



***Hydromastodon sallesi*, new genus and new species of Atalophlebiinae (Insecta: Ephemeroptera: Leptophlebiidae) from West and North of Brazil, and notes on systematics of *Hermanella* group**

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Abstract

The genus *Hydromastodon* is described here with a **new species** *H. sallesi*, and a **new combination**: *Hydromastodon* (= *Hydrosmilodon*) *mikei* (Thomas & Boutonnet 2004). *H. sallesi* was described based on nymphs from Pindaíba Stream, near Nova Xavantina, State of Mato Grosso, and from Bem Querer Stream, State of Roraima, Brazil. *Hydromastodon* can be distinguished from other genera of the *Hermanella* group by presence of posterolateral spines on abdominal segments 6 or 7 to 9, tarsal claws with subequal denticles in two separate rows, without large subapical denticle, and clavate setae on legs. *Hydromastodon* seems to be closely related to *Hydrosmilodon* and *Leentvaaria*.

Key words: *Hydromastodon*, Atalophlebiinae, new genus, Brazil

Resumo

O gênero *Hydromastodon* é aqui descrito com uma nova espécie *H. sallesi*, e uma nova combinação: *Hydromastodon* (= *Hydrosmilodon*) *mikei* (Thomas & Boutonnet 2004). *H. sallesi* foi descrito baseada em ninfas do Rio Pindaíba, próximo a Nova Xavantina, Estado do Mato Grosso, e do Rio Bem Querer, Estado de Roraima, Brasil. *Hydromastodon* pode ser distinguido dos demais gêneros do grupo-*Hermanella* pela presença de espinhos pótero-lateral nos segmentos abdominais 6 ou 7 a 9, unhas tarsais com dentículos subiguais em fileiras separadas, sem dentículo subapical grande, e cerdas clavadas nas pernas. *Hydromastodon* parece ser próximo de *Hydrosmilodon* and *Leentvaaria*.

Palavras-chave: *Hydrosmatodon*, Atalophlebiinae, gênero novo, Brasil

Introduction

Within the *Hermanella* group, *Hydromastodon sallesi*, new genus and species here described, together *Hydrosmilodon mikei* Thomas & Boutonnet, 2004, present important characters that distinguish both as members of a new genus within the group. Those characters, described in detail below, are sufficient to require designation of a new genus and a new combination, *Hydromastodon* (= *Hydrosmilodon*) *mikei* (Thomas & Boutonnet 2004), as the type-species.

The *Hermanella* group includes genera distinguished from all other Atalophlebiine, Leptophlebiidae, by remarkable characters of nymphs, such as large maxillary palpi attached at the posterior portion of maxilla, with long and fine setae on the third segment in parallel rows; an expanded labrum nearly as wide as the head capsule; also prominent anterolateral areas of the clipeus, rectangular shape of the mandibles, often with sharp

anterolateral angle; and broad and rectangular superlinguae. Moreover, the abdominal postero-lateral spines are present on segments 8 and 9, rarely also 7. Genera earlier described in this group were *Hermanella* (Needham and Murphy, 1924), *Leentvaaria* (Demoulin, 1966), *Traverella* (Edmunds, 1948b), *Hylister* (Dominguez and Flowers, 1989), *Needhamella* (Dominguez and Flowers, 1989) *Hydrosmilodon* (Flowers & Dominguez, 1992) and *Paramaka* (Savage & Dominguez, 1992). The group was well studied by Dominguez & Flowers (1989, 1991), Dominguez *et al.* (2001), Ferreira (1999), Ferreira & Dominguez (1992), including phylogeny of the group (Flowers & Dominguez 1991). Recently, Blanco-Belmonte *et al.* (2003) described the nymph of *Paramaka*, a genus established by Savage & Dominguez (1992) to include *Thraululus convexus*, earlier described based on adults by Spieth (1943). Adults of *Leentvaaria* are not described. There is a new phylogeny of the group with, new species (Sartori, 2005). Thomas *et al.* (2004) published new species of *Hydrosmilodon*. Although it is a little group and relatively well known, relationships within *Hermanella* group need more investigation.

