1960

# URUGUAYAN MAYFLIES

## Family *Leptophlebiidae*: Part II [1]

by **Jay R. Traver** [2]

## Genus *HERMANELLA* Needham and Murphy

*Hermanella thelma* Needham and Murphy, 1924. Bull. Lloyd Lib. 24, Ent. Ser. 4: 39-40. Nymph figured, Pl. 10.
*Hermanella incertans* Spieth, 1943. Amer. Mus. Novitates 1244: 8-10. Figures of nymph and adult.
*Hermanella incertans* Spieth, Traver, 1947. Rev. de Ent. 18 (1-2): 158. Figures of adult.
*Hermanellopsis* s. genus Demoulin, 1955. Bull. Inst. R. Sc. Nat. Belg. 31 (20): 8-11. (For *H. incertans* Spieth). Figures of nymph.

Many well preserved nymphs in different stages of development, some specimens of both sexes in the last or next to the last instar, were taken at Sepulturas (Picada del Negro Muerto, on the Cuareim River), Artigas Province, Uruguay, by Dr. C. S. Carbonell and his colleagues. One male nymph was in the process of transforming into the subimaginal stage. Venation, clearly visible in both wings of the late instar nymphs and in the fore wing of the transforming male (not ascertainable in the hind wing bud), and the incipient genitalic structures of the subimago as seen in this same male nymph, relate these nymphs to *Hermanella thelma* as regards venation, and to *H. incertans* in terms of the genitalia. Further discussion of the *Hermanella* complex follows a description of the Uruguayan nymphs.

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1) Este trabajo ha sido realizado en su mayor parte sobre materiales del Uruguay, pertenecientes a las colecciones del Departamento de Entomología de la Facultad de Humanidades y Ciencias (Universidad de la República, Uruguay). La mayoría de los insectos estudiados fueron coleccionados en los viajes de estudio al norte del país organizados por los Departamentos de Zoología de Vertebrados y de Entomología de la Facultad nombrada, como parte de su proyecto conjunto denominado "Identificación y distribución de la fauna indígena del Uruguay", viajes que fueron financiados con partidas del rubro "Investigaciones Originales". Por esta razón debe considerarse que se exponen en el presente trabajo, resultados parciales del mencionado proyecto de investigación. Recibido para su publicación en febrero de 1960. (Nota del editor).
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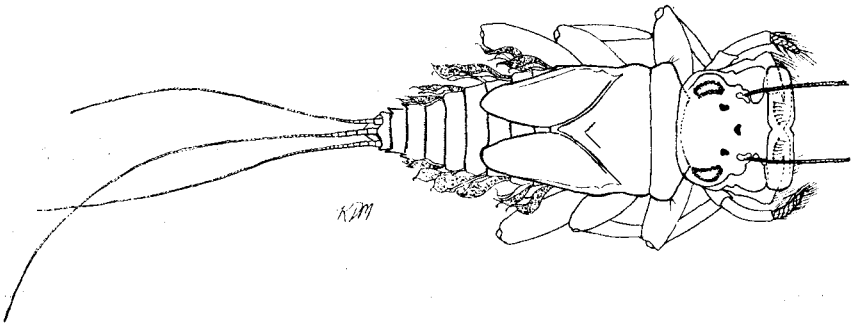

Fig. 1. Unidentified species of the *Hermanella* complex, female nymph, entire, dorsal aspect. Antennae partial only, distal portion not shown. Drawing by R. L. Di Minno.

## Uruguayan nymphs of the *Hermanella* complex

**Fig. 1**

Size: Fully grown female nymphs, body 7 ½ to 8 mm., middle tail circa 8 mm.; fully grown male nymphs, body 6 ½ to 7 mm., middle tail circa 8 mm.

General body color: quite bright reddish brown; long second joint of maxillary palp as seen at sides of head, yellowish white; antennae very pale reddish brown; paler areas around ocelli. Thorax concolorous with head. Legs slightly paler than dorsum of thorax. Somewhat crescentic brown preapical mark on femora (in young nymphs, this may appear as an incomplete transverse bar); two brown bands on each tibia, one basal, one pre–apical; wide brown band on basal half of each tarsus, but leaving extreme base and all of apical half pale. Dorsum of abdomen slightly darker reddish brown than head and thorax. Apical margins of tergites narrowly blackish, most distinct on segments 4–10. Sternites only slightly paler than tergites; usually a small black spot at middle of apical margin of sternite 7. On dark specimens, narrow dark bands at apical margins of sternites 7 and 8; on these specimens, the entire apical margin of 9 dark brown. On paler forms, lateral brown triangles near apex of sternite 9, two or three dark spots between triangles. Gills grayish lavender to pale purplish in color. Tails reddish brown, becoming very pale at extreme tip only; joinings only faintly darker; middle tail somewhat longer than laterals.

