States.

Campsurus sp. 1 Plate I, Figs. 1-12

Mature female 10.0 mm long; head light; clypeus without median projection, Fig. 3, but with two lateral "horns"; labrum small hidden by clypeus; mouth parts, Figs. 4, 5; maxilla and labrum, Fig. 1, project vertically below head; labrum especially so, with palpi folded together below glossae and paraglossae; pronotum about 1.5 times as wide as long, incompletely divided by a transverse suture; arms of suture do not meet at middle; mesonotum light, some faint purple pigments; legs, Figs. 6-10, with all claws smooth; no comb or fringed spines visible; abdomen light with purple pigment along anterior and posterior margins and down center of segments 2-7; 8, 9 with scattered pigment; tufts of light hairs along midlines of segments 2-8; gill 1 unequally bifid, small, Fig. 11, simple; 2-7 elongate bifid, Fig. 12, fringed; some purple pigment down center; cerci 2.1 mm; median filament fringed on both sides; cerci fringed on both sides, outer fringe heavier; egg, Figs. 2, 2a.

Material examined. — NANAY trap — 12 ♂, 6 ♀. NANAY — 1 ♀.

Campsurus sp. 2 ?

This species is represented by one early instar *Campsurus* nymph from a side pool of the Tulumayo. The specimen is about 2.4 mm long and no comparisons can be made with the previous species.

ASTHENOPUS ? Eaton

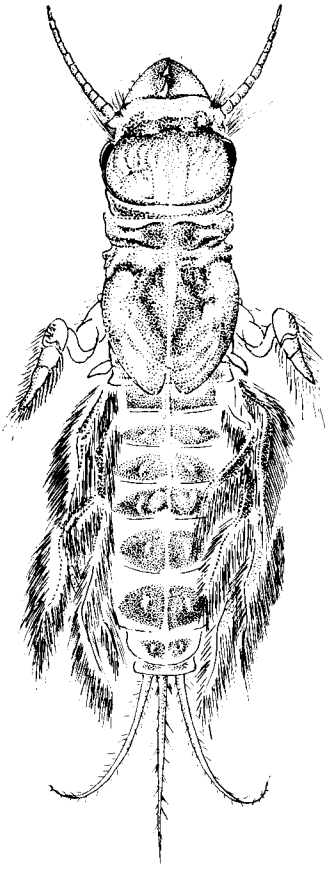
Asthenopus ? sp. Plate I, Figs. 13-18

This nymph is tentatively placed in the above genus on the basis of its resemblance to the nymph of the closely related genus *Povilla* and the structure of its pronotum which is close to that described for adult *Asthenopus* by Ulmer (1942). I have not been able to see Ulmer's original paper but Traver (1950) quotes Ulmer's description of the adult pronotum of *Asthenopus* as "pronotum short and broad, ring-like as in *Povilla*." The nymph resembles that of *Povilla* as described by Ulmer (1940) in general form of the head and mandibles and the structure of the pronotum.

Nymph, Text fig. 1, 5.4 mm long; labrum, small, hidden under clypeus; some purple pigment between ocelli; mandibles, Fig. 15; other mouth parts similar to *P. corporaali* Lestage; pronotum overall about twice as wide as long; subdivided into an anterior and posterior section by a transverse depression; mesally both parts with heavy scale-like spines and some scattered setae; integument resembles a piece of reptile skin; laterally there are finer

spines; mesonotum light with some scattered purple pigment; legs light; foreleg robust, Fig. 17, fossorial; tibia and tarsus indistinctly separated, some comb spines at apex, Fig. 14; claw curved and toothed, Fig. 13; meso- and metatarsi, Figs. 16, 18, distinct; legs overall robust; claws of meso and metathoracic legs smooth; some fringed hairs on tibiae; abdomen light, some purple and black pigment down center; gill 1 small, slightly spatulate; gills 2-7, double, fringed; some purple pigment down center; cerci short, light; with longer hairs on outer side; short robust spines on venter of cerci.

Material examined. — NANAY trap — 2 ♀.



TEXT FIGURE 1. — *Asthenopus* sp., dorsal view (Drawn by Miss Helen Wu).

SIPHLONUROIDIA

BAETIDAE

Although they were about equal with the Leptophlebiidae in genera and species number, the baetids (except for genus nr. *Callibaetis*) were far less abundant. These latter forms were found only in side pools left by the rivers at low water and were extremely abundant in these situations.

The following species are related in that they all have simple plate-like gills, the median filament is as well developed as the cerci, or nearly so, and they lack hind wing pads. On the basis of the characters of the mouth parts and claws they can be separated into five "genera" and these are discussed below.

Genus Poss. CLOEODES Traver

Plate III, Figs. 31-36

On the basis of the two segmented maxillary palpus, the structure of the labial palpus and the simple claw, I am unable to separate this species generically from the description of the genotype *C. maculipes* Traver (1938). The genus *Cloeodes* has, so far, not been recorded outside of Puerto Rico. Since the cerci and median filament, though apparently equal in diameter, are broken, I do not feel I can definitely assign this species to *Cloeodes*. The other species placed in *Cloeodes* by Traver (*C. portoricensis*) was placed in *Paracloeodes* by Day (1955).

Mature female 4.1 mm; male 3.9 mm; head and antennae brown; labrum, Fig. 31; labial palpus three segmented, no projection on segment 2, Fig. 36; glossae and paraglossae subequal; maxillary palpus two segmented; maxilla, Figs. 32, 34; mandible, Fig. 33; pronotum and mesonotum dark brown with some light spots; wing pads brown; hing wing pads absent; femora light with a mesal brown band; tibia light brown, tarsi dark brown; claw, Fig. 35, simple; abdomen dark brown with light pattern; lateral edges darker brown; tergites 4 and 8 lighter; sternites light except for last two; integument with anteriorly directed tubercles with a light apex; spines around base of gills on 5-7, absent on 1-4; gills on 1-7 single ovoid with a main trachea and 2-5 inner branches; cerci brown subequal in thickness.

Material examined. — PUENTE PEREZ — 2 ♂. BELLA — 1 ♂, 1 ♀. RONDOS — 2 ♂.

Genus nr. NEOCLOEON Traver

Plate III, Figs. 37-40

This species is placed near *Neocloeon* on the basis of the simple claw and the truncate labial palpus. It differs in having a two segmented maxillary palpus. It is also close to the African *Procloeon* and *Austrocloeon* which have truncate labial palpi and two segmented maxillary palpi but differ in gill structure.

Female nymph 4.2 mm, antennal segments white; head light with a pair of brown stripes running from lateral ocelli to front of head; stripes diverge around median ocellus; mouth parts as in Figs. 38, 40, maxillary palpus bare; thorax light with a variegated brown pattern; claw without pectinations; abdomen light with a variegated brown pattern; tergites 1, 4, 5, 8, 10 lighter; only gills 1 and 5 present; gills single with a faint main trachea, Figs. 37, 39; cerci broken; bases light and all equally heavy.

Material examined. — AMAZONAS — 1 ♀.

Genus 1 nr. PSEUDOCLOEON Klapalek

The following five species all appear to belong to the genus designated as *Pseudocloeon* ally by Traver (1944). It is characterized by the two segmented maxillary palpus, the three segmented labial palpus with an apico-mesal projection on segment two, and the pectinate claws. In all the species found in Peru, the glossae of the labium are shorter than the paraglossae.

Sp. 1 — Plate IV, Figs. 41-44

Mature female 6.0 mm, head and basal antennal segments brown; maxillary palpus two segmented, Fig. 43, with some hairs; labial palpus three segmented with an apico-mesal projection, Fig. 41; mandible, Fig. 44; pronotum brown; mesonotum variegated brown; wing pads 1.1 mm, brown with veins light; only the slightest suggestion of a hind wing pad present; legs light brown with some darker brown on femur and tibia; claw, Fig. 42, with teeth; abdomen relatively uniform brown; caudal margins of segments with spines, these not present laterally on 1-7; gills on segment 1-7, asymmetrically ovoid, cloudy, only a faint suggestion of a trachea present basally; cerci and median filament broken, brownish; all three remaining sections of equal weight.

Material examined. — BELLA — 1 ♀.

Sp. 2 — Plate IV, Figs. 45-47

Mature female 4.5 mm; head brown and white; basal antennal segments cloudy; mouth parts, Figs. 45, 46; labial palpus three segmented, second with apico-mesal projection; maxillary palpus two segmented; pronotum and mesonotum with brown and white pattern; wing pads 1.0 mm, light brown; veins white; hind wing pads absent; legs light, femora with faint mesal brown band; claws, Fig. 47, pectinate; abdomen light brown, slightly darker anteriorly on each side of midline; sternites light; caudal spines on tergites; no spines above gill bases; gills 1-7, asymmetrically ovoid, cloudy; no tracheae visible; cerci 2.0 mm with mesal and apical brown bands; median filament 1.7 mm; with mesal brown band.

Material examined. — TULUMAYO bottom — 1 ♀.

Sp. 3 — Plate IV, Figs. 48-51

Mature male 3.0 mm long; head brown, some light spots; antennal segments 1, 2, light, remainder light brown; mouth parts similar to Sp. 2; mesonotum brown with a mesal longitudinal light stripe; wing pads .9 mm long, brown; hind wing pads lacking; legs light; femora and tibiae with mesal brown bands; metathoracic leg, Fig. 51; tarsi light; claw pectinate as in Fig. 47; abdominal tergites with brown and white pattern, Fig. 50; tergite 10 light; sternites light; gills ovoid single on segments 1-7; trachea forked apically, Figs. 48, 49, with some faint inner branches; cerci and median filament, light brown; apices missing but bases equally heavy.

Material examined. — PUENTE PEREZ — 1 ♂.

Sp. 4 Plate IV, Figs. 52-55

Mature male 4.3 mm; head brown and white patterned; antenna 1.9 mm light, labium and mandible, Figs. 52, 53; pronotum and mesonotum brown and white patterned with a mesal longitudinal light band; wing pads 1.0 mm, brown with white spots; hind wing pads lacking; legs light; femora and tibiae with faint brown bands; claws pectinate as in Fig. 47; abdomen with tergites 2, 3, and 5-9 with center brown, light laterally; tergites 1, 4, 10 mostly light; abdominal sternites 2-9 and apex of 5, brown; gills on 1-7 ovate, Figs. 54, 55, no trachea visible; integument as in Genus poss. *Cloeodes,* tubercles smaller and sparser; cerci broken but median brown band present; base of median filament heavy.

Material examined. — TULUMAYO — 3 ♂.

Sp. 5 Plate V, Figs. 56, 57

Mature female 5.4 mm; labrum, Fig. 56; head, thorax and abdomen light brown; antenna light, 2.4 mm long; mouth parts similar to Sp. 4; wing pads light brown; veins white; hind wing pads absent; legs light, forefemora and tibia with mesal brown bands; tarsus with sub-basal band; meso- and metathoracic legs unbanded; claw pectinate as in Fig. 47; gills on 1-7 ovate, asymmetrical, branches inner side of main trachea Fig. 57; cerci 3.0 mm with mesal and preapical brown bands; median filament 1.8 mm with only mesal band.

Material examined. — RONDOS — 3 ♀.

Genus 2 nr. PSEUDOCLOEON Klapalek

Plate V, Figs. 58-63

The long *Callibaetis*-like claw, Fig. 61; and the enlarged first abdominal gill, (Fig. 59) will separate this from any of the other genera and species discussed here. In its general characteristics, it appears to be closely related to Genus 1 nr. *Pseudocloeon.*

Mature male 3.6 mm; nearly mature female 3.5 mm; head light yellow-brown; antennae light; labial palpus, Fig. 63, with segment 2 produced; segment 3 slightly truncate; glossae and paraglossae subequal in length; maxillary palpus, Fig. 62, two-segmented, apical segment elongate; pronotum and mesonotum light yellow-brown; wing pads whiteish, veins brown; hind wing pads lacking; legs light; claws elongate, narrow, pectinate, Fig. 61; abdomen light yellow-brown; segments laterally flattened, gills on 1-7; gill 1 enlarged, Fig. 59; gills, Fig. 60, paddle shaped; trachae purplish, interrupted; cerci 2.4 mm with a light mesal band; median filament 2.2 mm, with light mesal band.

Material examined. — NANAY — 1 ♂, 3 ♀.

Genus 3 nr. PSEUDOCLOEON Klapalek

Plate V, Figs. 64-69

The very unusual labium and labial palpus, and the claw with its preapical spur will separate this genus and species from any others in this group known

to me. Of the group genera which lack hind wing pads, and have simple gills, only *Neocloeon* has a three segmented maxillary palpus.

Mature male and female 3.6 mm; head brown and white patterned; antenna light, 1.9 mm long; maxillary palpus long, apparently three segmented; labial palpus long; second segment very strongly produced, Figs. 64, 68; pronotum and mesonotum brown with mesal longitudinal light stripe; wing pads brown; hind wing pads lacking; pleurae and sternites brownish; femora with two faint brown cross bands; foretibia and tarsus with sub-basal brown bands; these only faintly indicated on other legs; claw with large preapical spur and pectinations, Fig. 66; abdominal tergites 1-9 brown, 10 light; mesal lighter spots tend to form longitudinal band on 1-9; sternites brownish, apical ones darker; darker gills, Fig. 65, ovate, single on 1-7; central trachea with some faint branches on each side; cerci 2.0 mm long with mesal and preapical brown bands; median filament 1.8 mm with mesal band and apex from level of brown bands on cerci completely brown.

Material examined. — TULUMAYO — 1 ♂, 1 ♀.

Genus nr. BAETIS

Genus nr. **Baetis** sp. Plate VI, Figs. 70-75

The species included here differs from typical *Baetis* in the wide, spatulate claws and the longer forelegs. In its other characters it would key easily to *Baetis*. The following description is based on a nearly mature male nymph. This appears to be Baetine No. 1 of Traver (1944).

Length 5.7 mm; head brown; labrum, Fig. 74; mouth parts, Figs. 70, 72, 73; antenna 1.38 mm; pronotum mottled brown, quadrate; mesonotum and bases of front wing pads mottled brown; wings in pads, purplish in color; front wing pads 1.3 mm long; hind wing pads .48 mm; legs robust, light; foreleg slightly longer than mesothoracic leg and distinctly longer than metathoracic leg; femora flattened, with a median brown area and brown edging; claw, Fig. 71; abdominal tergites mottled brown-white; tergites 2, 4, 5, 7, 10 lighter; sternites light, 5-8 with caudo-lateral brown dashes; gills single, milky, with single trachae, Fig. 75; length of gills in mm from abdominal segments 1 to 7 .24-.6-.72-.6-.48-.42-.30; cerci and median filament relatively stocky; cerci 1.8 mm, brownish; median filament 1.5 mm, lighter.

Material examined. — RONDOS — 1 ♀. HUALLAGA — 2 ♂, 1 ♀.

Genus BAETIS Leach

The following three species are tentatively placed in *Baetis* on the basis of the presence of hind wing pads, a shorter or reduced median filament and pectinate claws. All three have two segmented maxillary palpi, a very small apico-mesal projection on the second labial palpal segment and equal glossae and paraglossae. The median filament of *Baetis* sp. 1 is distinctly narrower than the cerci while that of *Baetis* sp. 2 and 3 is more nearly equal to the cerci. This, in combination with the very distinctive claw and more truncate labial palpus, indicates that *Baetis* sp. 1 may represent another genus close to *Baetis*.

Baetis sp. 1 Plate VI, Figs. 76-83

Nearly mature female 12.0 mm; head brown; antenna 1.4 mm; segments brownish; labrum, Fig. 83; mouth parts as in Figs. 76, 80-82; pronotum and mesonotum brown with some light spots; forewing pads blackish; hind wing pads distinctly present; legs robust, mostly brown; claw, Fig. 77; abdomen brown, marked as in Fig. 79; venter a uniform light tan; gills single, asymmetrical, single on 1-7; only a few tracheae on outer side of main rib; cerci brown, about 6.5 mm; median filament narrower, 2.8 mm long.

Material examined. — PUENTE PEREZ — 7 ♀. BELLA — 2 ♀.

Baetis sp. 2 Plate VII, Figs. 84-89

Mature female 6.6 mm; head brown; labrum, Fig. 87; antenna light 2.4 mm long; maxilla, Figs. 86, 89; labrum as in Fig. 72; pronotum, mesonotum and forewings brown, hindwings present; femora light with some brown markings; tibiae light; tarsi darkened; claw, Fig. 88; abdomen brown; each segment with a faint median light area and some light spots, Fig. 84; venter light, darkening toward apex of abdomen; gills single on 1-7, asymmetrical, few tracheal branches, Fig. 85, on outer side; cerci and median filaments equally heavy at base; hairs darkened at mid-point of cerci and on median filament; cerci 3.1 mm, median filament 2.5 mm.

Material examined. — PENITENCIA — 3 ♀.

Baetis sp. 3 Plate VII, Figs. 90-93

Female 5.4 mm, male 4.8 mm; head light with some brown; labium as in Fig. 92; pronotum and mesonotum off-white and brown; wing pads light, margined in brown; in a mature male developing wings inside wing pads, black; legs light; femora with longitudinal brown mark and brown edging; faint on some specimens; apices of tibiae and tarsi darkened; claw, Fig. 93; abdominal tergites brown; anterior tergites marked as in Fig. 90; mature male much darker than more juvenile forms; markings more distinct; tergites 4-10 more uniformly brown, 7-10 light brown; anterior sternites light tan; last five sternites brown with some anterior light spots; gills 1-7 single platelike, Fig. 91; cerci of male 2.7 mm, with wide mesal brown band and apex darkened; median filament 1.9 mm with mesal brown band; cerci and median filament equally heavy at base.

Material examined. — PUENTE PEREZ — 2 ♂, 2 ♀.

Genus nr. CALLIBAETIS

The following two species agree in most respects with the published descriptions of the nymphs of the genus *Callibaetis* except that they possess a two-segmented, rather than a three-segmented, labial palpus. I have seen similar nymphs from the Savannah and Schuylkill rivers in the United States. The nymphs prefer slower water as the greatest number of them were found in side pools rather than in the main channels of the rivers.