In the Nova Xavantina region, State of Mato Grosso, a single nymph of *Hydrosmastodon sallesi* was collected, but *Leentvaaria*, *Hydrosmilodon* and *Needhamella* are abundant in streams of that region. Other nymphs of *Hydrosmastodon sallesi* were collected at State of Roraima, in northern Brazil. The material is deposited in the Museum of Zoology of the University of São Paulo (MZSP), São Paulo, and in the National Research Institute of Amazon (INPA), Amazonas, Brazil.

***Hydrosmastodon Polegatto and Batista*, new genus (Figs. 1–21)**

Type-species: *Hydrosmilodon miki* Thomas & Boutonnet 2004, p.72

Mature Nymph, Male (Fig. 1). *Head* (Fig. 2). Antennae 1.6 to 2.5 length of head.

Labrum (Fig. 13): expanded laterally, length 1/3 of width, and width subequal to that of head capsule; dorsal surface with 12–15 long setae on each side of median line; ventral surface with long setae in an oblique row and short setae on posteromedian area; anterior and posterolateral margin with short setae, some of those relatively long. Mandibles (Figs. 19–21): incisors and molae as in other genera of *Hermanella* group in general shape; prosthecae with numerous long and fine setae; both mandibles with V' shaped ventral row of setae. Maxillae: (Figs. 16–17) with a large tooth on anteromedian angle, as long as width of the apex of galeolaciniae; anteromedian margin of galeolaciniae strongly sinuous; apex of galeolaciniae wider than base; a weak posterolateral prominent area on the galeolaciniae; setae on crown of galeolaciniae numerous; maxillary palpi almost as long as maxillae; first segment of maxillary palpi robust; third segment of maxillary palpi with long and fine setae; apex of third segment bare and soft (Fig. 12). Hypopharynx: as in Fig. 18. Labium (Fig. 14–15). Glossae and paraglossae with setae as in Fig. 10.; labial palpi: first segment subequal in length to segment two, third segment about half of length of segment two.

Thorax. Legs (Figs. 7–10). Femora with long, strong and fine setae on posterior margin, and short setae on anterior margin; tibiae and tarsi with setae as in Figs. 7–9; the strong setae on femora, sometimes on tibiae, apically clavate (Fig. 10), and scale-like setae can be present on femora; tarsal claws (Fig. 6) with subequal denticles in two separate rows; a large subapical denticle absent.

Abdomen (Figs. 4, 12). Posterolateral spines on segments 6 to 9 or 7 to 9. Gills (Fig. 11) relatively slender and long, width at least 1/5 of length; gills with a fine apical projection; main trachea visible; ninth sternite with two sharp projections, longer in males.

Diagnosis: *Hydrosmastodon* can be distinguished from other genera of *Hermanella* group by the combination of: tarsal claws without large subapical denticle and subequal denticles in two different rows; abdominal posterolateral spines on seg. 6 or 7 to 9; and clavate setae on legs.

Adults: unknown

Etymology: in the genus *Hydrosmilodon*, described by Flowers & Dominguez (1991), the name refers to sabertooth-tiger, because of the big maxillary tusks; however, species of the *Hermanella* group are herbivo-

rous, i.e. filterers; therefore, *mastodon*, meaning an extinct elephant, which could use tusks against vegetation; *hydro*, meaning water.

Distribution: State of Mato Grosso, West of Brazil, to State of Roraima, North of Brazil, possibly in other states of West and North region, and also in French Guiane (Thomas *et al.* 2004).

***Hydromastodon sallesi* Polegatto and Batista, new species (Fig. 1-21)**

Mature nymph, male. In alcohol. Body length: ca. 6.7mm, without caudal filaments; head ca. 1.4mm.