Head approximately one–third to one–fourth of entire body length; somewhat variable in this respect due to the fact that in some specimens the abdominal tergites may be partially telescoped on one another, a condition common to all nymphal stages.

Head squarish in shape, almost as wide as widest part of thorax. Labrum very wide, as wide as or wider than head capsule (see figs. 1, 2). A short spine on mid-apical margin of head slightly overlaps the base of the labrum. Antennae arise from dorsal surface of head, and are fully as long as the thorax. Sharp spine at inner apex of galea-lacinia; "bottle brush" of long hairs on apical segment of maxillary palp (see fig. 8). Outer margins of mandibles bent almost at right angles; canines long and slender (see figs. 3, 4, 5, 6, and 7). Second joint of labial palp elbowed near base; distal joint circa one-fourth the length of the second (see fig. 9). Hypopharynx very much as in nymphs from Surinam, Argentina and Brazil (see fig. 10).

Prothorax angulate laterally at anterior margin. Legs as shown in figs. 11 and 12. All claws with prominent tooth just below tip of claw, thus presenting the aspect of a double-toothed tip; following this large tooth, circa nine others, somewhat smaller, these in turn followed by about six still smaller ones (see fig. 13). In none of the nymphs examined from the Uruguayan material was any found in which the mesothoracic wing buds completely concealed the gills, thus acting as opercula (cf. Needham and Murphy, p. 40). In the case of one fully grown male nymph in which the abdomen was somewhat more shortened than in most such nymphs, these wing pads did reach to the apex of the sixth tergite; however, the gills were plainly visible on each side of the abdomen. In several fully grown female nymphs, on the contrary, these wing pads extended backward only as far as the apex of the fourth tergite. Venation of the adult form, as determined from the wing pads of well developed nymphs, is shown in figs. 14 and 15.

Posterolateral spines present on abdominal segments 8 and 9 only, that on 8 somewhat the shorter; spine on 9 does not reach to apex of tenth tergite, nor is there any indication that the tip of this spine is bifid (cf. Needham and Murphy, p. 40). Each tergite is fringed on its apical margin by minute spines. Gills on segments 1–7 inclusive. General form quite similar in all: bilamellate, each lamella with several to many indistinct lateral branches arising from the main tracheal trunk, many of these in turn being subdivided; a finger-like process present at mid-area of apical margin of each lamella. Gill 1 is somewhat more slender than 3; 2 very similar to 3; 4 also resembles 3; 5,6 and 7 becoming progressively smaller (see figs. 16, 17, 18 and 19). Subgenital plate of female nymph more or less triangular, well developed and relatively long, its apex slightly emarginate. Genitalia of teneral subimaginal male, dissected from the transforming nymph, as shown in fig. 20; the long, strong spines on the penes resemble those of the adult *Hermanella incertans*.

The *Hermanella* complex

It appears that four types of nymphs are involved in this complex. These will be referred to as nymphs from Surinam (Spieth), from the Argentine (Needham and Murphy), from Brazil (Demoulin) and from Uruguay. These have much in common. There seems to be no essential difference in the structure of the claws, the generally squarish head, and the presence of lateral spines on abdominal segments 8 and 9, in all four types. The mouthparts differ in certain minor details: relative width of labrum; length of apical spine on inner margin of galea–lacinia; and relative length of distal joint of labial palp. The labrum seems similar in the Brazilian and Argentine nymphs, and is in each case narrower than the same structure in the Surinam and Uruguayan nymphs. Only in the Brazilian nymph is the apical spine on the maxilla rather short and blunt; in the others it is long and sharp. Mandibles and hypopharynx are very similar in all four. The distal joint of the labial palp is relatively shorter in the Surinam nymphs than in any of the others.