Genus nr. **Callibaetis** sp. 1 Plate VII, Figs. 96-103

Mature female 6.0 mm, male 5.4 mm; head brown with some light spots around antennal sockets; antenna 3.6 mm; labrum, Fig. 97, and mandibles

light; mouth parts as in Figs. 98, 103; labial palpus two segmented; pronotum and mesonotum brown with some light spots, especially at base of forewing pads; wing pads 1.3-1.5 mm long, light; veins partially brown; legs narrow, lightly infuscated with brown; tibiae with partial break near base; claw, Fig. 96; abdomen flat, upcurved; tergites mostly brown, more variegated in younger specimens; gills 1, 2, Fig. 99, trifoliate, 3-7 bifoliate, Figs. 100-102; caudal leaf of gills 3-7 grows smaller caudally, is almost completely absent on gill 7, Fig. 102; cerci light brown, 4.8 mm; median filament 3.6 mm; hairs at about midpoint of cerci and corresponding point of median cerci, brown.

Material examined. — TULUMAYO island pool and side pool — 17 ♂, 128 ♀. PENITENCIA — 1 ♂, 5 ♀. RONDOS — 1 ♀. RONDOS side pool — 1 ♀.

Genus nr. **Callibaetis** sp. 2 Plate VII, Figs. 94, 95

Mature female 7.2 mm male 5.4 mm; antenna 3.0 mm; mouth parts as in Genus nr. *Callibaetis* sp. 1; head and thorax light tan with some light brown markings; forewing veins party brown; legs light, meso and metafemora sometimes with preapical brown band; tibiae with basal break; claw, long, Fig. 95; abdomen maculation variable mostly light with brown markings, some specimens fairly dark; tergites 4, 8, 10 generally lighter; venter light, sometimes with an anterolateral purplish spot on each side; gills, Fig. 94, and cerci similar to Genus nr. *Callibaetis* sp. 1.

Material examined — AMAZONAS beach pool — 7 ♂, 19 ♀.

BAETODES Needham and Murphy

This genus was based on nymphal material from Brazil by Needham and Murphy (1924). Traver (1944) and Demoulin (1955d) have also described nymphs of this genus from Brazil. The five species described here are all smaller than *B. serratus* Needham and Murphy, the largest being 3.4 mm long. Though not mature, they appear to be close enough to maturity that none of them would achieve the 7-8 mm lengths of *B. serratus*. All the species found in Peru possess small filamentous gills on all the legs. These gills arise caudo-mesally, in the membrane between the coxa and trochanter and are here referred to as coxal gills. These gills may be simple, Fig. 104, or bifid, Fig. 123. Neither Needham and Murphy nor Traver describe *B. serratus* as possessing such gills, however, Demoulin (1955d) does mention them.

Baetodes sp. 1 Plate VIII, Figs. 104-109

Length of male 2.7 mm; head, Fig. 109, and body generally brown; antenna .9 mm long; pronotum lighter caudo-mesally but not clearly raised; base of wing pads and apex of mesonotum yellowish; wing pads 1.2 mm long; legs light, head, pronotum, mesonotum and wing pads with small subovate, scale-like hairs, Fig. 105; femora with mesal brown band and darker base and apex; claw as in Fig. 124; coxal gills single .18 mm long by .019 mm wide, Fig. 104; abdomen brown; tergites (Fig. 106) appear scale-like, apex of tergite 9, tergite 10 and sternites lighter; dorsal projections present on

tergites 1-9, Fig. 107; ratio of lengths in Table 1; gills on segments 1-5, subovate, drooping; cerci missing, median filament .12 mm long, Fig. 108.

Material examined. — TULUMAYO rapids — 1 ♂.

Baetodes sp. 2 Plate VIII, Figs. 110-112

Length of male 3.1 mm; female 3.4 mm; general color of head and body brown; base of wing pads and apex of mesonotum lighter; antenna light, .9 mm long; wing pads dark brown, .8 mm long, scale-hairs very sparse and light, difficult to discern, legs light; femora, Fig. 112, with a mesal brown band in addition to dark apex and base, marginal spine, Fig. 111, claw similar to Fig. 124; coxal gills, bifid, Fig. 123, about .19 mm long; venter of thorax with some purplish pigment; abdomen brown; caudal two-thirds of tergites 5-7, all of 10 and sternites, lighter; cerci 2.2 mm long; median filament about .12 mm long, as in Fig. 108; drooping, subovate gills on 1-5, .19 mm long; dorsal projections present on pronotum, metanotum, and abdominal tergites 1-9; ratio of lengths in Table 1; projections, Fig. 110, tend to be slightly shorter on Tulumayo specimens than in those from Bella; abdominal integument with fine spines, not as in *Baetodes* sp. 1, 4, Fig. 106; tend to form scale like patterns latero-ventrally.

Material examined. — BELLA — 2 ♂, 1 ♀. TULUMAYO rapids — 3 ♂, 2 ♀.

Baetodes sp. 3 Plate IX, Figs. 114-120

Length of male 2.9 mm, female 3.2 mm; mouth parts, Figs. 115-119, head, pronotum, mesonotum, wing pads, and abdomen a fairly uniform brown; antenna .9 mm long; pronotum without projection; some scale hairs, Fig. 120, present on head, thorax and wing pads; legs light; femora with mesal brown area tending to be longitudinal and with some purplish pigment in female; coxal gills bifid; abdominal sternites of female with some purple pigment; claw similar to Fig. 124; abdominal projections, Fig. 114 (1-9) low, Table 1; metanotum with just a suggestion of a projection; lateral cerci 2.4 mm; mesal .12 mm, as in Fig. 108; gills typical for genus; integument of abdominal tergites with fine spines, somewhat scale-like, not as pronounced as *Baetodes* sp. 1, 4.

Material examined. — BELLA — 1 ♂, 2 ♀. RONDOS — 1 ♂.

Baetodes sp. 4 Plate VIII, Fig. 113

Length male 2.5 mm, female 3.3 mm; head, pronotum, mesonotum, wing pads, and abdomen uniform dark brown; antenna .9 mm long; wing pads .9 mm long on female, .6 mm on male; scale-hairs moderately abundant on head, pronotum and wing pads; legs as in *Baetodes* sp. 1; coxal gills single; abdominal projections on tergites, Fig. 113, 1-9, Table 1; lateral cerci (female) 2.7 mm long, darkened apically, mesal .12 mm long; gills typical for genus; integument of abdominal tergites appear scaley.

Material examined. — MONZÓN — 1 ♂. HUALLAGA — 1 ♀.

Baetodes sp. 5 Plate IX, Figs. 121-125

Length 3.0 mm; head mottled light brown; pronotum mottled light brown, lighter caudo-mesally, mesonotum light brown; wing pads light, slightly darkened apically, .72 mm long; scale hairs not apparent; legs light; femora with

a slight mesal dark band; claw, Fig. 124; coxal gills bifid, Fig. 123, .19 mm long; abdominal tergites light brown with caudal one-half to two-thirds light; 1-9 sternites light, slightly darkened anteriorly; projections on abdominal tergites, Fig. 121, Table 2; lateral cerci missing, median .12 mm long as in Fig. 108; gills typical for genus; integument of abdominal tergites with fine spines, Fig. 122, these not scale-like as in *Baetodes* sp. 1, 4.

Material examined. — BELLA — 1 ♂.

TABLE 2. — Relative lengths of dorsal thoracic and abdominal projections of *Baetodes species.*

	Pro	Met	I	II	III	IV	V	VI	VII	VIII	IX
Baetodes sp. 1 ..			4	4	4	4	4	3	3	2	1
Baetodes sp. 2 ..	10	10	1	7	7	7	7	7	6	5	4
Baetodes sp. 3 ..		0.3	0.5	1	1.5	1.5	2	2	1.5	1.5	1
Baetodes sp. 4 ..			5	4	4	3	3	3	3	2	1
Baetodes sp. 5 ..			9	6	6	6	6	6	5	4	3

OLIGONEUROIDEA

OLIGONEURIIDAE

LACHLANIA Hagen

This genus seems to be widely distributed throughout the Neotropical and Nearctic Regions though the records are sparse. The genus was described from Cuba by Hagen; Needham and Murphy (1924) record it from Guatemala; Ulmer (1921), (under *Noya* Navas) from Argentina; Ide (1941) from Canada; and Edmunds (1948a) from Utah. Demoulin (1955) considers *Noya* as a subgenus of Neotropical distribution.

Lachlania sp. 1 Plate II, Figs. 27, 28, 30

In its lateral abdominal spination, size and structure of foreleg, this species appears close to *Lachlania* (=*Noya*) *pallipes* Navas.

Mature female 19.2 mm; mature male 13.8 mm; antennal segments as in Fig. 27; head flat, Fig. 28, shield shaped, completely hides mouth parts; labrum, small extends vertically from underside of clypeus, in front of mouth parts; mouth parts, large and flat; labial plate, ventrally spined, in situ resembles suction or scraping disc; maxillae with multifilamentous branched gills; thorax brown; claw, with one large and two-three small lateral teeth, abdomen brown, lateral spines or 2-9, wide and relatively flat, Fig. 30; in younger specimens yellow, light to medium brown in older specimens; gills small, consist of small plate with short multifilamentous tracheal gills under it; gills ventral on segment 1, dorsal on 2-7; abdominal venter brown; a few short dark brown spurs caudally on each side of midline on sternites 2-8; only 1 or 2 spurs on each side on sternite 8; cerci (2) light brown; 15.0 mm long on female.

Material examined. — HUALLAGA — 2 ♂, 5 ♀.

Lachlania sp. 2 Plate II, Fig. 29

Nearly mature female 12.0 mm; male 8.4 mm; antennae, mouth parts,

head, and thorax as in *Lachlania* sp. 1; body color slightly darker than *Lachlania* sp. 1; legs dark brown; segments differ in shape from the above species; claw with single lateral tooth; with lateral spines of abdomen, smaller, Fig. 29, than *Lachlania* sp. 1 and almost same color as abdominal tergites; cerci (2) light brown; 6.0 mm long.

Material examined. — TULUMAYO — 1 ♂, 22 ♀. TULUMAYO rapids — 6 ♀. MONZÓN — 1 ♂, 5 ♀.

LEPTOPHLEBIIDAE

This family with nine genera and 23 species was the dominant element of the Peruvian fauna. The Baetidae were as numerous in genera and species but were much sparser (except Genus nr. *Callibaetis*) in individuals. The adult records indicate that the family is very widespread in the Neotropical region. The nymphs occupy all the habitats which in North America are occupied by *Stenonema, Heptagenia,* and their allies and possess all the morphological adaptations demonstrated by the North American *Stenonema* and *Heptagenia.* To the best of my knowledge, no true Heptageniidae have been recorded from South America. The collecting I have done in the rivers of North America indicates that here the leptophlebiid nymphs are relatively scarce when compared to the number of *Stenonema* and *Heptagenia* taken.

Demoulin (1958) lists 45 genera and subgenera in the Leptophlebiidae, of these, 14 are recorded from South America and three (*Hagenulus* Eaton, *Neohagenulus* Traver, and *Borinquena* Traver) are known from Cuba and and Puerto Rico. Of this total of 17 genera and subgenera, the nymphs of 15 are known, however, in many cases such as *Atalonella, Hagenulus,* and *Massartella* the associations are questionable. The genus *Thraulus* Eaton, commonly recorded from South America, apparently does not occur there and is restricted to the old world. (Edmunds 1950 b, Traver 1956.)

The following three species possess the emarginate labrum with some denticles in the depression which characterize the genera *Atalophlebia* and *Atalonella?.* Two of these have the large preapical tooth on the claw, figured by Needham and Murphy (1924) for the questionably associated *Atalonella* nymph described by them. All three, however, have very narrow elongate lanceolate acuminate gills with unbranched tracheae. They are completely different from any described for the above genera. The gills of *Atalonella* are described as lanceolate with coarsely pinnate tracheation and with the exception of *A. nodularis* (Eaton) all the *Atalophlebia* nymphs described by Phillips (1930) and Harker (1954) possess basically ovate gills with pinnate tracheation. The gills described by Harker (1950, 1954) vary from simple ovate-acuminate, to trifid, to deeply fringed. All, however, have lateral trachal branches. It may be that the extent of gill fringing or emargination is an adaptive character and not of value at the generic level. Harker's (1954) data seems to indicate this clearly.

On the basis of the claw, the single female from the Bella is tentatively assigned to near *Atalophlebia,* while the two species with a large preapical

tooth on the claw are placed near *Atalonella*?. In overall form, all three resemble Phillips (1930) photograph of the nymph of *A. nodularis*. This latter species probably does not belong in *Atalophlebia*.

Genus nr. ATALOPHLEBIA Eaton

Genus nr. **Atalophlebia** sp. Plate X, Figs. 137-140

This species appears to be close to the nymph of *Atalophlebia nodularis* (Eaton) as described by Phillips (1930). Both have double gills containing only a single unbranched central trachea. *A. nodularis* has lateral abdominal spines on 6-9, and my Peruvian specimen has spines only on 8 and 9.

Nearly mature nymph 6.0 mm long, appears close to maturity; labrum, Fig. 140, about twice as wide as long; five denticles in median depression; maxillary palpus 12:13:9, labial palpus 20:20:9; body mottled light brown, scattered black pigment; only foreleg present, light with few scattered pointed spines and no hairs; claw, Fig. 138; abdomen with lateral spines discernable only on segments 8, 9; gills on 1-7 bilamellate, narrow, Fig. 137, lanceolate-acuminate; tracheae unbranched; cerci broken, brown; ninth abdominal sternite of female, Fig. 139.

Material examined. — BELLA (on slide) — 1 ♀.

Genus nr. ATALONELLA Needham and Murphy

Genus nr. **Atalonella** sp. 1 Plate X, Figs. 126-128

Immature female 3.6 mm; labrum, Fig. 128, two times as wide as long; four teeth in antero-mesal depression; labrum, head brown; head caudally with black pigment arranged in distinct pattern; mouth parts similar to *Thraulodes*; pronotum and mesonotum brown with distinct black pattern; femora expanded, light with scattered black pigment; black spines present but no hairs; tibiae with two faint bands, sub-basal and preapical; tarsi with faint sub-basal band; claw as in Fig. 127; abdomen with tergites 1-8 mostly black, lighter anteriorly and mesally; 9, 10 with black areas antero-laterally; bilamellate gills, Fig. 126, 1-7, very narrow lanceolate-acuminate; tracheae not branched, sinuate apically; each gill lanella appears almost tubular; lateral spines on segments 6-9, small on 6, 7; cerci brown.

Material examined. — NANAY trap — 1 ♀.

Genus nr. **Atalonella** sp. 2 Plate X, Figs. 129-136

Nearly mature nymph 5.0 mm; labrum 2.2 times as wide as long; six teeth in antero-mesal depression; maxillary palpus 9:11:8; labial palpus 16:18:10; head, Fig. 134, and body bottled brown with some slight scattered black pigment; metathoracic leg, Fig. 136; femora light, scattered blunt spines, Fig. 131, and no hairs; a light preapical brown band present; tibiae with sub-basal and preapical brown bands; tarsus with sub-basal brown band; claw with preapical tooth large, Fig. 135; abdomen with distinct lateral spines on 8, 9; possible small spines on 6, 7; gills, Figs. 129, 130, on 1-7, bilamellate, narrow, lanceolate-acuminate; median tracheae unbranched; cerci brown, broken; section of cercus, Fig. 133; ninth abdominal sternite of male, Fig. 132.

Material examined. — RONDOS (on slide) — 1 ♀. TULUMAYO (male on slide, both immature) — 1 ♂, 1 ♀.

Genus nr. HAGENULOPSIS Ulmer

The two nymphs placed here agree very well with the nymph described by Traver as *Hagenulopsis* ally. The form of the last segment of the labial palpus and the spatulate hairs on the glossae are distinctive.

Genus nr. **Hagenulopsis** sp. 1 — Plate XI, Figs. 141-148

Nymph 6.6 mm; labrum, Fig. 142, 2.4 times as wide as long; three denticles in antero-mesal depression; head and labrum yellow, some scattered black pigment on head; mouth parts as in Figs. 147, 148, 150, 152; maxillary palpus segments 19:20:10; labial palpus 30:25:10; last segment narrowed distally; glossae with spatulate hairs; legs with femora light, not greatly expanded; scattered pointed spines, Figs. 147, 148, a very few fine marginal hairs; tibia and tarsi light; claw, Fig. 146; pronotum and mesonotum yellow with margins darker, blackish; wing pads yellow; abdominal tergites with center one-third yellow, lateral third dark; lateral spines on 6-9; gills bilamellate, elongate, narrow lanceolate, Fig. 141; main trachea purple, unbranched, sharply defined; gill 2 extends to apex of segment 6; gills extend past apex of abdomen; cerci 11.4 mm long; section of cercus, Fig. 145.

Material examined. — PUENTE PEREZ — 4 ♂, 3 ♀.

Genus nr. **Hagenulopsis** sp. 2 — Plate XI, Figs. 149-152

Nearly mature nymph 4.2 mm; head, Fig. 149; labrum 2.2 times as wide as long; three denticles in antero-mesal depression; mouth parts, Figs. 150, 152; maxillary palpus 13:13:9 labial palpus as in Genus nr. *Hagenulopsis* sp. 1; segments in ratio 20:20:10; labrum and head light red brown; pronotum and mesonotum light red-brown, darker marginally and with some black pigment laterally; wing pads red-brown; legs light, femora only moderately expanded; with some spines and sparse marginal hairs; tibiae and tarsi light; claw-like, Fig. 146; abdomen dark red-brown; some underlying black pigment; lateral spines on 5-9; gills bilamellate; elongate, narrow lanceolate-acuminate; main trachea light purple unbranched; gill 2 extends to top of segment 7; gills 6, 7 extend past tip of abdomen; cerci brown; ninth abdominal sternite of male, Fig. 151.

Material examined. — PUENTE PEREZ — 4 ♂, 2 ♀. RONDOS — 1 ♂.

ATALOPHLEBIA Eaton

These species agree closely with the nymphs of *Atalophlebia* described by Phillips (1930) and Harker (1950, 1955), the form of the labrum and mouth parts agree with this genus. The gills are shaped like *A. cruentata* of Phillips and the abdominal segments have lateral spines on segments 2-9, species 3 differs in lacking lateral tracheal branches and the claws have fewer teeth but I do not feel these are of generic value. Faint lateral tracheae are present on the gills of species 1 and 2. There is some resemblance to *Atalophlebioides* but the labrum of this genus has only a very small antero-mesal depression without any denticles and the gills appear to be more lanceolate.