Head (Fig. 2). Color pattern: head of male nymph light brown, upper portion of eyes orange-brown, lower portion black; in male, lower portion of eyes about 1/5 width of upper portion. Antennae 1,6 length of head. Labrum (Fig. 13): dorsal surface with fourteen to fifteen long setae; ventral surface with long setae in a oblique row decreasing posteriorly, and short setae on posterior area; posterior and lateral margin with short and relatively long setae respectively. Hypopharynx: as in Fig. 18. Left mandible (Fig. 21): incisors with three denticles, one prominent denticle and two smaller; prostheca with numerous long and fine setae, and two hard setae; mola with a prominent and hard posterior area. Right mandible (Fig. 19-20). Anterior incisor with three denticles, one of them prominent, posterior incisor with two subequal denticles; prostheca more slender than right, with long and fine setae. Maxillae (Fig. 16-17). Setae on crown of galeolaciniae numerous, and with setae on the base of tooth; setae on medial galeolacinial margin fine and long in a single row, except on anterior region with two rows; all setae as in Fig. 13; third segment of maxillary palpi with long and fine setae in six parallel rows; apex of third segment bare and soft (Fig. 17). Labium (Fig. 14-15). Glossae and paraglossae with setae as in Fig. 14; labial palp: segment two with nine long dorsal setae, segment three with long setae concentrated ventrally, third segment with fifteen-sixteen short spine-like setae on inner margin (Fig. 15).

Thorax. Color pattern: thorax brown, legs light brown. Pronotum with weak anterolateral angle, with two setae. Legs (Fig. 7-10). Femora with long, strong and fine setae on posterior margin, and short setae on anterior margin; tibiae with long fine setae on anterior margin, scarce on third tibiae; long setae on all femora and on third tibiae, clavate apically (Fig. 10); short setae on median margin of tibiae and tarsi as in Figs. 7-9; tarsal claws (Fig. 6) with subequal denticles, three apical and five at middle point, in two separate rows.

Abdomen (Fig. 4). Color pattern: segments 1 to 5 pigmented of black, segments 6 to 10, with color pattern as in Fig. 4. Segments 6 to 9 with posterolateral spines. Gills (Fig. 11) with a minute fine apical projection.

Mature nymph, female. In alcohol. Color pattern: Head and abdomen of female nymph with pattern as in Figs. 3, 5; thorax with color similar to male; segments 1 to 5 pigmented of black as in male, but with small areas lighter; segments 6 to 10 similar of in males, as in Fig. 5.