More important differences are seen in the gills and the venation, in the three cases where the latter is known. Spieth seems to indicate clearly that the venation and genitalic structures of the nymphs he refers to *Hermanella* are generically similar to the adults of *H. incertans,* although presumed to be of different species. In the Argentine nymphs the gills on the basal segments are smaller than the middle ones; each gill is bilamellate, each lamella except those of the seventh pair ending in two digitate processes, from between which a slender filament emerges; the seventh pair lacks the digitate processes but the distal filament is present. Gills of the Brazilian nymphs bear a marked resemblance to those from the Argentine as to general structure, but the basal and middle pairs are approximately subequal in length and longer and more slender than those of the fifth and sixth segments, while the seventh gill is completely lacking. In nymphs from Surinam and Uruguay the gills are similarly bilamellate except for the seventh on the Surinam forms, which is "uniramous, slender, and thread–like". In none of the gills of the Uruguayan nymphs do the apical digitate processes occur, but the distal filament is present. Of the Surinam nymphs Spieth says: "Some specimens, but not all, have slender finger–like processes arising from the distal margin". I do not know whether he is referring to the filament or to the digitate process, as I have used these terms in the above statements. His figure shows a gill similar to those of the Uruguayan forms.

Venation as determined from the wing pads of nearly mature nymphs is known for all except the Brazilian forms, which are immature. Cross veins are very copious, extending in the

fore wing quite to the outer margin, in nymphs from Argentine and Uruguay. But the Surinam nymphs have relatively few cross veins, and the area near the outer margin is devoid of them. In all three, there is a *very slight* sag in MA2 of the fore wing as it leaves the MA stem, but the stem itself is straight. MP2 appears to end blindly in the membrane, in the Surinam forms; in those from the Argentine it is attached to its own stem, but very close to the wing base; in the Uruguayan forms it is likewise attached to its main stem but on a level with the fork of R 2 + 3 with R 4 + 5. All three types of nymphs have two cubital intercalaries, which in the Surinam and Uruguay forms unite before being joined to CuA by a cross vein, those from Uruguay being connected likewise to CuP; the figure given for the Argentine nymphs seems to show these veins continuing separately to the wing base. The principal differences in the fore wings seem to be the relative abundance of cross veins: sparse in the Surinam forms, very abundant in the other two. Hind wings also vary as to the numbers of cross veins. There appear to be three longitudinals posterior to MA, in these wings. The hind wing figured for the Argentine nymphs does not accord exactly with either of the other two. In the adults of *H. incertans* the costal angulation of the hind wing is quite large and distinctly acute. It is not possible to determine from nymphal wings exactly how this angulation will appear in the wing of the fully developed adult insect, hence the relatively low angulation of the Argentine and Uruguayan nymphs may be of no significance. Genitalia of the teneral subimago from Uruguay agree quite well with those of the adult form of *H. incertans*, presumably also with these structures on the nymphs from Surinam. The outstanding feature is the long, sharp-pointed penial spines.

Demoulin erected the subgenus *Hermanellopsis* to include nymphs and imagos from Surinam, the nymph he himself described from Brazil, and an adult from British Guiana referred by Traver to *Hermanella* sp. In the subgenus *Hermanella* he placed only *H. thelma*. Adults of the two subgenera were differentiated principally on the relative number of cross veins present and their extent in the fore wing, as well as on the relative width vs. length of the hind wing. This latter character is deceptive, as it was used in comparing hind wings of adults with nymphal wing pads. Nymphs were separated in terms of head length to total body length; relative lengths of abdomen to thorax; and length of tail to total body length. Inasmuch as the length of the abdomen in both nymphs and adults varies with the presence or absence of partial telescoping of segment on segment, relative lengths of head and thorax to abdomen and to total body length are likewise variable. No mention was made of such structural features as gills and mouthparts, in differen-

tiating these subgenera. If such structural features be considered, the Brazilian nymphs would fall in the subgenus *Hermanella* rather than in *Hermanellopsis,* while the nymphs from Surinam and Uruguay would certainly be placed in the same subgenus. Yet the Uruguayan forms would fall into *Hermanella* and the Surinam ones into *Hermanellopsis* as regards venation, and the Uruguayan nymphs into *Hermanellopsis* on the basis of relative length of tail to body. Thus it seems that these two subgenera, as at present defined, are incompatible with the facts in the case. I propose therefore to include all four types in the undivided genus *Hermanella,* until such time as more is known of the nymphal vs. the adult forms.