Atalophlebia sp. 1 Plate XI, Figs. 153-160

Female 8.4 mm long; antenna 4.2 mm long; labrum, Fig. 157, 2.3 times as wide as long; anterior margin not indented but with some very shallow denticles indicated; mouth parts as in Figs. 169, 171; maxillary palpal segments in ratio 30:30:22; labial palpus 50:44:11; general color of head and body light yellow-brown, slightly mottled; femora marked as in Fig. 158; tibiae, tarsi light; femora and tibiae with relatively few hairs; spines in Figs. 154, 155, 159; claw as in Fig. 153; abdominal tergites marked with some variation as in Fig. 160; sternites light; bilamellate gills on segments 1-7 lanceolate-acuminate; lateral tracheae faint, Fig. 156, some purplish color around tracheae; lobes subequal; lateral spines on segments 2-9; cerci, light brown, about 12.0 mm long.

Material examined. — PUENTE PEREZ — 1 ♀.

Atalophlebia sp. 2 Plate XII, Figs. 161-168

Female 6.6 mm, male 5.4 mm; labrum, Fig. 164, 2.2 times as wide as long; anterior margin not indented but with some faintly indicated shallow denticles; mouth parts as in Figs. 169, 171; segments of maxillary palpus in ratio 15:15:12; labial palpus 35:25:10; head and thorax mottled brown; wing pads appear lighter; femora with some irregular brown areas and preapical black spot; lateral line present; tibiae with a wide mesal brown area; femora and tibiae lightly haired on margin; claw, Fig. 162, spines of femora, Figs. 163, 165; abdomen light brown; lateral light spots on tergites 2-9; median light areas on tergites 5-9; spots divided and fainter on tergites 6, 7, 9; often absent on 7 and 9; sternites light; bilamellate gills on segments, 1-7 ovate acuminate, Figs. 167, 168; lateral tracheae very faint; gills cloudy purplish; lamellae subequal; lateral spines on segments 2-9; cerci light, 9.0 mm long, section of cercus, Fig. 161; ninth abdominal sternite of female, Fig. 166.

Material examined. — AMAZONAS — 3 ♂, 25 ♀. AMAZONAS beach pool — 1 ♀.

Atalophlebia sp. 3 Plate XII, Figs. 169-173

Female 6.6 mm long; labrum, Fig. 172, 2.2 times as wide as long; anterior margin slightly concave with some faintly indicated shallow denticles; mouth parts, Figs. 169, 171; maxillary palpal segments in ratio 20:20:11; labial palpus 30:29:15; head, thorax, and abdomen with a red-brown, dark brown, and white harlequin pattern; wing pads brown; legs missing; bilamellate gills on abdominal segments 1-7; gills ovate acuminate, Figs. 170, 173, with a purplish main trachea; no lateral tracheae visible; body of gills pinkish; lamellae subequal; lateral spines on segments 2-9; cerci brown.

Material examined. — NANAY trap — 1 ♀.

THRAULODES Ulmer

The first three species are placed in *Thraulodes* in spite of the lateral tracheae on the abdominal gills. They agree in all respects with the characters of *Thraulodes* larvae as given by Traver (1944) and Demoulin (1955d). The incipient venation of the forewing also agrees with those given by the aforementioned authors. Considering the situation in *Ataloghlebioides* and possibly *Atalophlebia* where there are species with and with-

out lateral tracheal branches. I do not feel that this character is of any more than specific value.

Thraulodes sp. 1 Plate XIII, Figs. 182, 183

Female 8.7 mm, male 7.8 mm; antenna 3.6 mm; labrum 3 times as wide as long; mouth parts as in Figs. 195, 197, 198; segments of maxillary palpus in ratio 22:26:17; labial palpus 33:33:10; head and thorax brown; thoracic tergites with a light pattern; wing pads light brown; femora expanded with a brown and white pattern and lateral line; femoral spines ovate as in Fig. 175; tibiae and tarsi light brown; femora and tibiae strongly haired; claw as in Fig. 186; abdomen brown; lighter laterally; lateral spines on segments 2-9; sternites light, last two very slightly brownish; bilamellate gills, Fig. 182, 183, on segments 1-7, lanceolate-acuminate; lateral trachae present; lamellae subequal; cerci 10.8 mm long; light brown; hairs on cerci small and sparse, Fig. 177.

Material examined. — PUENTE PEREZ — 9 ♂, 10 ♀. TULUMAYO — 1 ♂, 2 ♀. TULUMAYO rapids — 9 ♀. BELLA — 5 ♂, 1 ♀.

Thraulodes sp. 2 Plate XIII, Figs. 174-181

This species is very close to *Thraulodes* sp. 1, differing only in slightly smaller size and in color pattern.

Female 7.8 mm; male 7.4 mm; head, Fig. 174, labrum and mouth parts as in Figs. 178, 195, 197, 198; head with labrum, and a stripe extending back from labrum, brown; sides of head yellow; pronotum yellow except for some brown marks anteriorly; mesonotum and wing pads marked as in Fig. 179; abdomen of female with tergites 2, 3, 6, 7 dark brown; 1, 4, 5, 8, 9, 10 light yellow-brown; tergites 6, 7 of male with some brown laterally; gills and spines as in *Thraulodes* sp. 1; cerci as in *Thraulodes* sp. 1, Fig. 177; ninth sternites of male and female, Figs. 180, 181.

Material examined. — BELLA — 2 ♀. PUENTE PEREZ — 1 ♂. TULUMAYO — 2 ♂. TULUMAYO rapids — 5 ♀.

Thraulodes sp. 3 Plate XIII, Figs. 184-189

Almost mature male 8.4 mm long; labrum, Fig. 187, and mouth parts as in *Thraulodes* sp. 4; maxillary palpal segments 26:30:15; head and thorax brown; incipient wing venation similar to Fig. 206; femora with brown and yellow pattern; small femoral spines acute, Fig. 184, rather than ovate as *Thraulodes* sp. 1 and sp. 2; femora and tibiae haired; claw as in Fig. 186; abdomen brown; lateral spines 2-9; gills bilamellate, lanceolate-acuminate; lateral tracheae present, Fig. 189; gills appear narrower and longer than *Thraulodes* sp. 1; gill 7, .9 mm long (.5 mm on *Thraulodes* sp. 1); cerci broken; cercal hairs long, thick, Fig. 188.

Material examined. — PUENTE PEREZ — 1 ♂.

Thraulodes sp. 4 Plate XIV, Figs. 190-198

This species superficially resembles *Thraulodes* sp. 1 but the gills lack lateral tracheal branches, the integument is darker and more glabrous and the abdominal sternites are darker.

Nearly mature male and female 6.6 mm; labrum three times as wide as long; mouth parts, Figs. 195, 197, 198; maxillary palpus 20:25:16; labial palpus 32:32:10; head and thorax shining dark red-brown; wing pads brown, incipient wing venation similar to Fig. 206; femora brown and white patterned, with lateral line; femora and tibiae haired; spines as in Figs. 191-194; abdomen shining red-brown; not lighter laterally; lateral spines on 2-9, small on 2-5; gills, Fig. 190, bilamellate on segments 1-7; no lateral tracheal branches; main trachea, blackish purple; lamellae subequal; abdominal sternites light brown; last two dark red-brown; lighter sternites with lateral, longitudinal darker marks; section of cercus, Fig. 196.

Material examined. — BELLA — 2 ♀. MONZÓN — 3 ♀. RONDOS — 4 ♂, 9 ♀.

Thraulodes ? sp. 5 Plate XIV, Figs. 199-208

This rather small species is placed in *Thraulodes* in spite of having lateral spines on abdominal segments 6-9 rather than 2-9. In Traver's (1944) key, it would run to *Atalophlebioides*. It differs from the latter in lacking the median depression of the labrum figured by both Phillips (1930) and Ulmer (1904) and in the spines of the femora which are blunt and expanded both on the edges and on the disc. Ulmer describes these spines as being sharp, while Phillips' figures of *A. cromwelli* show narrow sharp spines on the disc rather than the globose spines possessed by this species. The claw also differs from those figured by the aforementioned authors. The forewing venation, Fig. 206, and the shape of the hind wing, Fig. 207, are like *Thraulodes* and it is on this basis, as well as the labrum and shape of the femoral spines, that it is placed in *Thraulodes*. The venation of the hindwing could not be discerned.

Nearly mature female nymph 4.8 mm, male 4.5 mm; labrum, Fig. 200, just below three times as wide as long; mouth parts, similar to *Thraulodes* sp. 4; maxillary palpus segments in ratio 15:17:11; labial palpus 20:21:7; labrum and head black-brown; thorax and wing pads brown; legs light, femora slightly expanded; spines as in Figs. 202, 205; claw as in Fig. 201; femora and tibiae haired; abdomen brown; lateral spines 5 or 6-9; gills, Fig. 203, 204, on segments 1-7 bilamellate, lanceolate-acuminate; no lateral tracheal branches; cerci 5.4 mm long, very hairy, Fig. 199.

Material examined. — RONDOS — 3 ♂, 9 ♀. TULUMAYO rapids — 1 ♂. BELLA — 2 ♂.

Thraulodes sp. 6 Plate XV, Figs. 209-213

This species resembles *Thraulodes* sp. 2 but differs in lacking lateral branches on the gill tracheae and in the body color pattern.

Nymphs 5.4 mm; mouth parts and labrum as in *Thraulodes* sp. 2 or 4; head dark brown; mandibles light; pronotum yellow, brownish anteriorly; mesonotum and wing pads marked as in Fig. 211; legs as in *Thraulodes* sp. 2; spines, Figs. 216, 217, and claw, Fig. 210; abdominal tergites 1-3 brown infuscated; 4, 5 yellow; 6, 7 red-brown; 8-10 light reddish-yellow; gills, Fig. 209, on 1-7 bilamellate, lanceolate-acuminate; no lateral tracheal branches; cerci broken.

Material examined. — RONDOS — 1 ♂, 1 ♀.

TRAVERELLA Edmunds

The following three nymphs agree very well with the characters given for the nymphs of this genus by Edmunds (1948b). *Traverella* sp. 2 and sp. 3 lack gills on segment 7. Careful examination of all the specimens has failed to turn up even the scars of the gill base and the gills appear to be actually missing rather than lost in handling. *Demoulin* (1955d) who has observed the same phenomenon in *Hermanella* (*Hermanellopsis*) sp. suggests that this reduction is only of specific value and I am inclined to agree with him. The nymphs before me also indicate that the presence or size of the clypeal projection and the presence or absence of the maxillary spine are also of only specific value. Many of the Neotropical species formerly assigned to *Thraulus* Eaton fall in this genus (Edmunds 1950b).

Traverella sp. 1 Plate XVI, Figs. 225-229

Female 5.4 mm long; clypeal projection absent; antenna 2.7 mm long; labrum (Fig. 228) about three times as wide as long; maxilla, (Fig. 225) with long spur; ratio of maxillary palpus segments 26:33:35; labrum and head anterior to ocelli light with motted red-brown pigment; darker at and behind ocelli with scattered black pigment, pronotum and mesonotum red-brown; wing pads lighter; forefemur light red-brown with preapical brown cross band; meso and metafemur lighter with preapical cross band; tibiae light, occasionally darkened at base and apex; tarsi light, may show 4-5 indistinct red-brown cross bands; claw as in Fig. 229; abdominal tergites medium to dark red-brown; sterna lighter red-brown; segment 9 with lateral spines; gills as in Figs. 226, 227, lobes of gill 7 subequal; approaching fibrilliform condition, cerci light brown, about 4.9 mm long.

Male 4.2 mm long; head light with overall scattered light red-brown infuscation; pronotum and mesonotum light with some scattered brown pigment; wing pads light; abdominal tergites 1-6, 10, light; tergites 7-9 dark red-brown; legs light; femora with preapical cross band.

Material examined. — NANAY — 11 ♂, 22 ♀. NANAY trap — 5 ♂, 21 ♀.

Traverella sp. 2 Plate XVII, Figs. 230-237

Immature female 5.0 mm long; clypeal projection 1.2 mm long, Fig. 231; labrum similar to *Traverella* sp. 1; maxillary spine .04 mm long; palpal segments in ratio 25:60:30; labial palpus similar to *Traverella* sp. 1; labrum, head, and thorax light with some scattered black pigment; wing pads light; legs light; coxae with some black infuscation; claw, Fig. 232; abdominal tergites 1-5 with some black pigment on each side of midline, 6-9 uniformly black-brown; gills on segments 1-6 bilamellate, fringed, posterior member smaller, Fig. 237; tracheae purplish; no trace of gills on segment 7; lateral spines present on segment 9; median filament 5.4 mm long, light brown; lateral cerci broken.

Material examined. — TULUMAYO — 1 ♀.

Traverella sp. 3 Plate XVII, Figs. 233-238

Female 6.6 mm long; male about 5.0 mm long; antenna 2.0 mm long; labrum about three times as wide as long; clypeal spur .24 mm long, Fig.

238; maxillary spur lacking, Fig. 234; palpal segments in 20:75:40 ratio; labial palpal segments in ratio 40:33:33; head, thorax, and legs, light brown; claw, Fig. 235; wing pads darker; abdomen medium brown; tergites 1-5 slightly lighter; gills bilamellate, Fig. 236, fringed, slightly purplish; present on segments 1-6, no trace of gill on segment 7; gills of segment 6 almost fibrilliform; lateral abdominal spines on 8 and 9, barely present on segment 8; cerci brown, tips broken; female ninth abdominal sternite, Fig. 233.

Material examined. — MONZÓN — 1 ♂, 1 ♀. HUALLAGA — 2 ♀. TULUMAYO rapids — 2 ♀.

HERMANELLA

HERMANELLOPSIS Demoulin

The following species on the basis of its overall body form would fall in this subgenus. The gill shape is slightly aberrant but does not justify the erection of any new group.

Hermanella (Hermanellopsis) sp. Plate XVI, Figs. 220-224

Female 7.8 mm long; head, 1.8 mm long; antenna at least 4.2 mm long; labrum about three times as wide as long; apex of left mandible, Fig. 223; maxilla with spur, Fig. 220; maxillary palpal segments in ratio 25:92:37; labial palpal segments in ratio 45:50:34; head, thorax, and abdomen brown; basal abdominal tergites lighter; femora expanded, densely spined; ground color blackish, light lateral line present; tibiae and tarsi light; claws, Fig. 224, preapical tooth larger; gills bilamellate purplish, on segments 1-7; lamellae subequal; lanceolate in form with an apical filament, Figs. 221, 222, indentations at base of filament (found in other forms described in this genus) lacking; only a median trachea indicated; cerci brown, 12.6 mm long; median cercus slightly longer; lateral spines on abdominal segments 8-9.

Material examined. — PUENTE PEREZ — 7 ♂.

HOMOTHRAULUS Demoulin

This is the nymph given as *Thraulus ally* by Traver (1944). The nymph described below belongs in this genus.

Hemothraulus sp. Plate XV, Figs. 214-219

Female 4.2 mm long, male 3.6 mm long, both immature; antenna about 1.5 mm long; head, Fig. 214; labrum narrow with single point in the median depression; mouth parts as in Figs. 216, 218; maxillary palpus ratio 28:22:15; small spur .049 mm long at apex of maxilla; labial palpus 28:30:6; head and body light with some scattered black infuscation; legs light, femora relatively bare; claw, Fig. 215; femora and tibiae with occasional dark spot; gills on abdominal segments 1-7 bilamellate, very deeply fringed, Figs. 217, 219; posterior lamella larger than anterior; lamellae purplish apically; lateral spines on abdominal segments 3-9; cerci light, broken.

Material examined. — NANAY trap — 1 ♂, 1 ♀.

Genus nr. ADENOPHLEBIA Eaton

The specimens placed here are clearly related to the South African genera *Aprionyx* Barnard and *Adenophlebia* Eaton. Dr. A. Harrison of the University College of Rhodesia, Nyasaland, who has examined my material suggested that they are closer to the latter genus. The baetid-like cerci, the shape of the labrum and labium, the general shape and tracheation of the gills and the overall body form are common to both the South American and African forms; the wing venation of the South American specimens Fig. 248, as far as it could be discerned, is similar to the African species and show the dark heavy subcosta and radius possessed by the *Adenophlebia* species from South Africa. They differ in that the Peruvian forms have a toothed claw, Fig. 241; simple lateral abdominal spines, Fig. 246; a longer third segment of the labial palpus and slightly shorter glossae.

Genus nr. **Adenophlebia** sp. 1 — Plate XVIII, Figs. 239-246

Nymphs, nearly mature, 7.8 mm long; labrum twice as wide as long, Fig. 243, roughly quadrate, with antero-mesal depression; labium as in Fig. 244; maxillary palpus 15:15:9; labial palpus 23:19:14; detail of apical segment, Fig. 244A; head and thorax light brown; wing pads light; legs with femora light, slightly expanded, not hairy, with scattered pointed spines; tibiae and tarsi colored as femora or slightly darker; claw, Fig. 241; abdomen, mottled yellow-brown, Fig. 242; lateral spines on 8, 9, Fig. 246; and possibly small spines on 6, 7; spines not bifid; spines along caudal margins of tergites 5-10; none on 1-4; gills 1-7 bilamellate, Figs. 239, 240, ovate to lanceolate acuminate; only 3, 6, 7 present on specimens; tracheae generally branched, though branches are fragmentary and not pigmented at bases, Fig. 239; absent on gill 7 of one specimen; lower lamella shorter than upper; atrophic gills often present; long hairs on inner sides of cerci and on both sides of median filament; basal 1.2 mm of cerci and hairs darker brown; long hairs extend to 2.4 mm from base; ninth abdominal sternite of male, Fig. 245.

Material examined. — RONDOS — 4 ♂. BELLA — 2 ♂, 5 ♀.

Genus nr. **Adenophlebia** sp. 2 — Plate XVIII, Figs. 247, 248

Female, 5.0 mm; like Genus nr. *Adenophlebia* sp. 1 in structure and color except that lateral spines are present on abdominal segments 5-9 and the gills are proportionally narrower than in the previous species; only gills 4 and 5 present on specimen, gill 4 .85 mm, Fig. 247; gill 5, .80 mm.

Material examined. — BELLA — 1 ♀.