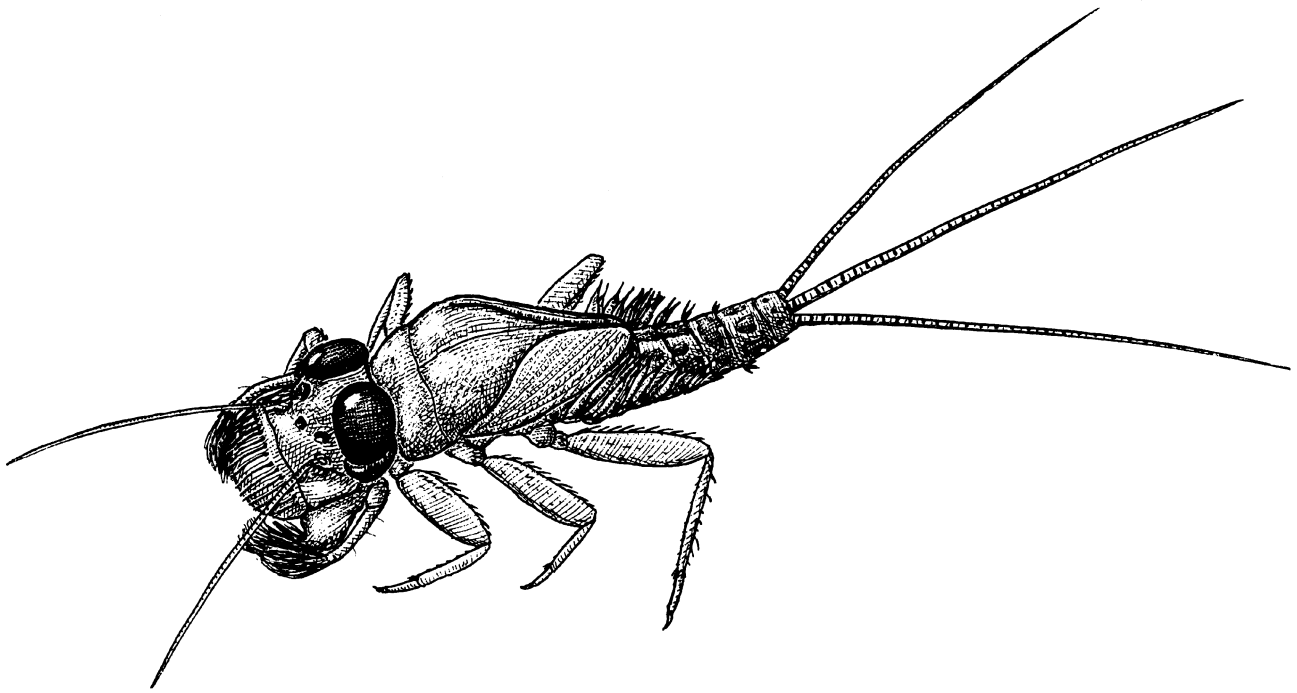
Diagnosis: This species can be distinguished from *Hydromastodon mikei* (Thomas & Boutonnet, 2004), by the the following combination of characters: presence of posterolateral spines on abdominal segment 6 to 9; absence of spots in tibiae and tarsi; more numerous dorsal setae on labrum; prominent and hard posterior area of left mola; and color pattern of abdomen.

Adults: unknown.

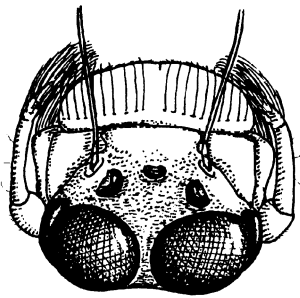
Etymology: The name of species is in honour to my friend Frederico Falcão Salles, a great specialist in Ephemeroptera in Brazil.

Material examined: Holotype: mature nymph male, North of Brazil State of Roraima, Bem Querer Stream, 18-X-2004., Frederico F. Salles. Paratypes: 1 mature nymph female, same of holotype, 1 imature nymph male, West of Brazil, State of Mato Grosso, near to Nova Xavantina, Pindaíba Stream; II-2003; Joana D. Batista & Helena S.R. Cabette.

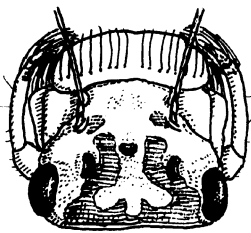
The holotype and 1 paratype are deposited in the National Research Institute of Amazon, and 1 paratype is deposited in the Museum of Zoology of the University of São Paulo (MZSP), São Paulo.