### The *Hagenulus* — *Traverella* complexes

Other genera which have certain features in common with those of the *Hermanella* complex are: *Choroterpides* Ulmer, which seems quite close to *Hermanella,* although definitely distinct from it; *Traverella* Edmunds and *Ulmeritus* Traver, members of the *Traverella* complex; *Hagenulus* Eaton, *Neohagenulus* Traver and *Borinquena* Traver, together forming the *Hagenulus* complex. Spieth indicated these resemblances between *Choroterpides* and *Hagenulus,* " and probably *Neohagenulus* and *Borinquena*"; *Traverella* and *Ulmeritus* had not yet been delineated as genera distinct from *Thraulus,* at the time of publication of his paper. Nymphs are known with certainty for all of these except *Hagenulus.* Morrison described and figured a nymph from Cuba which she assigned to *Hagenulus;* this nymph has never been associated with the adult and there is some doubt as to whether it represents that genus or an undescribed member of the same group. Several nymphs in my collection, taken at two different areas in Cuba (Vento, and Santa Cruz de los Baños del Rio) appear to be the same as those described and figured by Morrison. Venation is quite similar to that of *Hagenulus caligatus* Eaton, the type species of the genus, as figured by Eaton. In both sexes, the mature nymphs have spotted wings. No indication of an ovipositor, a feature characteristic of *Hagenulus,* can be made out on any of the mature female nymphs. Genitalia of a mature male nymph about to transform show rather long penes, not too slender at least in this stage however; each penis lobe bears a short stout inwardly–directed spine in approximately the same position as those on the penes of *Neohagenulus.* The apparent lack of an ovipositor plus the presence of the spines on the penes, the latter not shown in Eaton's figure, leads me to refer to the nymph described by Morrison as *?Hagenulus.*

Similarities in mouthparts of nymphs of the above genera may be summarized as follows. A prominent spine at apex of

maxilla occurs in *Traverella, ?Hagenulus, Ulmeritus, Choroterpides* and *Hermanella,* but not in the others; mandibles bent at right angles in *Traverella, ?Hagenulus* and *Hermanella* only; very wide labrum in *Traverella, ?Hagenulus* and *Hermanella,* much narrower in all others. Gills in only one genus, *Choroterpides,* are in any way similar to those of *Hermanella;* gills of *Traverella* and *Ulmeritus* are of *Thraulus* type; those of *Borinquena* and *Neohagenulus* are slender filaments, bifid in the latter, single in *Borinquena.*

Venation of the adult insects differs considerably in the genera under discussion. There is, however, a general similarity between *Choroterpides* and *Hermanella;* between *Hagenulus, Neohagenulus* and *Borinquena;* and between *Traverella* and *Ulmeritus.* Genitalia of *Choroterpides* and *Hagenulus* have much in common; *Neohagenulus* and *Borinquena* each have short spines just below the apex of each penis lobe, the penes being less slender than in those of the first group; *Traverella* differs from all the others by the presence of rod-like projections between forceps and penes; *Ulmeritus* is likewise distinct and unlike those of the other genera. Claws of the adults are dissimilar on all tarsi, in all the genera listed above.

In my collection there are nymphs of one and perhaps two undescribed genera of the *Traverella* complex; two belonging to the *Hermanella* group; one or more which seem related to the *Hagenulus* complex. Still another, this one from Paraguay, has spines at the apex of the maxilla, mandibles much as in *Ulmeritus,* hypopharynx quite similar to that of *Traverella.* The bilamellate gills taper toward the tip, each lamella ending in a slender filament; lateral tracheal branches seem wholly wanting. Although our knowledge of the Neotropical Leptophlebiidae has increased considerably in the past several years, there are still many conspicuous gaps to be filled in the future.