Genus nr. **Adenophlebia** sp. 3 — Plate XIX, Figs. 249-254

Mature female 6.0 mm; male 5.4 mm; labrum, Fig. 252, 1.8 times as wide as long; six denticles in antero-mesal depression; mouth parts, Figs. 253, 254; maxillary palpus 17:14:10; labial palpus 22:20:12; head and thorax light brown; thoracic color of subimago (yellow and brown) visible; folded wing inside wing pad appears black; legs light; forefemora appear darker and slightly expanded (color apparently due to color of legs of subimago); meso and metafemora light, not expanded; tibiae and tarsi light; claw, Fig. 251;

abdomen red-brown; lateral spines on 3-9; caudal margins of segments 5-10 with spines; gills, Figs. 249, 250, bilamellate, ovate acuminate; with long narrow apex.

Material examined. — PUENTE PEREZ — 2 ♂, 5 ♀.

Genus nr. **Adenophlebia** sp. 4 Plate XIX, Figs. 255-259

Female 7.2 mm; head hypognathous; labrum brown, twice as wide as long, slightly depressed antero-mesally, some shallow denticles, Fig. 256, in depression; left mandible, Fig. 259; maxillary palpus 18:12:11; labial palpus 25:20:15; apical segment with inner edge toothed, Fig. 244A; thorax brown; legs light; forefemora slightly expanded; tibiae and tarsi light; claw, Fig. 255; abdomen brown; some black pigment under integument; arranged in longitudinal bands on each side of midline on segments 2-8, convergent on 6-8; lateral spines on 8, 9, simple; gills on 1-6 bilamellate, Fig. 257; apically truncate and incised on 1; median depression with apical filament; lower lamella about three-quarters length of upper; gill 7, bilamellate, ovate acuminate, Fig. 258, cerci 6.6+ mm; setae typical for genus.

Material examined. — PUENTE PEREZ — 1 ♀.

TRICORYTHIDAE

TRICORYTHODES Ulmer

Tricorythodes sp. Plate XX, Figs. 265-267

Length of largest specimen 4.2 mm; head, pronotum, mesonotum, and abdomen light tan with scattered purplish black pigment, this especially strong on abdomen; body sternites light; legs light, tibiae with some brown basally; claw of foreleg, Fig. 266; teeth very small; triangular gill of segment 2, Fig. 265, with purplish pigment; gills of 3-6, double, platelike, margins entire, Fig. 267; abdomen without strong lateral spines; cerci light; median filament 3.0 mm; cerci 2.6 mm.

Material examined. — BELLA — 2 ♀. TULUMAYO — 4 ♀.

LEPTOHYPHES Eaton

This genus is primarily Neotropical, but extends up into Central America and the South Central United States. The six species into which the Peruvian nymphs seem to fall, were all from the rivers around Tingo Maria.

Leptohyphes sp. 1 Plate XXI, Figs. 268-275

Length 3.9 mm; antenna about 2.1 mm; distal antennal segments subdivided, Fig. 268; labrum, Fig. 273; head and thorax brown with scattered blue-black pigment; wing pads light brown with lateral marginal purplish band; legs light, femora, Figs. 269, 274, only slightly expanded with some black marks, tibiae light; tarsi brown basally; clear; claw, Fig. 275; abdomen light brown with blackish pigment tending to form four longitudinal bands: caudal margins of tergite 2-10 with small spines; disc of 3-7 with elongate scale-like hairs on each side, Figs. 270, 271, gills on 2-6; operculate gill on 2 purplish basally; cerci broken, spines at each joint, Fig. 272.

Material examined. — TULUMAYO — 2 specimens. RONDOS — 1 specimen.

Leptohyphes sp. 2 Plate XXI, Figs. 276-284

Length 4.0 mm (mature specimen); distal antennal segments, Fig. 278, not subdivided; mouth parts, Figs. 277, 283, 284; maxillary palpus 6:2:7; labial palpus 16:4:6; head dark brown; pronotum dark and medium-brown mottled, with antero-lateral humps; immature specimens appear more purplish; mesonotum colored as pronotum; integument of thorax appears punctate; venation of wing from wing pads, Fig. 276; legs dark brown; femora, Figs. 280, 282, expanded; metafemur with distinct lateral carina, Fig. 282; claw, Fig. 281; abdomen brown; caudal margins of tergites 2-10 with robust brown spines; disc of tergites 3-10 with elongate flat hairs and scale-hairs; best developed on tergite 7; operculate gill on segment 2 almost entirely purple, cerci 4.5 mm long; mesal segments with strong spines at alternate joints, Fig. 279.

Material examined. — RONDOS — 4 specimens. HUALLAGA — 1 specimen. MONZÓN — 3 specimens. BELLA — 2 specimens. TULUMAYO — 5 specimens.

Leptohyphes sp. 3 Plate XXII, Figs. 285-290

Length about 3.7 mm; head light brown with scattered dark pigment; antenna with distal segments not subdivided; labrum and mouth parts, as in *Leptohyphes* sp. 1 and sp. 2; maxillary palpus, 7:4:8; labial palpus 17:6:5; pronotum light brown with scattered black pigment, no antero-lateral humps; mesonotum colored as pronotum; wing pads light brown, some pigment laterally; legs light; femora expanded; forefemur, Fig. 285; metafemur slightly carinate (Fig. 289) but not as in *Leptohyphes* sp. 2; claw, Fig. 286; abdomen light brown with scattered black pigment; on younger specimens this pigment forms two lateral areas and a darker smaller mesal area; on older specimens the dark areas run together; caudal margins of tergites 2-10 with fine spines; elongate flat hairs, scale-hairs and fine hairs on tergites 3-9; best developed tergite, Figs. 287, 288; operculate gill (Fig. 290) of segment 2 with base, lateral margin, and tip purplish; cerci brown, about 3.6 mm; spined as in Fig. 279.

Material examined. — BELLA — 16 specimens. PUENTE PEREZ — 4 specimens. RONDOS — 3 specimens. TULUMAYO — 1 specimen.

Leptohyphes sp. 4 Plate XXII, Figs. 291-293

Length 4.2 mm; very robust species; general maculation color, antennae, and cerci, Fig. 293, similar to *Leptohyphes* sp. 3; thorax, abdomen, and legs covered with fine, long hair; metafemora, Fig. 291, expanded with extensive purple pigment, non-carinate; tibiae and tarsi lighter; claw, Fig. 292; abdomen with a few scale-hairs among long hairs; caudal spines very small, difficult to discern; operculate gill 2 with basal half and inner margin purple.

Material examined. — PUENTE PEREZ — 3 specimens.

Leptohyphes sp. 5 Plate XXII, Figs. 294, 295

Length 4.8 mm; labrum and mouth parts similar to Figs. 273, 277, 283, 284; head light brown with some scattered dark pigment anterior to eyes; pronotum and mesonotum light brown, slight scattered dark pigment; wing pads light brown; legs light; femora expanded; hind femora barely carinate; claw, Fig. 295; abdomen light brown with scattered black pigment; on tergites 1-4 pigment extends across segment; on 5-10 pigment tends to form four

longitudinal bands, similar to *Leptohyphes* sp. 1; scale hairs, elongate flat hairs, and some fine long hairs present on 2-9; caudal edges of segments appear roughened but no spines could be discerned; semioperculate gill 2 with basal one-third purple; cerci brown; 4.0 mm long; alternate elongate joints with spines as in Fig. 293.

Material examined. — TULUMAYO — 10 specimens.

Leptohyphes sp. 6 Plate XX, Figs. 262, 263

Length 4.2 mm; antennal segments not subdivided; head and labrum light brown; only traces of dark pigment; maxillary palpus 7:3:6 labial palpus 14:5:5; mouth parts similar to Figs. 277, 283, 284; thorax and wing pads light brown; some slight scattered pigment; legs light; femora expanded; hind femora non-carinate; tibiae and tarsi light; claw, Fig. 262; abdomen light brown with sparse purple-black pigment; tergites 5-9 with caudo-mesal protuberances, largest on 8, 9, Fig. 263; semioperculate gill 2 light yellow-brown with a slight amount of dark pigment at the base; abdominal tergites with some scattered scale-hairs; no caudal spine rows on tergites; edge appears rugose; cerci about 3.0 mm.

Material examined. — RONDOS — 6 specimens. RONDOS side pool — 1 specimen. HUALLAGA — 1 specimen.

CAENIDAE

CAENODES Ulmer

Caenodes ? sp. Plate XX, Figs. 260-264

This nymph agrees with the description of the nymph of *Caenodes* as given by Thew (1960). The basal spines on the claw, the strong spines on the triangular ridge of the operculate gill, and the lack of a submarginal row are common to both. The only difference is that the strong spines are on all arms of the triangular ridge and the disc, rather than on only the mesal arms of the ridge. Thew lists the genus from Africa, Italy, China, Java, Sumatra, and Bali.

Length of female 2.7 mm; antenna 1.9 mm, head light red-brown; whitish behind the eyes; mandible with lateral hairs; pronotum and mesonotum light; mesonotum brownish laterally; legs light, scattered purplish pigment, tarsi with faint mesal brown band; meso and metacoxae with lateral spur like projections; claw of forelegs as in Fig. 260; filamentous gill of first abdominal segment .13 mm long; two-segmented operculate gill of segment 2, Fig. 264; quadrate, strong spines on all arms of triangular ridge and some scattered spines on disc, mesal of ridge; no submarginal spines present; gills 3-6, Fig. 261; single, multifringed gills with scattered purplish pigment; pronounced, flat lateral spines (Fig. 264) on 3-9; abdomen compact, light with some scattered blackish pigment; cerci missing.

Material examined. — AMAZONAS trap — 1 ♀.

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* Not seen

APPENDIX

A few adults were collected at light. Unfortunately most were females and could not be placed to species. I am indebted to Dr. Lewis Berner of the University of Florida, for the determinations.

Spaniophlobia trailiae Eaton — 2 ♂, 1 ♀, Iquitos, October 18-20, 1955 (at light).

Campsurus sp. 1 — 3 ♀, same date as above.

Campsurus sp. 2 — 3 ♀, same date as above.

Baetis sp. — 6 ♀ subimagoes, Tingo Maria, September 24-27, 1955 (at light).

Leptohyphes sp. — 7 ♂, 1 ♀, Tingo Maria, September 24-27, 1955 (at light), 3 ♂ retained by Dr. Berner.

PLATE I

Campsurus sp.— Fig. 1 head, lateral view
Fig. 2 egg
Fig. 2A polar filament, dorsal view
Fig. 3 apex of head and mandibles, dorsal
Fig. 4 labium
Fig. 5 maxilla
Fig. 6 claw foreleg
Fig. 7 claw, mesothoracic leg
Fig. 8 claw, metathoracic leg
Fig. 9 foreleg
Fig. 10 mesothoracic leg
Fig. 11 gill 1
Fig. 12 gill 5

Asthenopus ? sp. — Fig. 13 claw of foreleg
Fig. 14 detail of fringed spine at apex of foretibia-tarsus
Fig. 15 apex of head and mandibles, dorsal
Fig. 16 tibia, tarsus, metathoracic leg
Fig. 17 foreleg
Fig. 18 tibia, tarsus, mesothoracic leg

ROBACK: PERUVIAN-AMAZON EXPEDITION

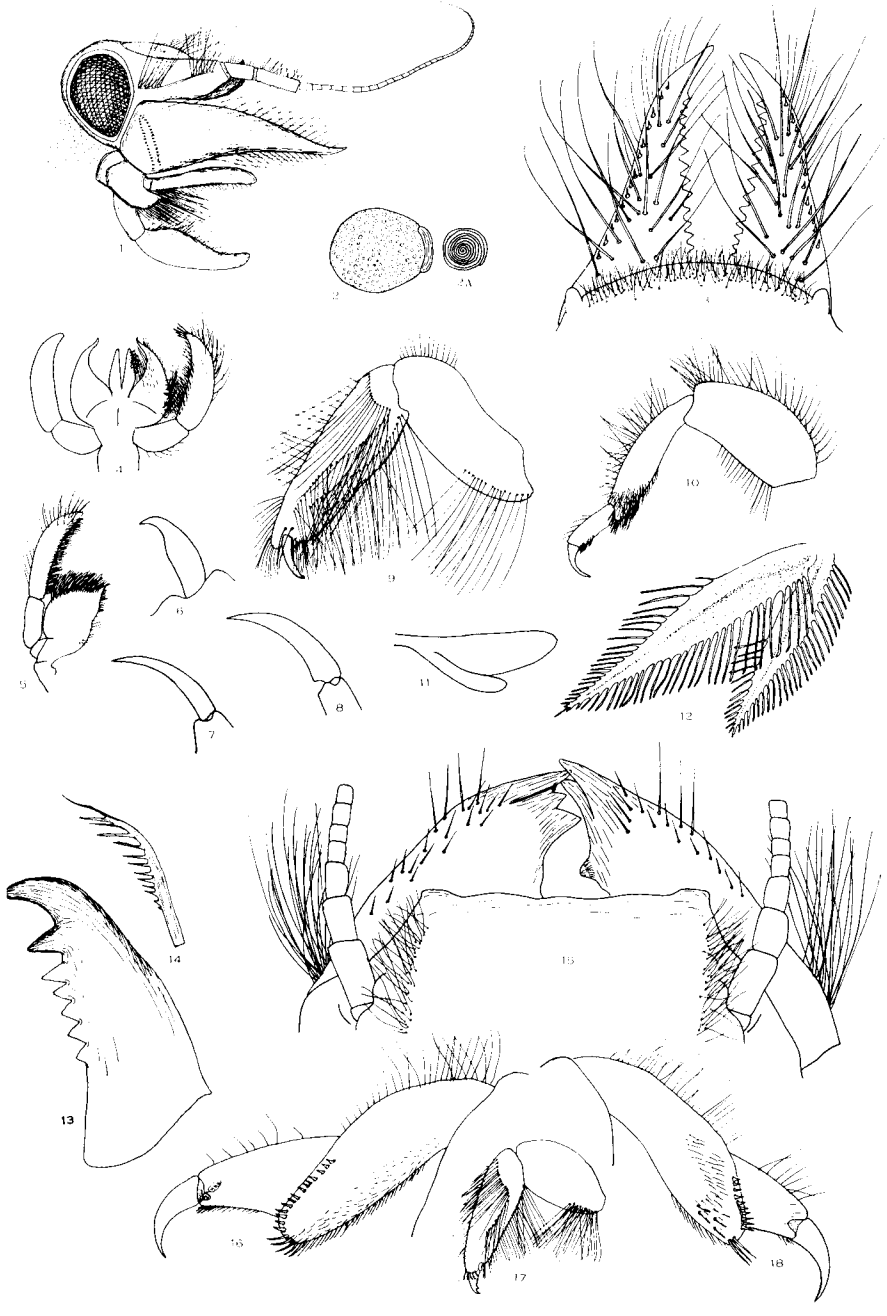

PLATE II

Euthyplocia sp. — Fig. 19 apex of foreleg
Fig. 20 gill 6
Fig. 21 left mandible and base of antenna, dorsal
Fig. 22 egg
Fig. 23 gill 1
Fig. 24 labrum
Fig. 25 maxilla
Fig. 26 right half, labrum
Lachlania sp. 1 — Fig. 27 antennal segment
Fig. 28 head lateral view
Fig. 30 outline of lateral spines of abdomen
Lachlania sp. 2 — Fig. 29 outline of lateral spines of abdomen

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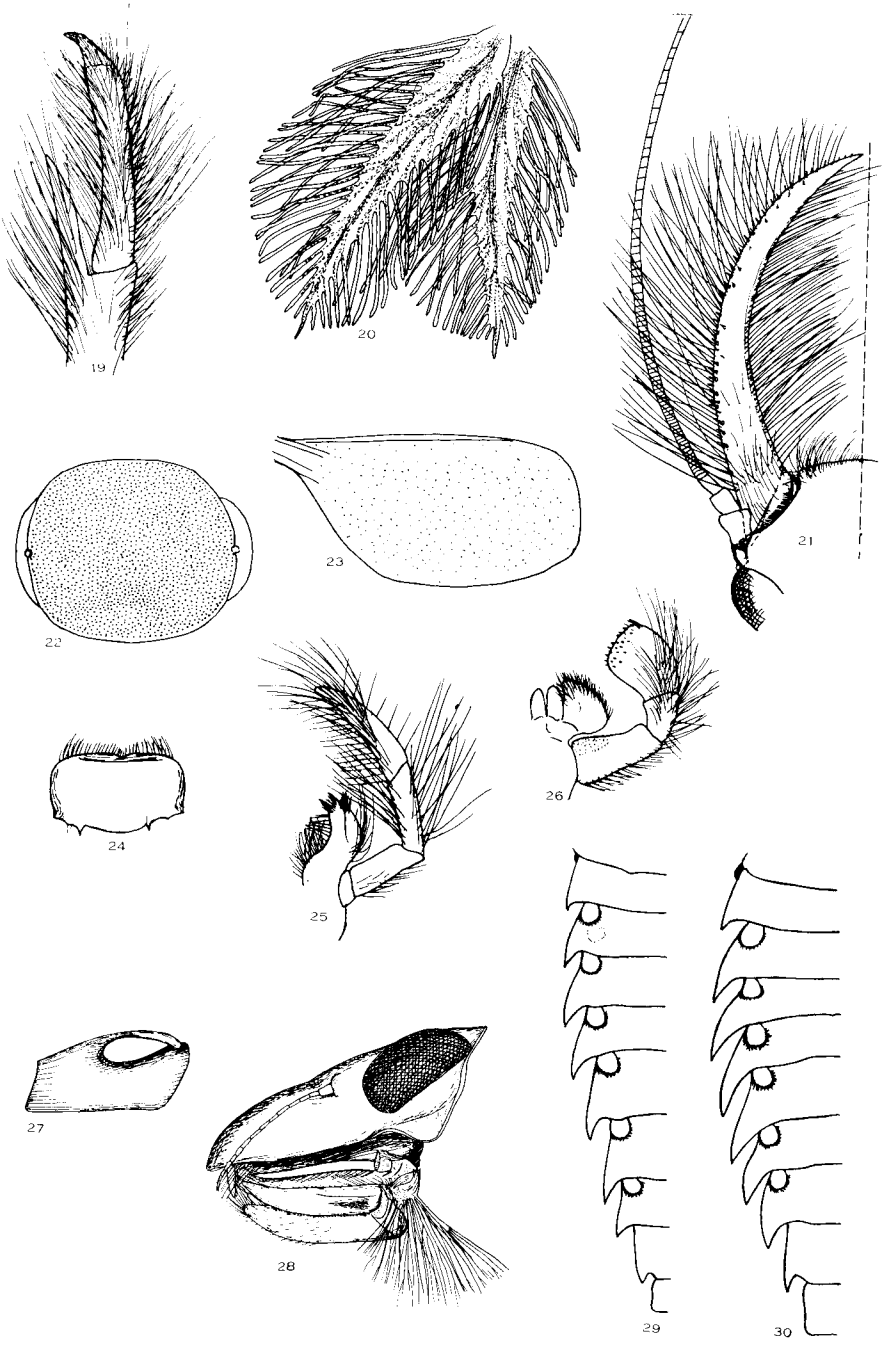