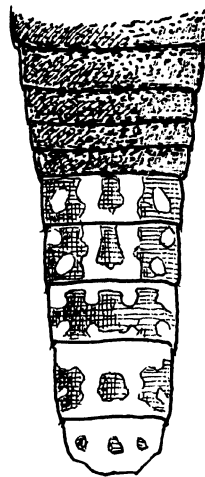
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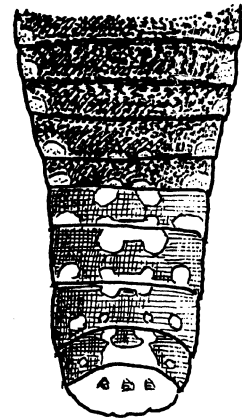
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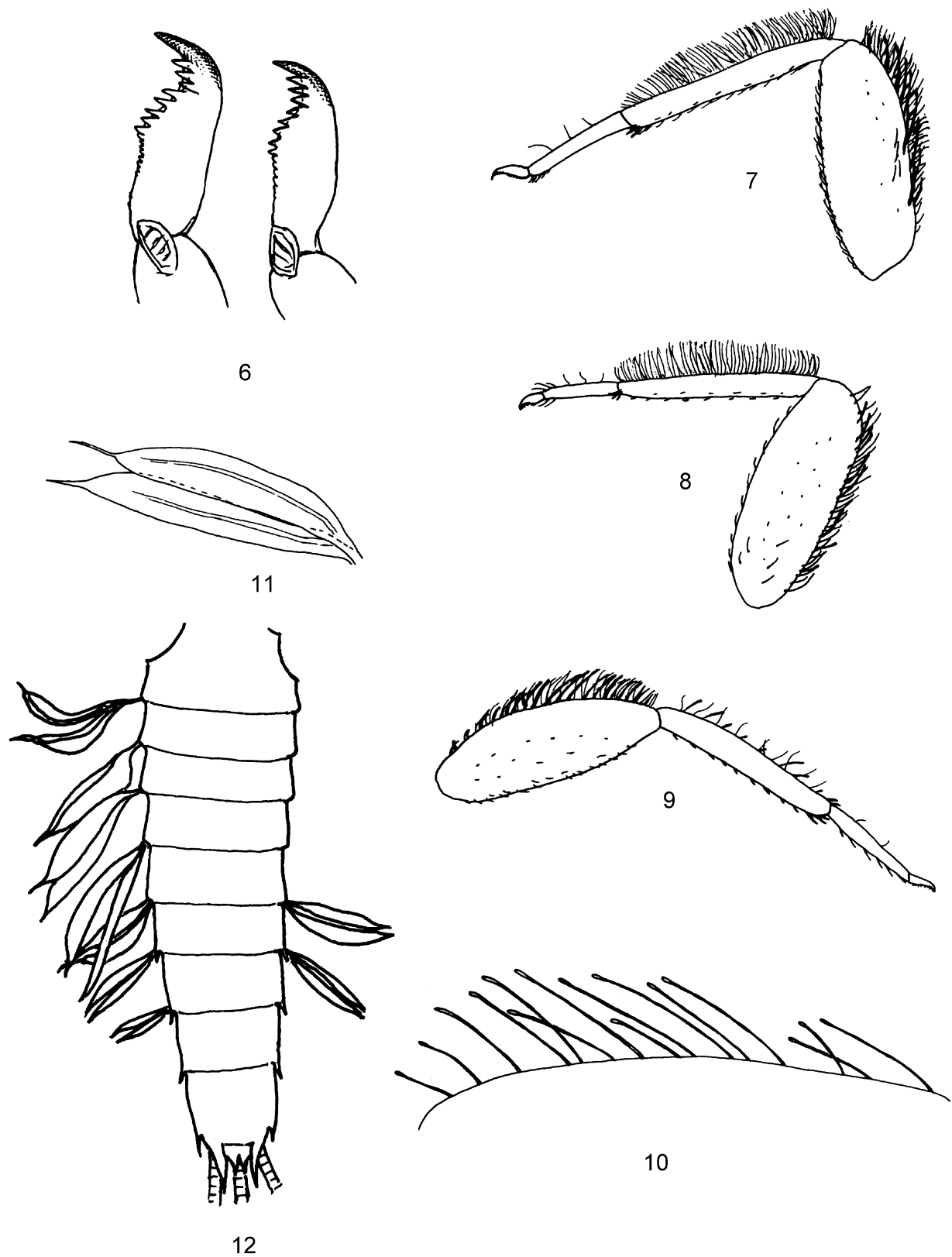