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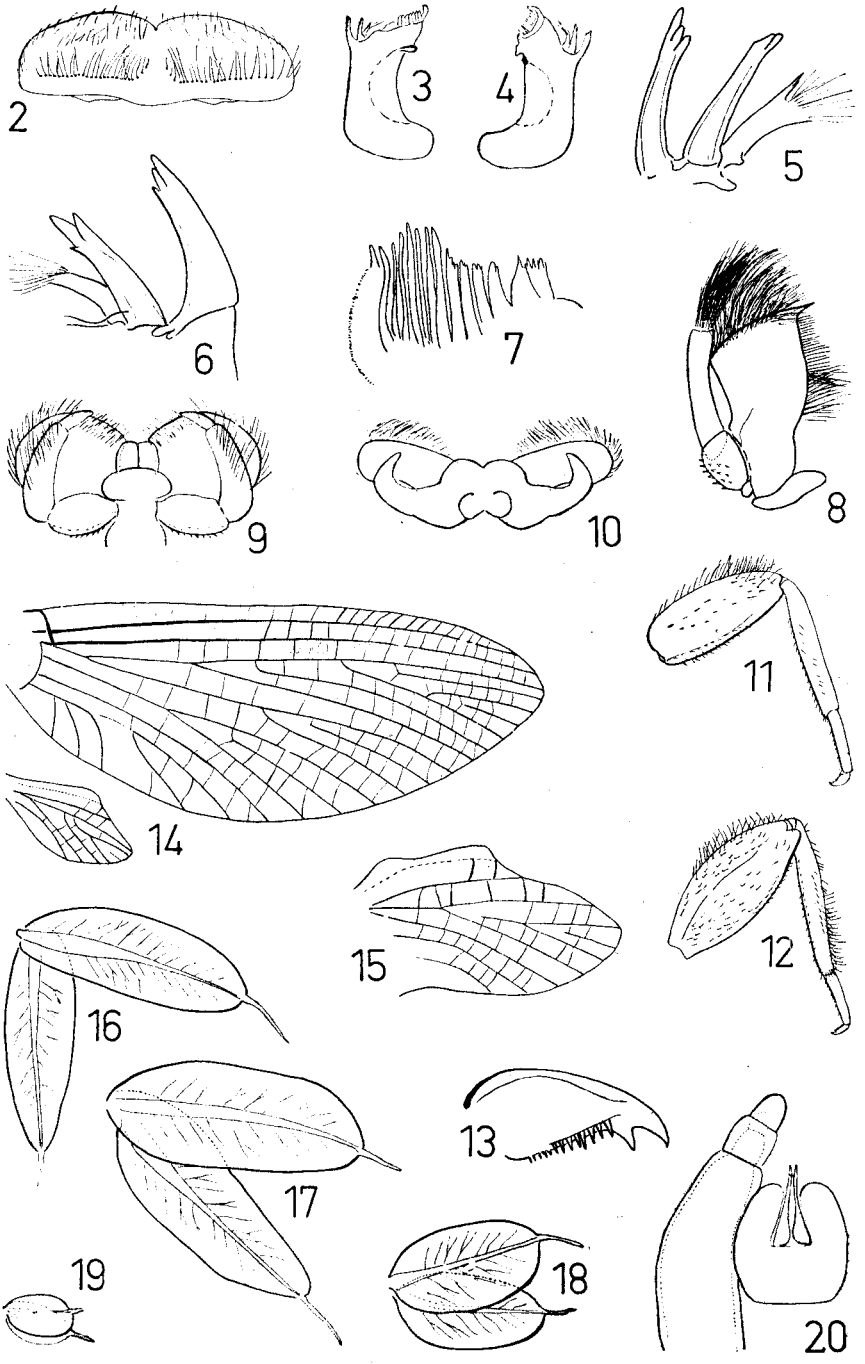
## *PLATE 1*

Unidentified species of the *Hermanella* complex, nymph.

Fig. 2, labrum; fig. 3, right mandible; fig. 4, left mandible; fig. 5, canines of right mandible, enlarged; fig. 6, canines of left mandible, enlarged; fig 7, molar surface of left mandible, enlarged; fig. 8, maxilla; fig. 9, labium; fig 10. hypopharynx; fig. 11, first leg; fig. 12, third leg; fig. 13, claw, enlarged; fig. 14, venation of an almost mature nymph; fig. 15, hind wing of a different nymph, enlarged; fig. 16, gills of first pair; fig. 17, gills of third pair; fig. 18, gills of fifth pair; fig. 19, gills of seventh pair; fig. 20, incipient genitalia of subimago. Dissected out from transforming nymph.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## ERRATUM

In the paper by Jay R. Traver "Uruguayan Mayflies. Family Leptophlebiidae: part I." (Rev. Soc. Uruguaya Ent. vol. 3, pp. 1–19, 1959), the following erratum has been noticed by the author in figure 23 (Plate III, pag. 19). The drawing lacks one short intercalary in the apical region of the Rs group of veins. The second intercalary shown there should have been a little higher up to allow for the short weak one that follows and was by accident omitted.