PLATE III

Genus Poss. *Cloeodes* — Fig. 31 labrum
Fig. 32 apex of maxilla, detail
Fig. 33 apex of left mandible, detail
Fig. 34 maxilla
Fig. 35 claw
Fig. 36 labium, left half

Genus nr. *Neocloeon* — Fig. 37 gill 5
Fig. 38 maxilla
Fig. 39 gill 1
Fig. 40 labium, left half

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PLATE IV

Genus 1 nr. *Pseudocloeon* sp. 1 — Fig. 41 labium
Fig. 42 claw
Fig. 43 maxillary palpus
Fig. 44 left mandible
Genus 1 nr. *Pseudocloeon* sp. 2 — Fig. 45 maxilla
Fig. 46 labium, right half
Fig. 47 claw
Genus 1 nr. *Pseudocloeon* sp. 3 — Fig. 48 gill 3
Fig. 49 gill 7
Fig. 50 abdominal tergites 4, 5
Fig. 51 metathoracic leg
Genus 1 nr. *Pseudocloeon* sp. 4 — Fig. 52 labium, left half
Fig. 53 left mandible, apex
Fig. 54 gill 3
Fig. 55 gill 7

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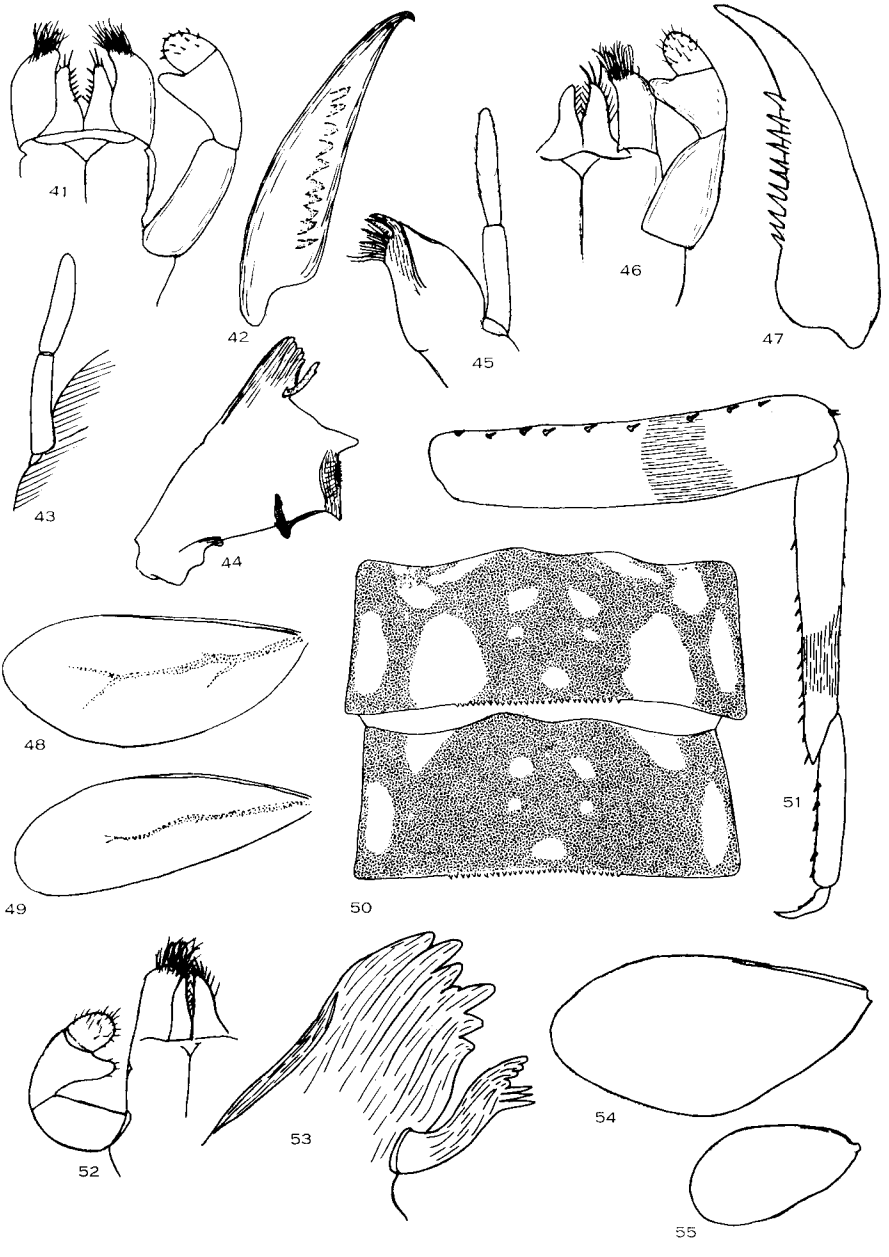

PLATE V

Genus 1 nr. *Pseudocloeon* sp. 5 — Fig. 56 labrum
Fig. 57 gill 3

Genus 2 nr. *Pseudocloeon* — Fig. 58 apex of left mandible
Fig. 59 gill 1
Fig. 60 gill 3
Fig. 61 claw
Fig. 62 maxillary palpus
Fig. 63 labial palpus

Genus 3 nr. *Pseudocloeon* — Fig. 64 labium, right half
Fig. 65 gill 4
Fig. 66 claw
Fig. 67 apex of maxilla
Fig. 68 maxilla
Fig. 69 apex of left mandible

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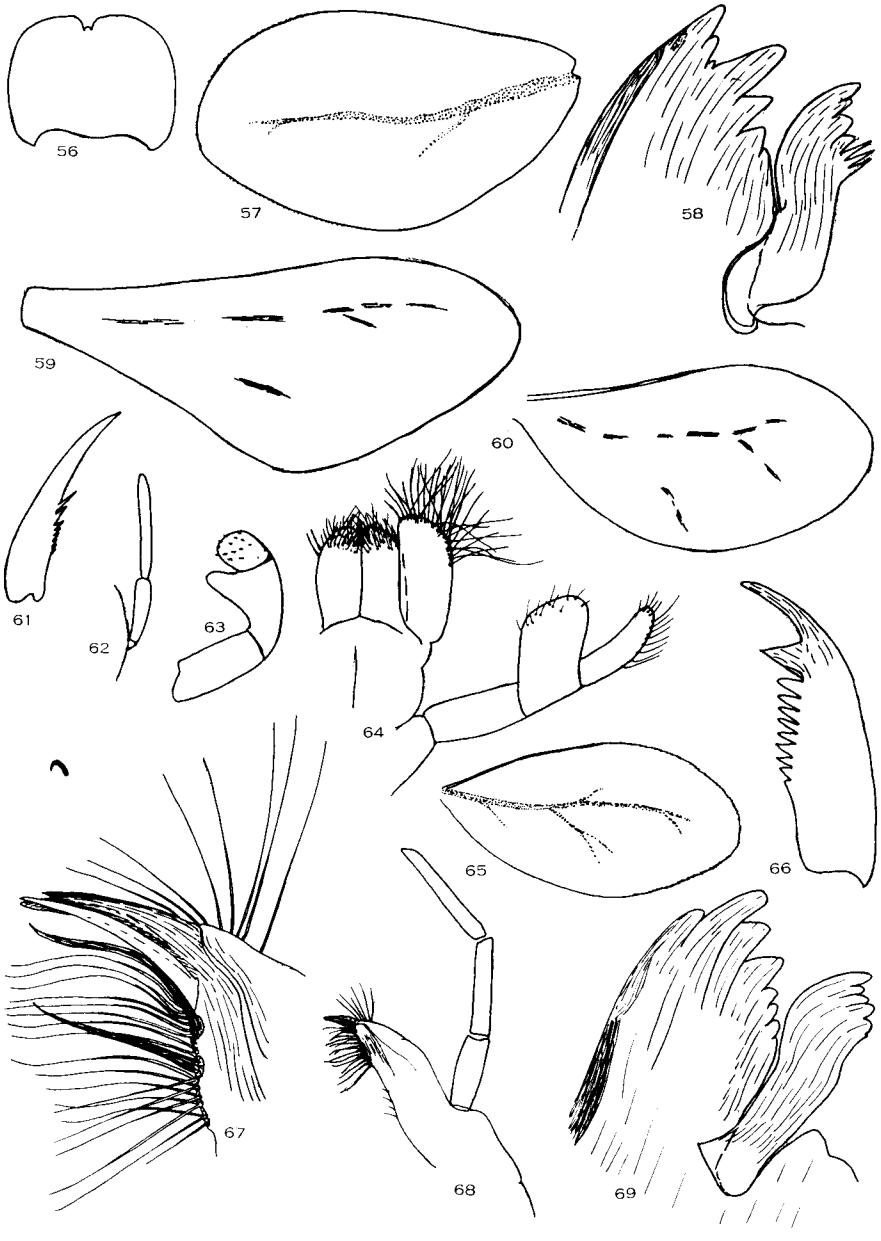

PLATE VI

Genus nr. *Baetis* — Fig. 70 labium, left half
Fig. 71 claw, dorsal
Fig. 72 right mandible
Fig. 73 maxilla
Fig. 74 labrum
Fig. 75 gill 3

Baetis sp. 1 — Fig. 76 apex of left mandible
Fig. 77 claw
Fig. 78 gill 1
Fig. 79 abdominal tergite 8
Fig. 80 maxilla
Fig. 81 labium, left half
Fig. 82 right mandible
Fig. 83 labrum

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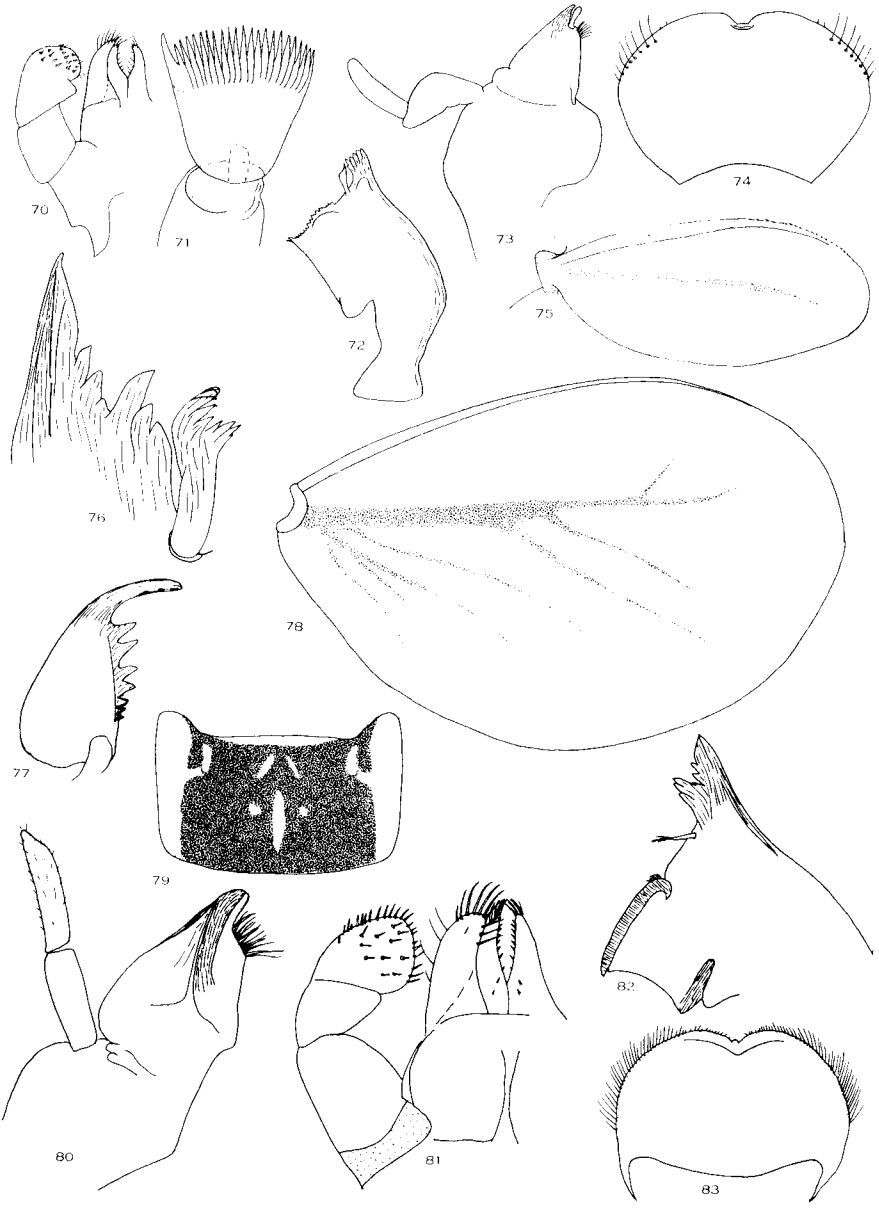


PLATE VII

Baetis sp. 2 — Fig. 84 abdominal tergite 5
Fig. 85 gill 1
Fig. 86 apex of maxilla
Fig. 87 labrum
Fig. 88 claw
Fig. 89 maxilla

Baetis sp. 3 — Fig. 90 abdominal tergites 2, 3
Fig. 91 gill 1
Fig. 92 labium, right half
Fig. 93 claw

Genus nr. *Callibaetis* sp. 2 — Fig. 94 gills 2, 3, dorsal view
Fig. 95 claw

Genus nr. *Callibaetis* sp. 1 — Fig. 96 claw
Fig. 97 labrum
Fig. 98 labium, right half
Fig. 99 gill 1
Fig. 100 gill 4
Fig. 101 gill 6
Fig. 102 gill 7
Fig. 103 maxilla

ROBACK: PERUVIAN-AMAZON EXPEDITION

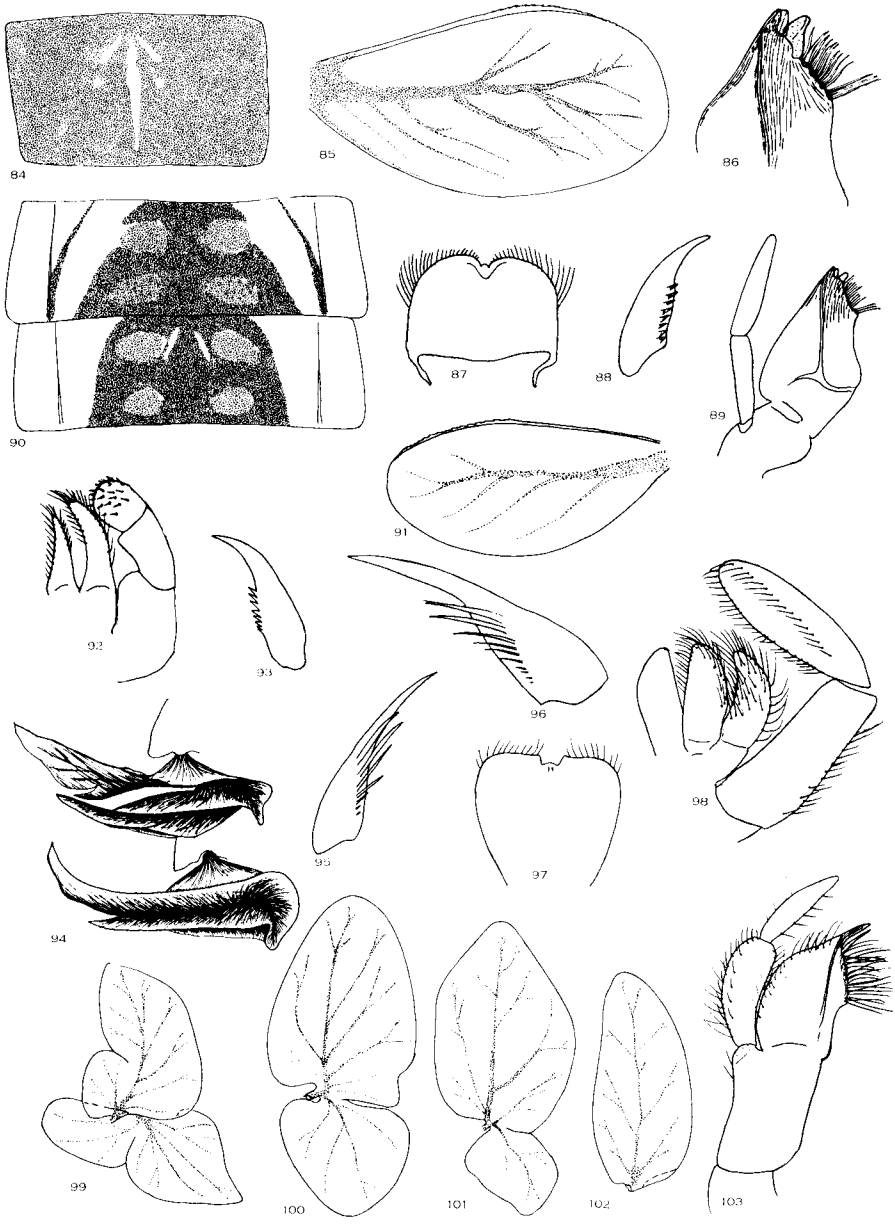


PLATE VIII

Baetodes sp. 1 — Fig. 104 coxal gill
Fig. 105 head scale hair
Fig. 106 sculpturation of abdominal tergites
Fig. 107 abdomen, lateral view
Fig. 108 median filament, lateral view
Fig. 109 head, dorsal view
Baetodes sp. 2 — Fig. 110 abdomen, lateral view
Fig. 111 marginal spine, forefemur
Fig. 112 forefemur
Baetodes sp. 4 — Fig. 113 abdomen, lateral view