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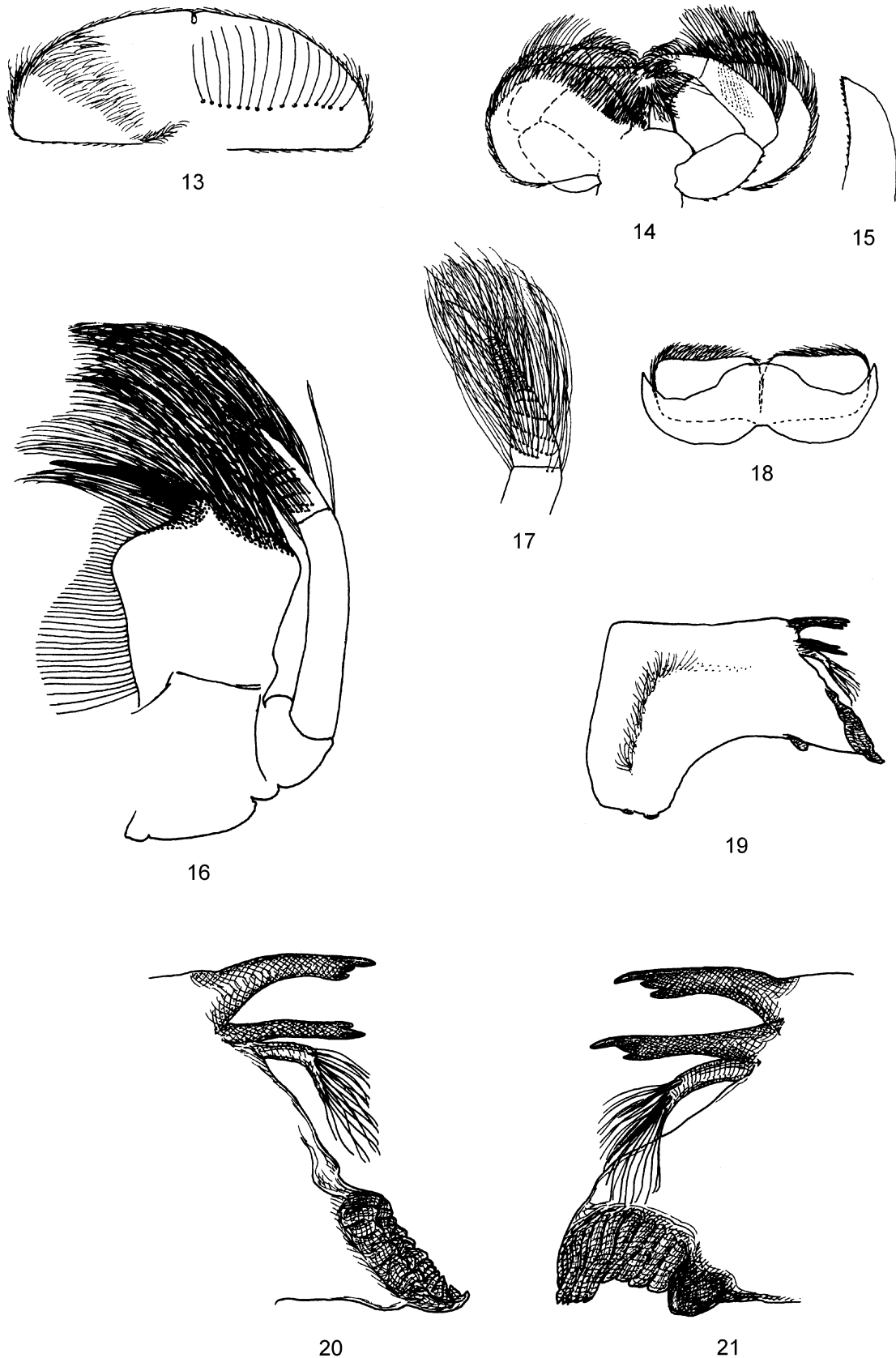


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FIGURES 1 TO 5. *Hydromastodon sallesi*: 1, nymph of male. 2, male head. 3, female head. 4, male abdomen, dorsal view. 5, female abdomen, dorsal view.



FIGURES 6 TO 12. *Hydromastodon sallesi*: 6, tarsal claws. 7, leg I, right, dorsal view. 8, leg II, right, dorsal view. 9, leg III, left, dorsal view. 10, detail of clavate setae on femur I. 11, gill 4. 12, male abdomen, ventral view.



FIGURES 13 TO 21. *Hydromastodon sallesi*: 13, labrum, left: ventral view, right: dorsal view. 14, labium, left: dorsal view, right: ventral view. 15, labial palp, detail of third segment. 16, maxilla, right, dorsal view. 17, maxillary palp, third segment, right, dorsal view. 18, Hypopharynx, ventral view. 19, mandible, right, ventral view. 20, detail of incisors, prostheta and mola of right mandible, ventral view. 21, same of left mandible, ventral view.

Discussion

The recent discovery of *Hydromastodon sallesi* is explained by absence of collections in western and northern Brazil and in other regions of South America. The knowledge of the *Hermanella* group, present in Neotropics and parts of North America was based on studies in Amazonian forests and southeastern Brazil, and also Argentina (Needham & Murphy 1924, Edmunds 1948b, Demoulin 1955, 1966, Dominguez & Flowers 1989, Ferreira & Dominguez 1992, Savage & Dominguez 1992, Lopes 1999, Blanco-Belmonte *et al.* 2003, Thomas *et al.* 2004).

The genus *Hydrosmilodon* is most closely related to *Leentvaaria* because of the well developed maxillary tooth and the shape of gills. According to Dominguez *et al.* (2001) and Ferreira (1999), *Leentvaaria* is closer to *Hydrosmilodon* and, by some authors, to *Needhamella* (*cf.* Michel Sartori, cited above).

Regarding *Hydromastodon*, we believe the generic status is supported by: (i) posterolateral spines on abdominal segment 6 or 7 to 9; spines on 6 segment seems unique in the *Hermanella* group, although there are spines on segment 7 in *Hylister*; (ii) the shape of tarsal claws which is unusual in Neotropical genera of Leptophlebiidae; (iii) the sinuous margin behind the galealacinial tooth and the broad anterior portion of galealacinia are also remarkable; (iv) clavate setae of the femora; although this kind of setae is found in other group of Leptophlebiidae; (v) hard posterior area of left mola, at least in *Hydromastodon sallesi*. Color pattern is also relatively characteristic, as seen in the head and abdomen of the nymphs.

As for some characters and the systematic position of *Needhamella*, *Paramaka* and *Hydrosmilodon*, it is important to consider new data by Sartori (cited above) and Thomas *et al.* (2004). Some characters in *Hydrosmilodon* and in *Needhamella* are possibly not valid, e.g. minute denticles near apical and subapical denticles in tarsal claws, since they are present or absent in the species of both genera (unpublished data from Mato Grosso; and Sartori, cited above). On the other hand, the gills in *Needhamella* are apparently more elliptical and with filament more conspicuous than in *Hydrosmilodon*. Gills with absence of digital filament are found in *Needhamella*-like forms in northern Brazil; also slender gills with more than one filament are found in *Hydrosmilodon*-like forms (Frederico F.Salles, personal communication). We suggest the slender gills are typical of *Hydrosmilodon*, *Leentvaaria* and *Hydromastodon*, whereas the more elliptical gills are typical of *Needhamella* and *Paramaka*. *Needhamella* and *Paramaka* have few characters for a separation at genus level, even in adult stages (*cf.* Dominguez and Flowers 1989, Savage & Dominguez 1992, Blanco-Belmonte *et al.* 2003).

The large galealacinial teeth of *Leentvaaria*, *Hydrosmilodon* and *Hydromastodon* are distinctive from the small or relatively undeveloped teeth of *Needhamella*, *Paramaka*, *Hermanella* and *Hylister*. *Traverella* can have small teeth, no teeth (*cf.* Dominguez *et al.* 1992) or teeth as large as in *Leentvaaria* and allies; such as in a nymph from northern Brazil (Frederico F.Salles, personal communication), but this case could be a convergence.