ROBACK: PERUVIAN-AMAZON EXPEDITION

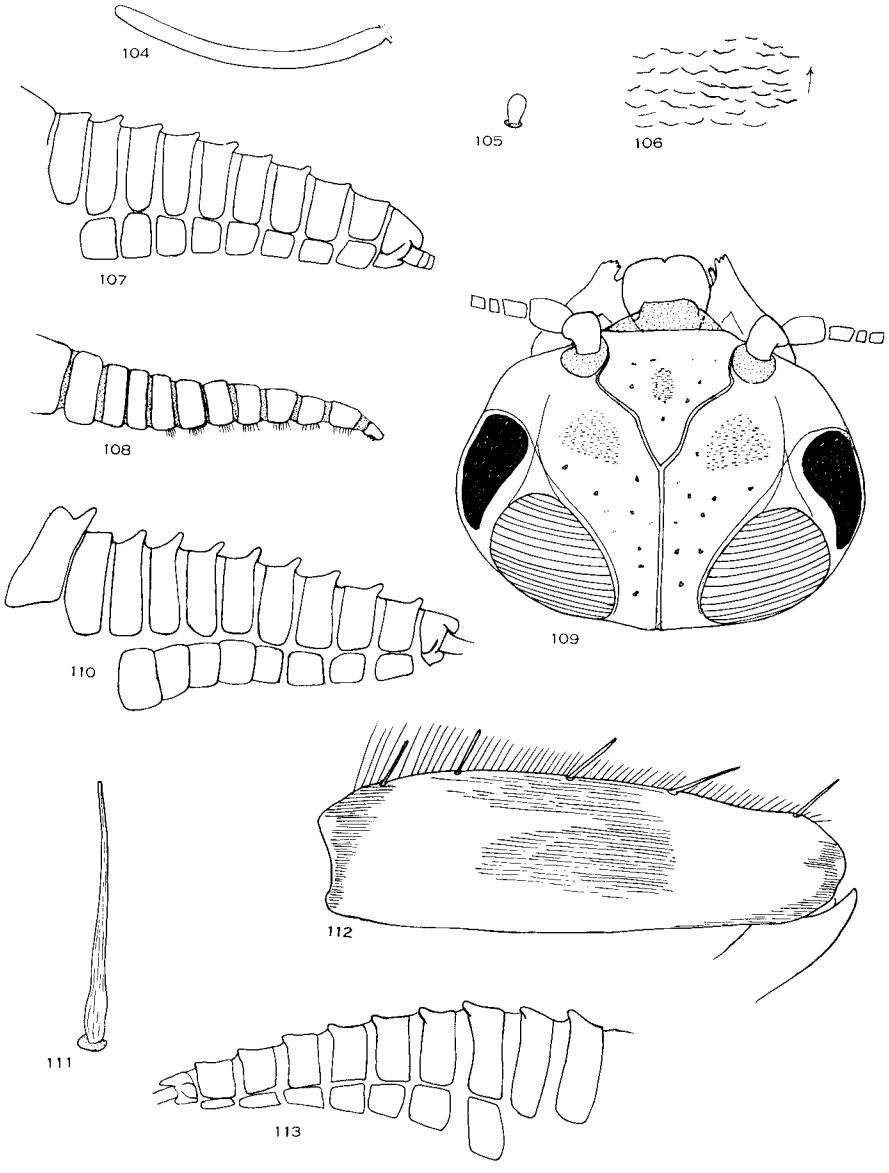
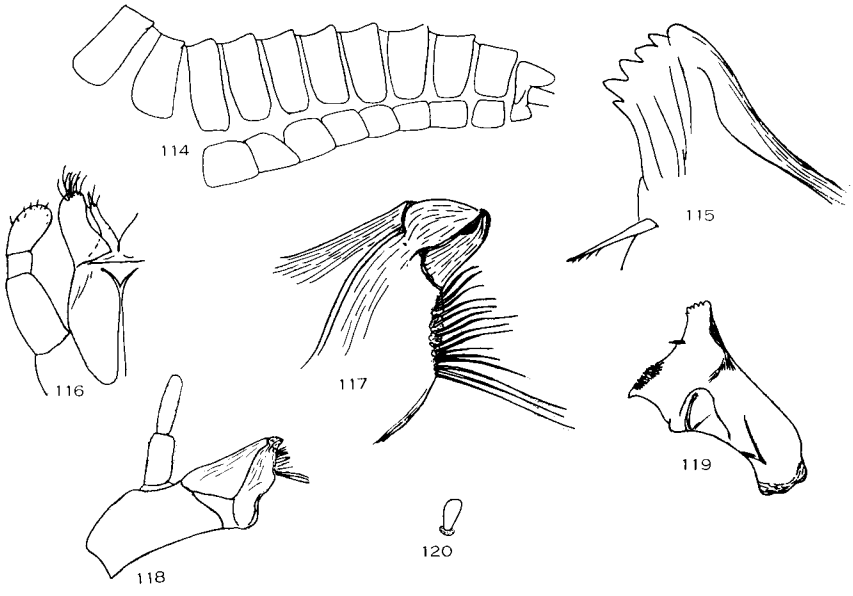


PLATE IX

Baetodes sp. 3 — Fig. 114 abdomen, lateral view
Fig. 115 apex, right mandible
Fig. 116 labium, left half
Fig. 117 apex of maxilla
Fig. 118 maxilla
Fig. 119 right mandible
Fig. 120 thoracic scale hair
Baetodes sp. 5 — Fig. 121 abdomen, lateral view
Fig. 122 sculpturation of abdominal tergites
Fig. 123 coxal gill
Fig. 124 claw
Fig. 125 marginal spine, metafemur

ROBACK: PERUVIAN-AMAZON EXPEDITION



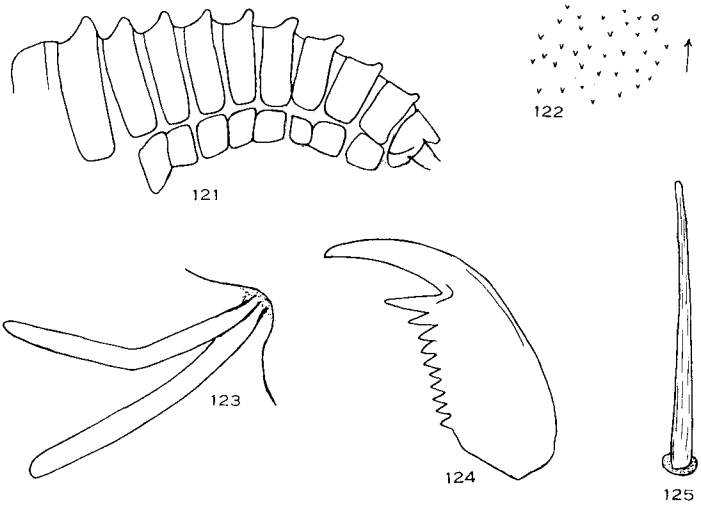


PLATE X

Genus nr. *Atalonella* sp. 1 — Fig. 126 gill 2
Fig. 127 claw
Fig. 128 labrum

Genus nr. *Atalonella* sp. 2 — Fig. 129 gill 3
Fig. 130 gill 6
Fig. 131 discal spine of femur
Fig. 132 ninth abdominal sternite, male
Fig. 133 section of cercus
Fig. 134 head, dorsal
Fig. 135 claw
Fig. 136 metathoracic leg

Genus nr. *Atalophlebia* — Fig. 137 gill 6
Fig. 138 claw
Fig. 139 ninth abdominal sternite, female
Fig. 140 labrum

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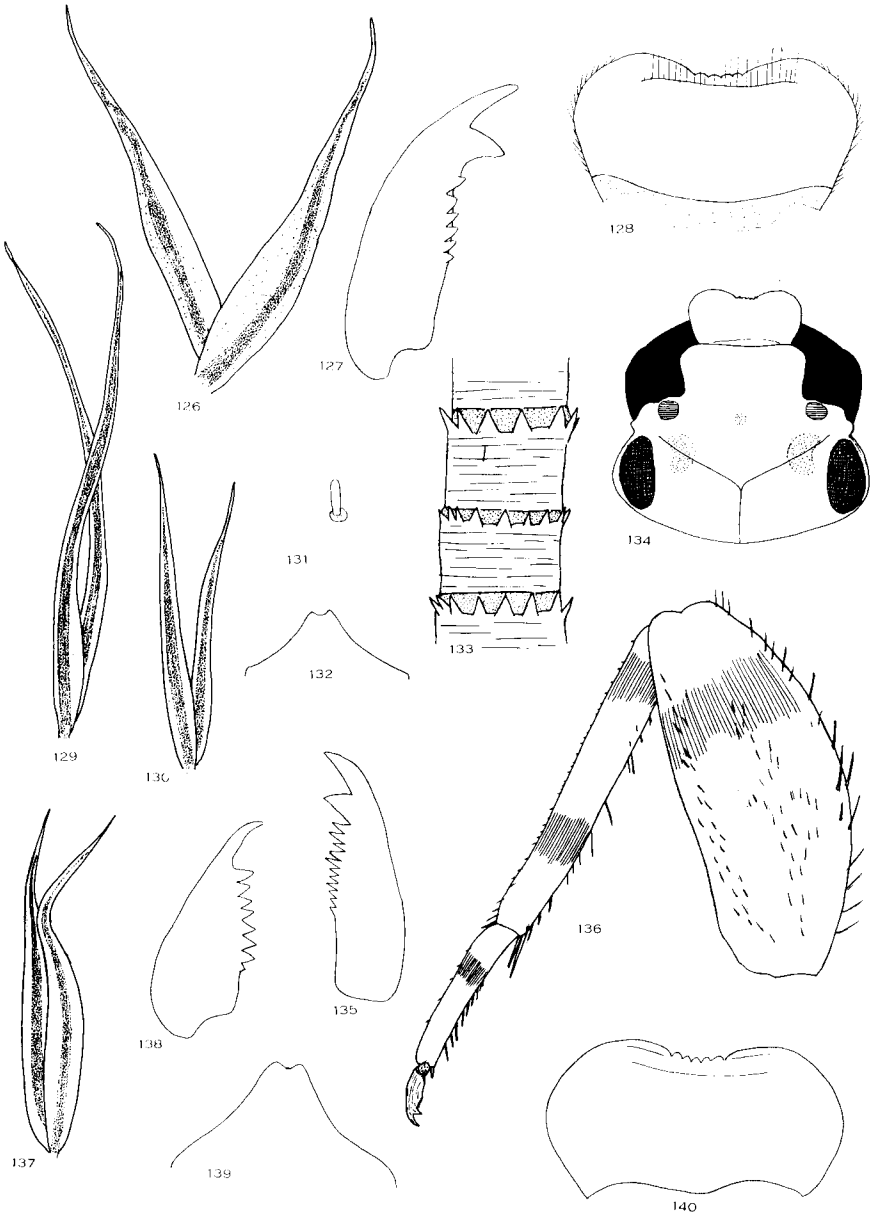

PLATE XI

Genus nr. *Hagenulopsis* sp. 1 — Fig. 141 gill 5
Fig. 142 labrum
Figs. 143, 144 discal spines of femora
Fig. 145 section of cercus
Fig. 146 claw
Fig. 147 apices of glossae
Fig. 148 left mandible

Genus nr. *Hagenulopsis* sp. 2 — Fig. 149 head, dorsal
Fig. 150 labium, left half
Fig. 151 ninth abdominal sternite, male
Fig. 152 detail of last segment of labial palpus

Atalophlebia sp. 1 — Fig. 153 claw
Figs. 154, 155 marginal spines of femora
Fig. 156 gill 7
Fig. 157 labrum
Fig. 158 metafemur
Fig. 159 discal spine of femora
Fig. 160 abdominal tergites 2-5

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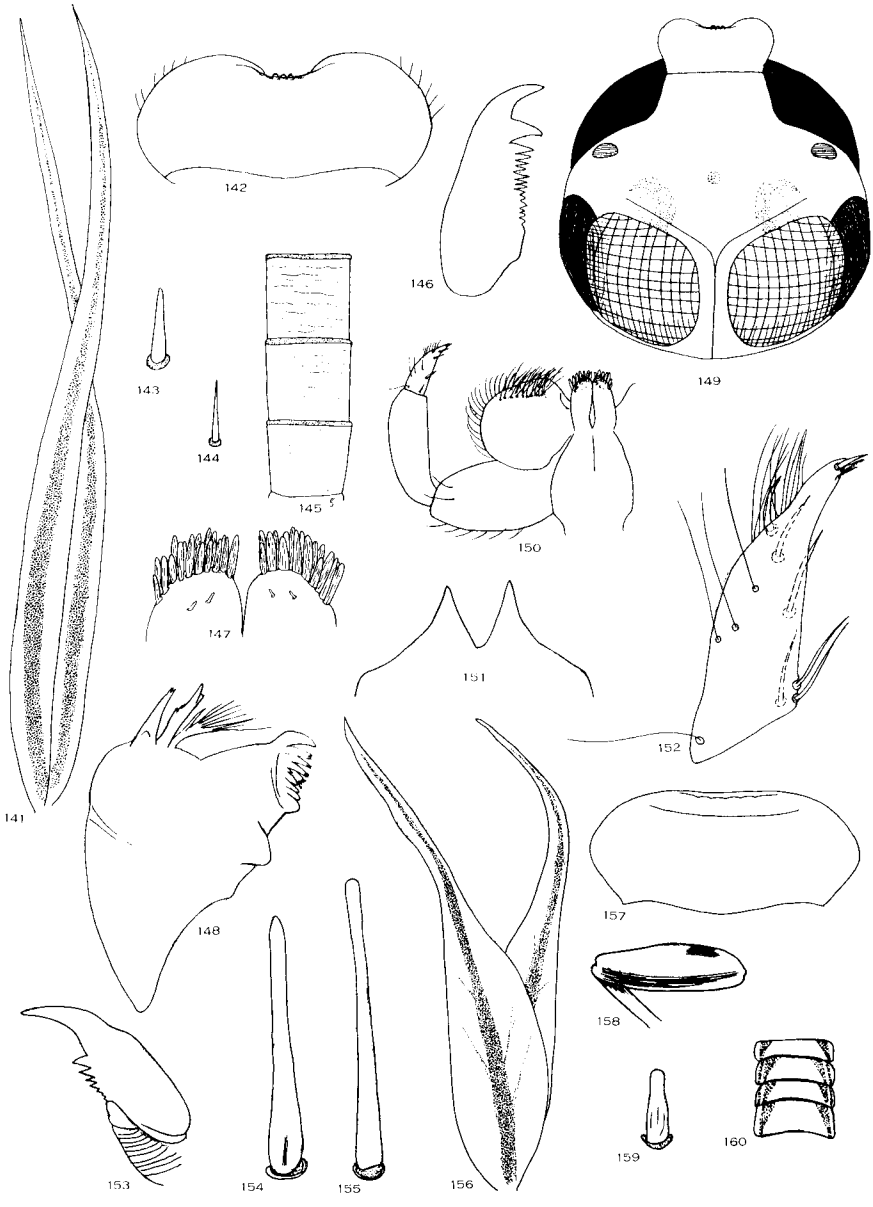

PLATE XII

Atalophlebia sp. 2 — Fig. 161 section of cercus
Fig. 162 claw
Fig. 163 discal spine of femora
Fig. 164 labrum
Fig. 165 marginal spine of femora
Fig. 166 ninth abdominal sternite, female
Fig. 167 gill 7
Fig. 168 gill 1
Atalophlebia sp. 3 — Fig. 169 labium, left half
Fig. 170 gill 2
Fig. 171 left mandible
Fig. 172 labrum
Fig. 173 gill 7

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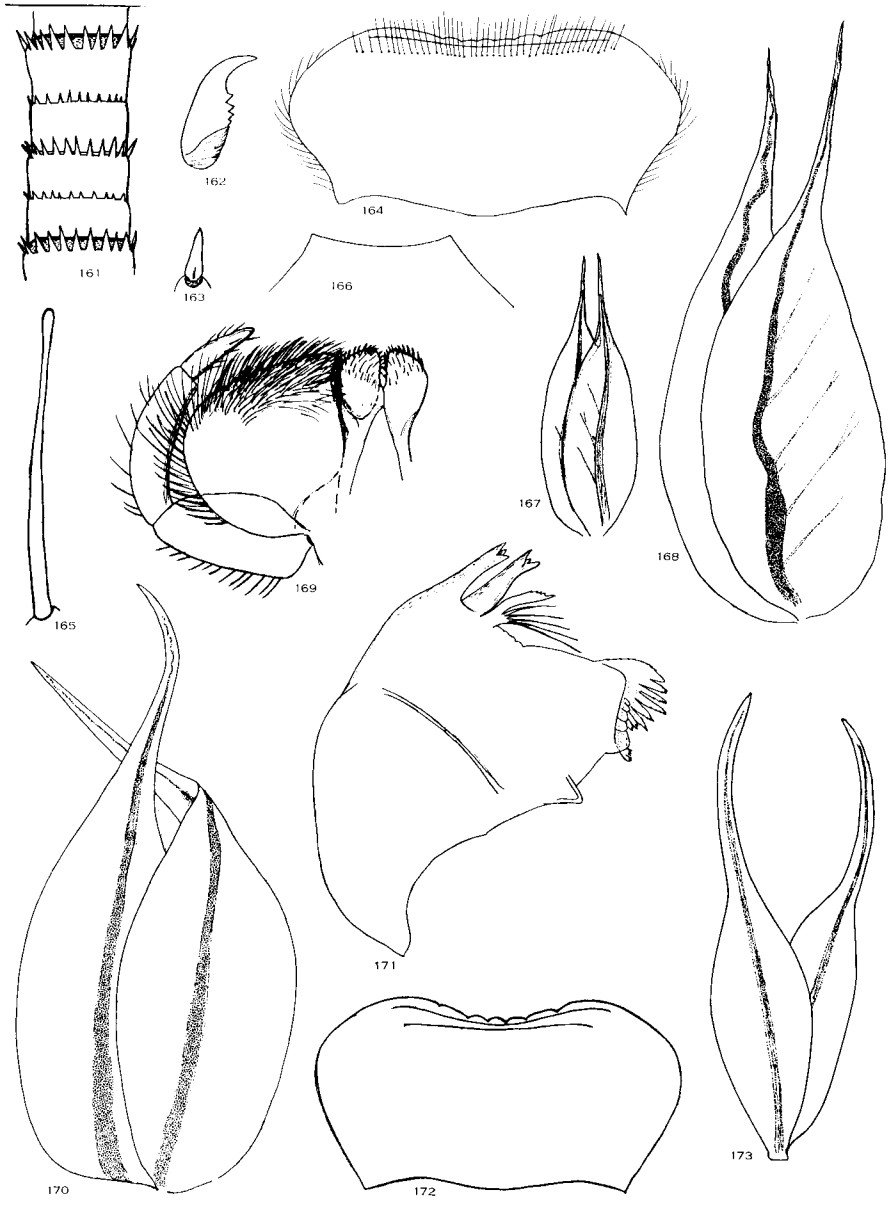

PLATE XIII

Thraulodes sp. 2 — Fig. 174 head, male, dorsal
Fig. 175 discal spine of femora
Fig. 176 marginal spine of femora
Fig. 177 section of cercus
Fig. 178 apical segment of maxillary palpus
Fig. 179 color pattern, mesothorax and wing pads
Fig. 180 ninth abdominal sternite, female
Fig. 181 ninth abdominal sternite, male
Thraulodes sp. 1 — Fig. 182 gill 7
Fig. 183 gill 1
Thraulodes sp. 3 — Fig. 184 discal spine of femora
Fig. 185 marginal spine of femora
Fig. 186 claw
Fig. 187 labrum
Fig. 188 section of cercus
Fig. 189 gill 5

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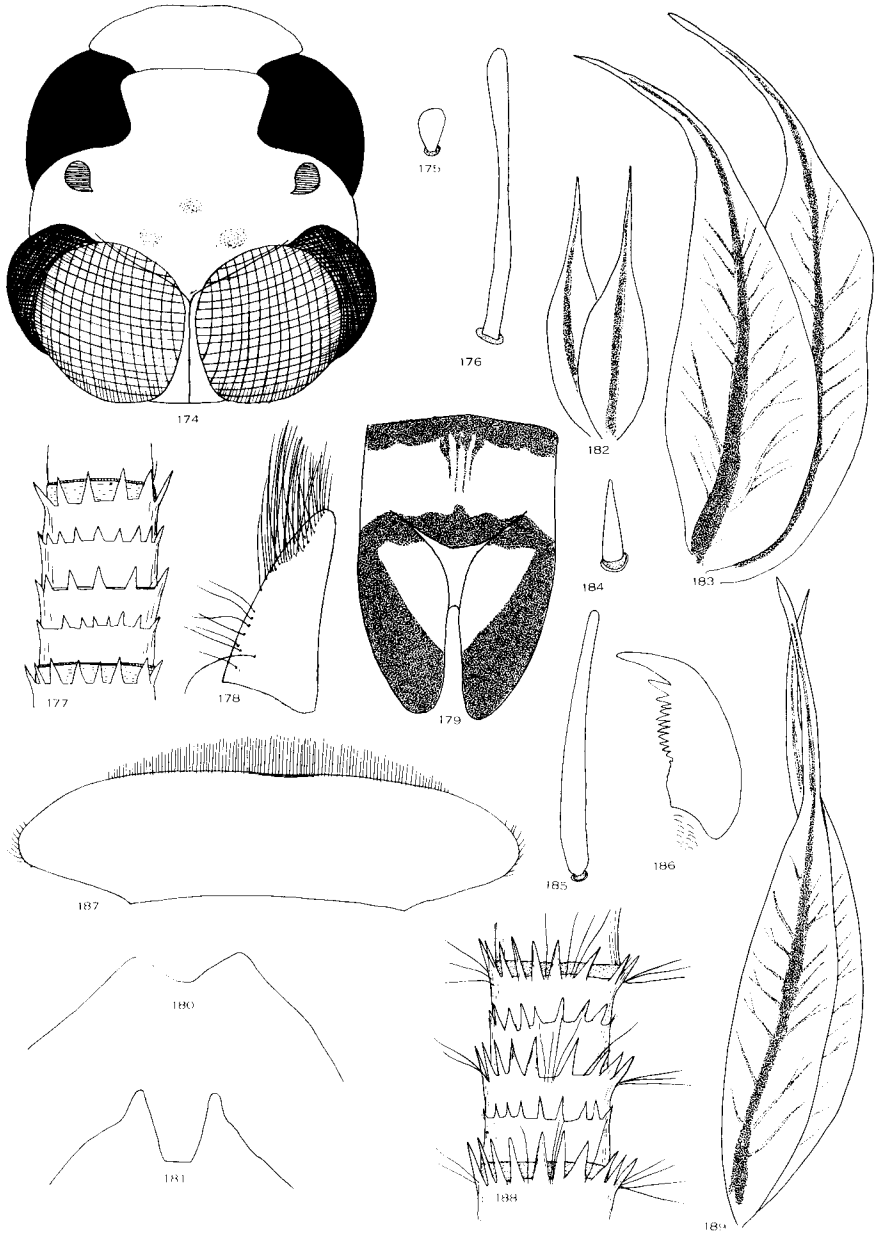

PLATE XIV

Thraulodes sp. 4 — Fig. 190 gill 1
Figs. 191, 192 discal spines of femora
Figs. 193, 194 marginal spines of femora
Fig. 195 left mandible
Fig. 196 section of cercus
Fig. 197 apex of maxilla
Fig. 198 labium, right half

Thraulodes sp. 5 — Fig. 199 section of cercus
Fig. 200 labrum
Fig. 201 claw
Fig. 202 marginal spine of femora
Fig. 203 gill 2
Fig. 204 gill 7
Fig. 205 discal spine of femora
Fig. 206 venation of nymphal forewing pad
Fig. 207 outline of nymphal hindwing pad
Fig. 208 ninth abdominal sternite, female

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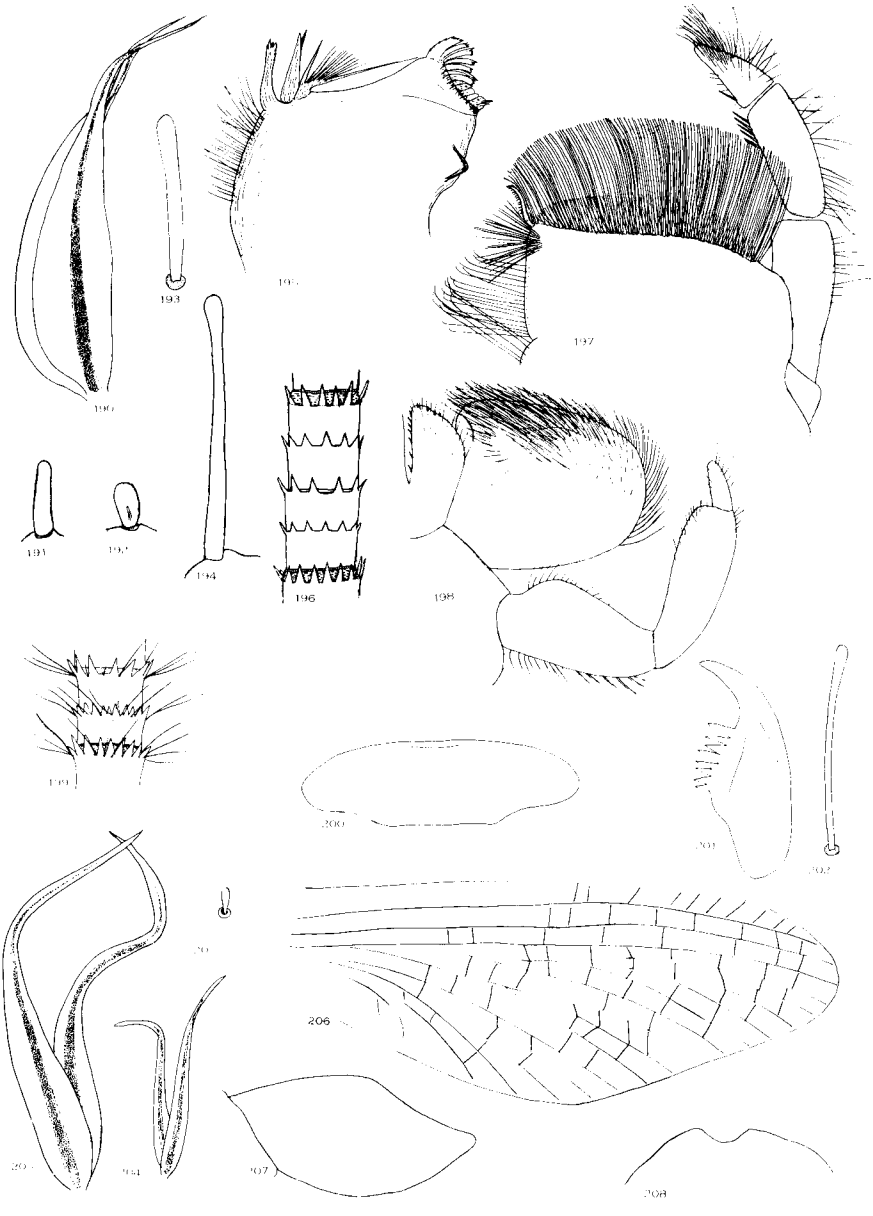

PLATE XV

Thraulodes sp. 6 — Fig. 209 gill 5
Fig. 210 claw
Fig. 211 color pattern, mesonotum and wing pads
Fig. 212 discal spine of femora
Fig. 213 marginal spine of femora

Homothraulus sp. — Fig. 214 head, female, dorsal
Fig. 215 claw
Fig. 216 right mandible
Fig. 217 gill 7
Fig. 218 labium, right half
Fig. 219 gill 1

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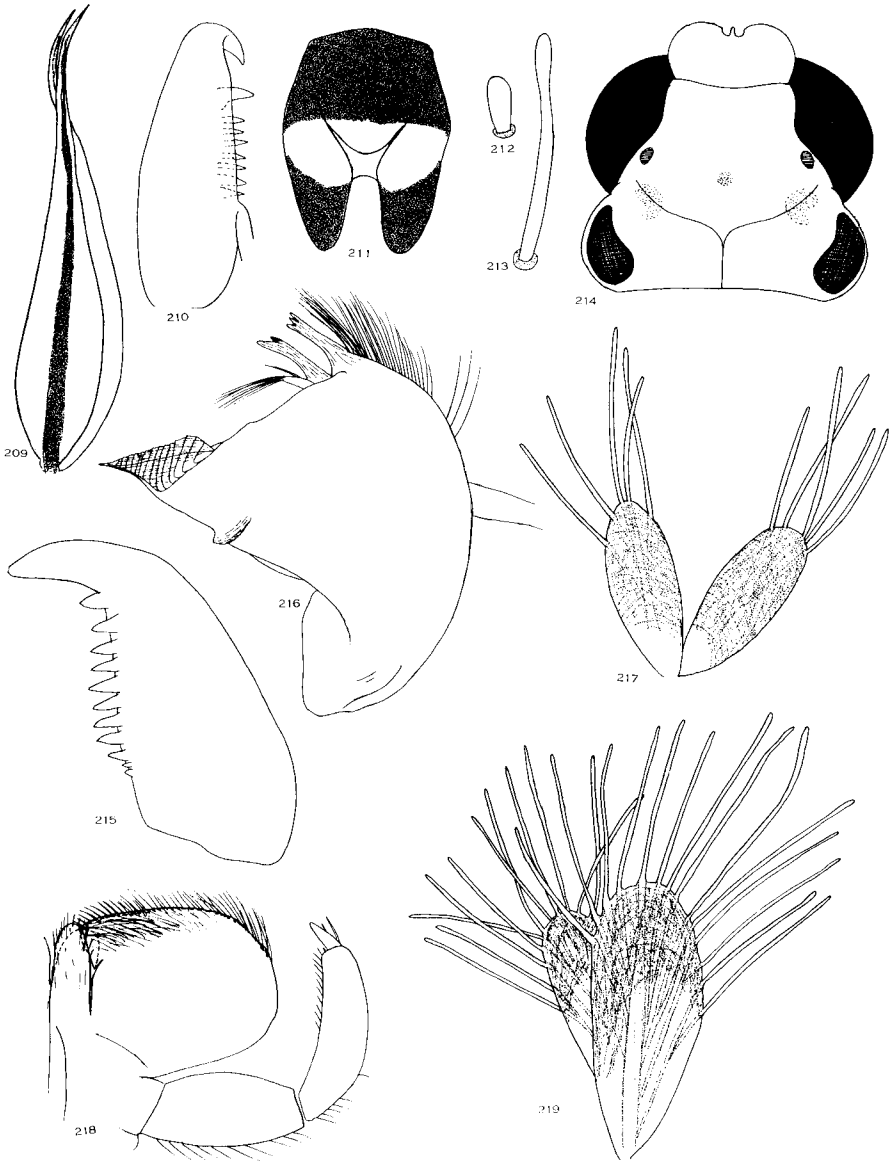

PLATE XVI

Hermanella (*Hermanellopsis*) sp. — Fig. 220 spine of maxilla
Fig. 221 gill 1
Fig. 222 gill 7
Fig. 223 apex, left mandible
Fig. 224 teeth of claw

Traverella sp. 1 — Fig. 225 spine of maxilla
Fig. 226 gill 7
Fig. 227 gill 6
Fig. 228 head, male, dorsal
Fig. 229 claw

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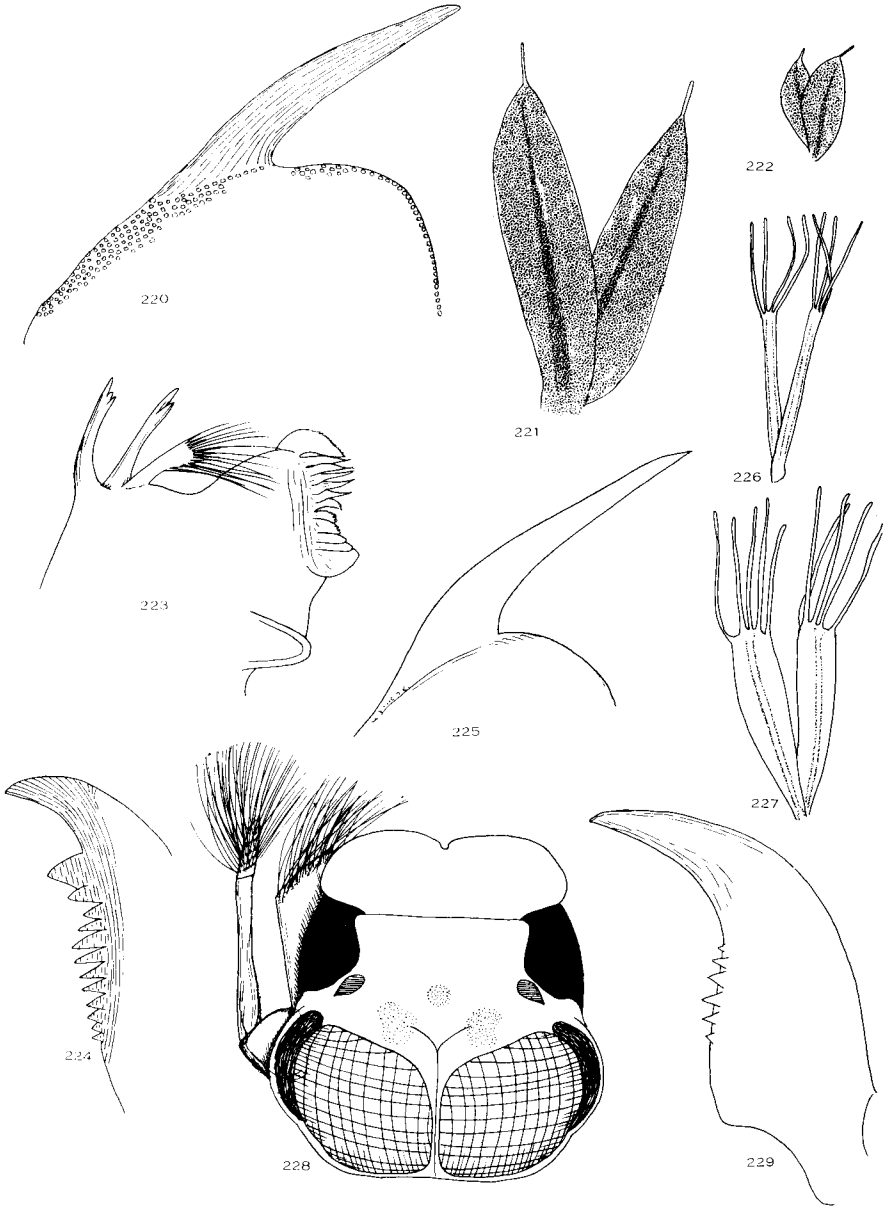

PLATE XVII

Traverella sp. 2 — Fig. 230 spine of maxilla
Fig. 231 head, female, lateral
Fig. 232 claw
Fig. 237 gill 3

Traverella sp. 3 — Fig. 233 ninth abdominal sternite, female
Fig. 234 apex of maxilla
Fig. 235 teeth of claw
Fig. 236 gill 1
Fig. 238 head, female, dorsal