Ecology: *Hydromastodon sallesi* inhabits parts of the same region as species of *Hydrosmilodon* and *Leentvaaria* reported in Mato Grosso and also North of Southamerica. Nova Xavantina region presents many Atalophlebiinae genera, some of them new for science (unpublished data). Habitat is warm-water streams at low altitudes.

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References

- Blanco-Belmonte, L., Ruaise, V. & Peters, J.G. (2003) The nymph of *Paramaka* Savage & Domínguez (Ephemeroptera: Leptophlebiidae: Atalophlebiinae). In: Gaino E. (Ed.), *Research update on Ephemeroptera & Plecoptera*, Università di Perugia, Perugia, pp 117–121.
- Demoulin, G. (1955) Une mission biologique belge au Brésil. Éphéméroptères. *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique*, 31(20), 1–32.
- Demoulin, G. (1966) Contribution a l'étude des Éphéméroptères du Surinam. *Bull. Institut Royal des Sciences Naturelles de Belgique*, 42 (37), 1–22.
- Domínguez, E. & Flowers, R.W. (1989) A revision of *Hermanella* and related genera (Ephemeroptera: Leptophlebiidae: Atalophlebiinae) from Subtropical South America. *Annals of the Entomological Society of America*, 82, 555–573.
- Domínguez, E., Ferreira, M.J. & Nieto, C. (2001) Redescription and phylogenetic relationships of *Leentvaaria* Demoulin (Ephemeroptera: Leptophlebiidae). In: Dominguez, E. (Ed.), *Trends in research in Ephemeroptera and Plecoptera*, Kluwer Academic/Plenum Publishers, New York, pp 313–320.
- Edmunds, G.F., JR. (1948b) A new genus of mayflies from western North America (Leptophlebiidae). *Proceeding of the Biological Society of Washington*, 61, 141–148.
- Ferreira, M.J.N. (1999) *Sistemática de Atalophlebiinae (Insecta: Ephemeroptera, Leptophlebiidae) nos escudos das Guianas e brasileiro (Rondônia)*. Universidade da Amazônia-Instituto Nacional de Pesquisas da Amazônia, 75 pp.
- Ferreira, M.J.N. & Domínguez, E. (1992) A new species of *Hermanella* (Ephemeroptera: Leptophlebiidae: Atalophlebiinae) from Southeastern Brazil. *Aquatic Insects*, 145(3), 179–182.
- Flowers, R.W. & Domínguez, E. (1991) Preliminary cladistics of the *Hermanella* complex (Ephemeroptera: Leptophlebiidae). In: Alba-Tercedor, J. & Sanchez-Ortega, A. (Ed.), *Overview and Strategies of Ephemeroptera and Plecoptera*, Sandhill Crane Press, Gainesville, Florida, 49–62.
- Lopes, M.J.N. (1999) *Sistemática de Atalophlebiinae (Insecta: Ephemeroptera, Leptophlebiidae) nos escudos das guianas e brasileiro (Rondônia)*. Universidade do Amazonas-Instituto Nacional de Pesquisas da Amazônia, vii+75 pp.
- Needham, J.G. & Murphy, H.E. (1924) Neotropical mayflies. *Bulletin of the Lloyd Library, Entomological Series, N. 24*, 4, 1–79.
- Sartori M. (2005) A new species of the genus *Paramaka* Savage & Dominguez, 1992 with some comments on related genera (Ephemeroptera, Leptophlebiidae, Atalophlebiinae). *Studies on Neotropical Fauna and Environment*, 40 (3): 237-245.
- Savage, H.M. & Domínguez, E. (1992) A new genus of Atalophlebiinae (Ephemeroptera: Leptophlebiidae) from Northern South America. *Aquatic Insects*, 14(4), 243–248.
- Spieth, H.T. (1943) Taxonomic studies on the Ephemeroptera. III. Some interesting Ephemerids from Surinam and other Neotropical localities. *American Museum Novitates*, 1244, 1–13.