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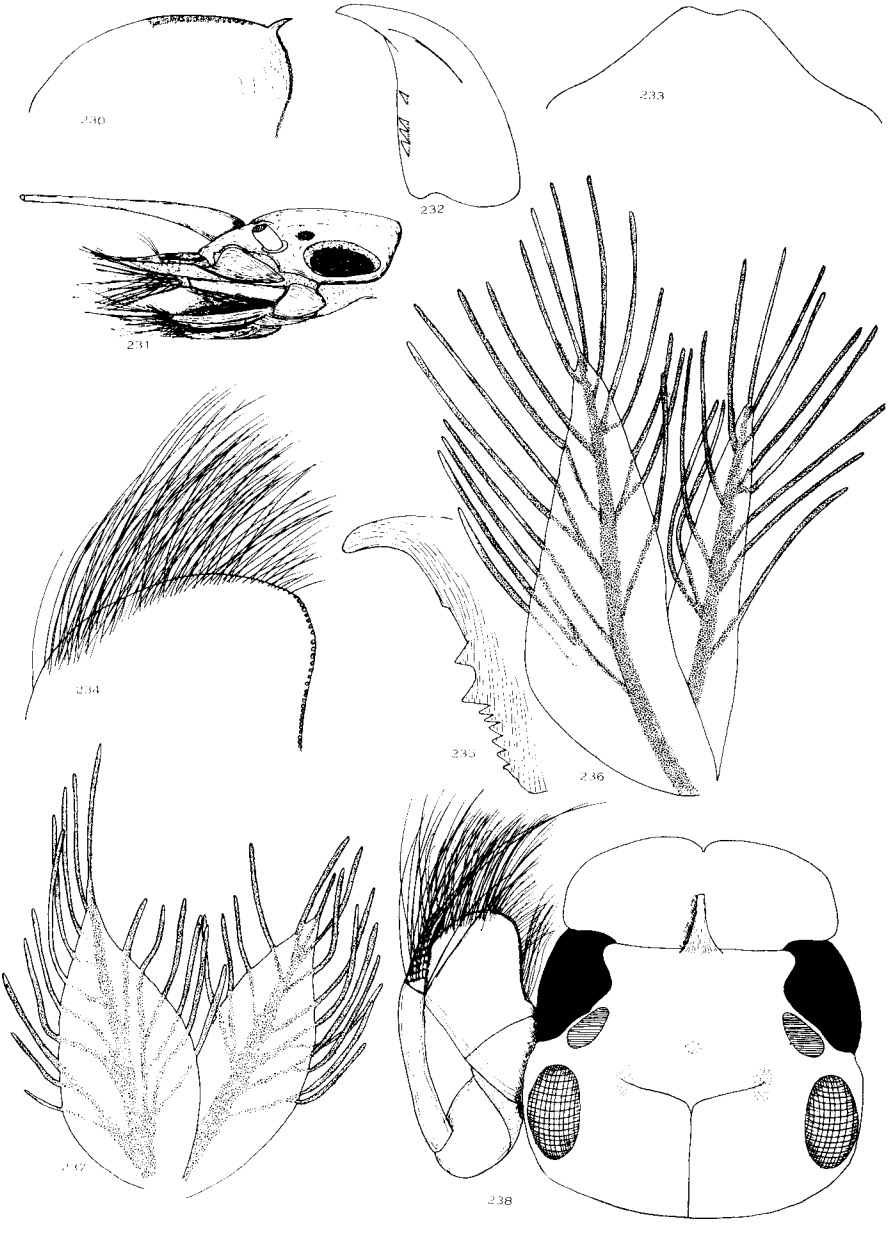

PLATE XVIII

Genus nr. *Adenophlebia* sp. 1 — Fig. 239 gill 2
Fig. 240 gill 7
Fig. 241 claw
Fig. 242 abdominal tergites 6-8
Fig. 243 head, male, dorsal
Fig. 244 labium, left half
Fig. 244A detail of apical segment, labial palpus
Fig. 245 ninth abdominal sternite, male
Fig. 246 lateral spine, abdominal segment 8
Genus nr. *Adenophlebia* sp. 2 — Fig. 247 gill 4
Fig. 248 wing venation, nymphal mesothoracic wing pad

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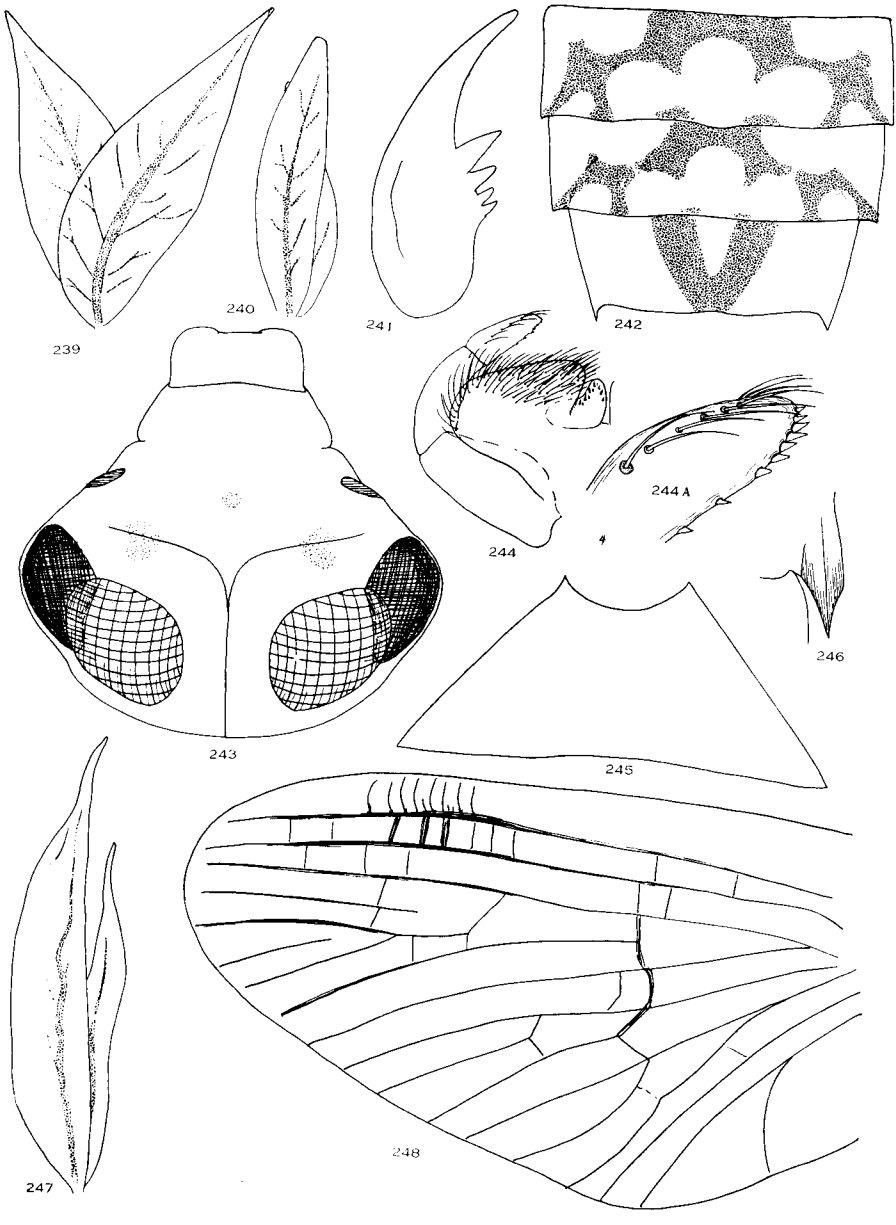

PLATE XIX

Genus nr. *Adenophlebia* sp. 3 — Fig. 249 gill 1
Fig. 250 gill 5
Fig. 251 claw
Fig. 252 labrum
Fig. 253 maxilla
Fig. 254 apex, right mandible

Genus nr. *Adenophlebia* sp. 4 — Fig. 255 claw
Fig. 256 labrum
Fig. 257 gill 4
Fig. 258 gill 7
Fig. 259 left mandible

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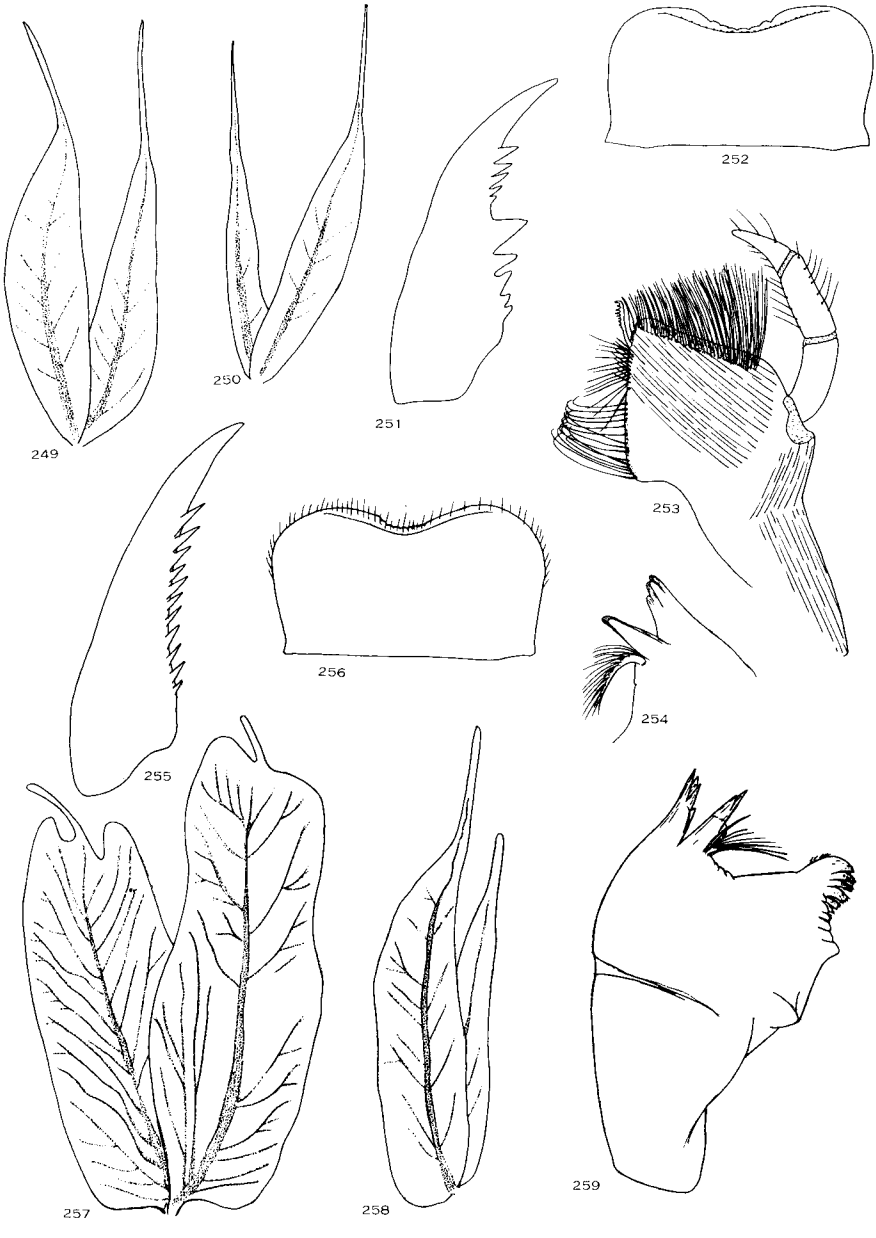

PLATE XX

Caenodes? sp. — Fig. 260 claw
Fig. 261 gill 3
Fig. 264 base of abdomen, operculate gills, dorsal
Leptohyphes sp. 6 — Fig. 262 claw
Fig. 263 abdominal tergites 8, 9
Tricorythodes sp. — Fig. 265 operculate gill
Fig. 266 claw
Fig. 267 gill 3

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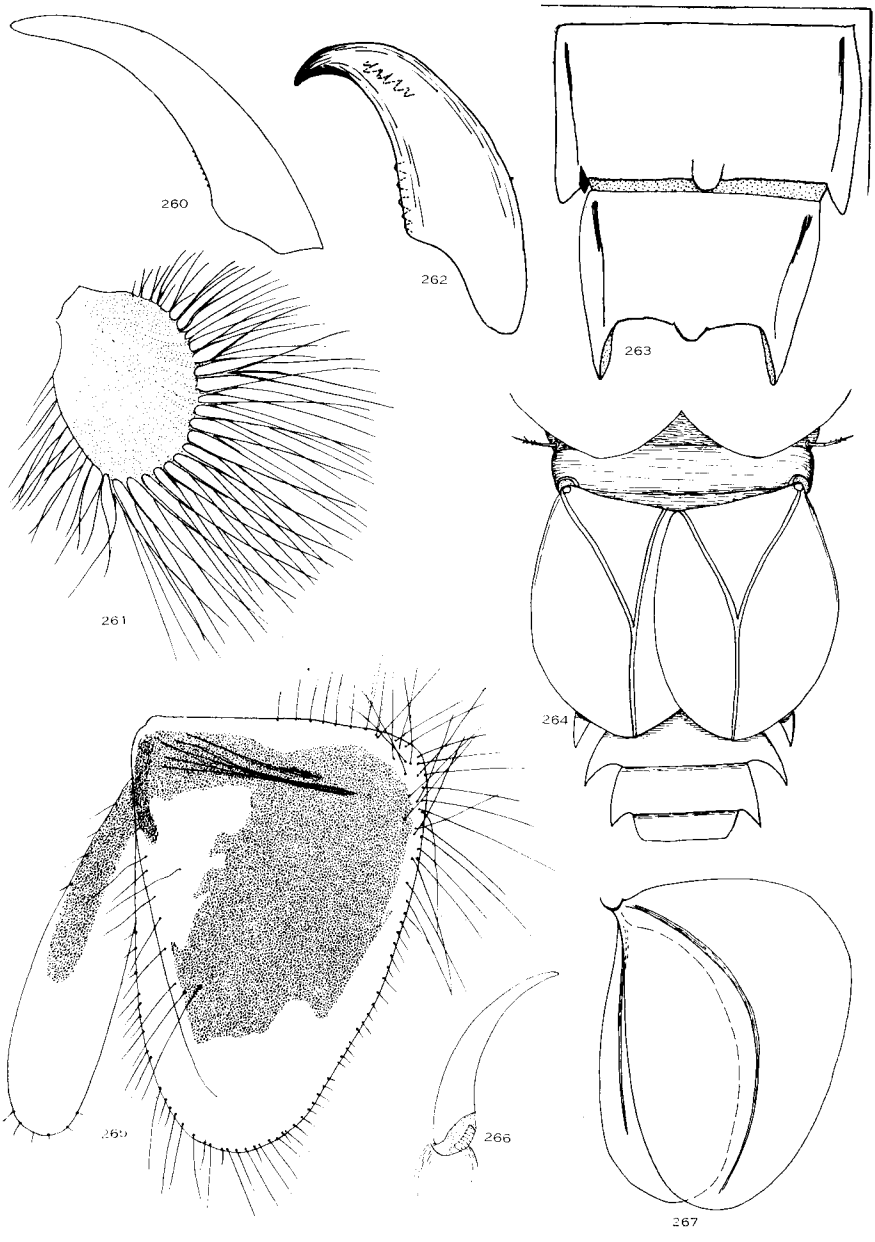

PLATE XXI

Leptohyphes sp. 1 — Fig. 268 section of antenna
Fig. 269 forefemur
Figs. 270, 271 spines of abdominal tergite 7
Fig. 272 section of cercus
Fig. 273 labrum
Fig. 274 metafemur
Fig. 275 claw

Leptohyphes sp. 2 — Fig. 276 venation of nymphal mesothoracic wing pad
Fig. 277 labium
Fig. 278 section of antenna
Fig. 279 section of cercus
Fig. 280 forefemur
Fig. 281 claw
Fig. 282 metafemur
Fig. 283 left mandible
Fig. 284 maxilla

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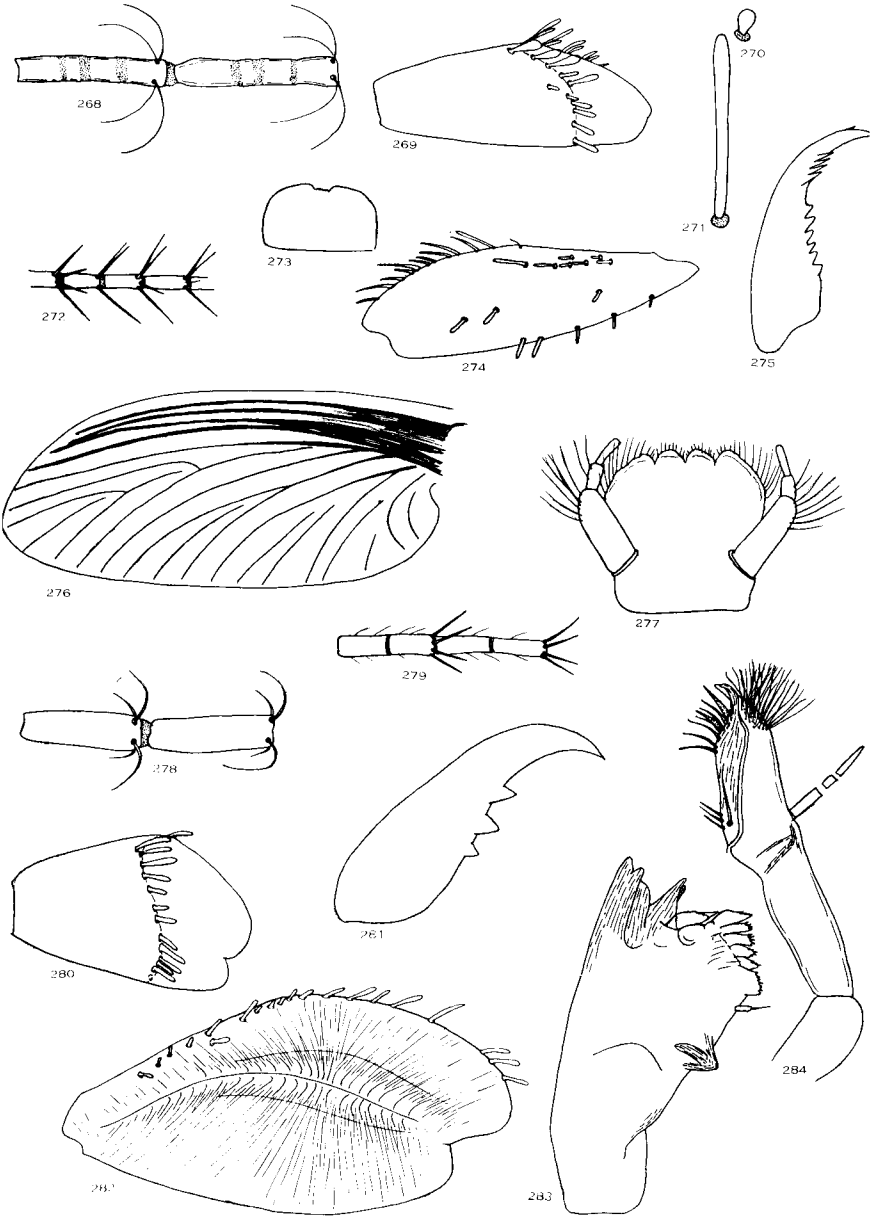

PLATE XXII

Leptohyphes sp. 3 — Fig. 285 forefemur
Fig. 286 claw
Figs. 287, 288 spines of abdominal segment 7
Fig. 289 metafemur
Fig. 290 elytroid gill
Leptohyphes sp. 4 — Fig. 291 metafemur
Fig. 292 claw
Fig. 293 section of cercus
Leptohyphes sp. 5 — Fig. 294 forefemur
Fig. 295 claw, ventral

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