

## **A Curious New Genus and Species of Atalophlebiinae (Ephemeroptera: Leptophlebiidae) from the Southern Coastal Mountains of Brazil**

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### ABSTRACT

A new genus and species of Atalophlebiinae, *Perissophlebia flinti*, is described based on nymphal specimens collected from the Serra dos Órgãos of southern Brazil. Nymphs of *P. flinti* display a large number of derived character states that appear to be correlated with a sprawling habit and the use of the legs for collecting-gathering.

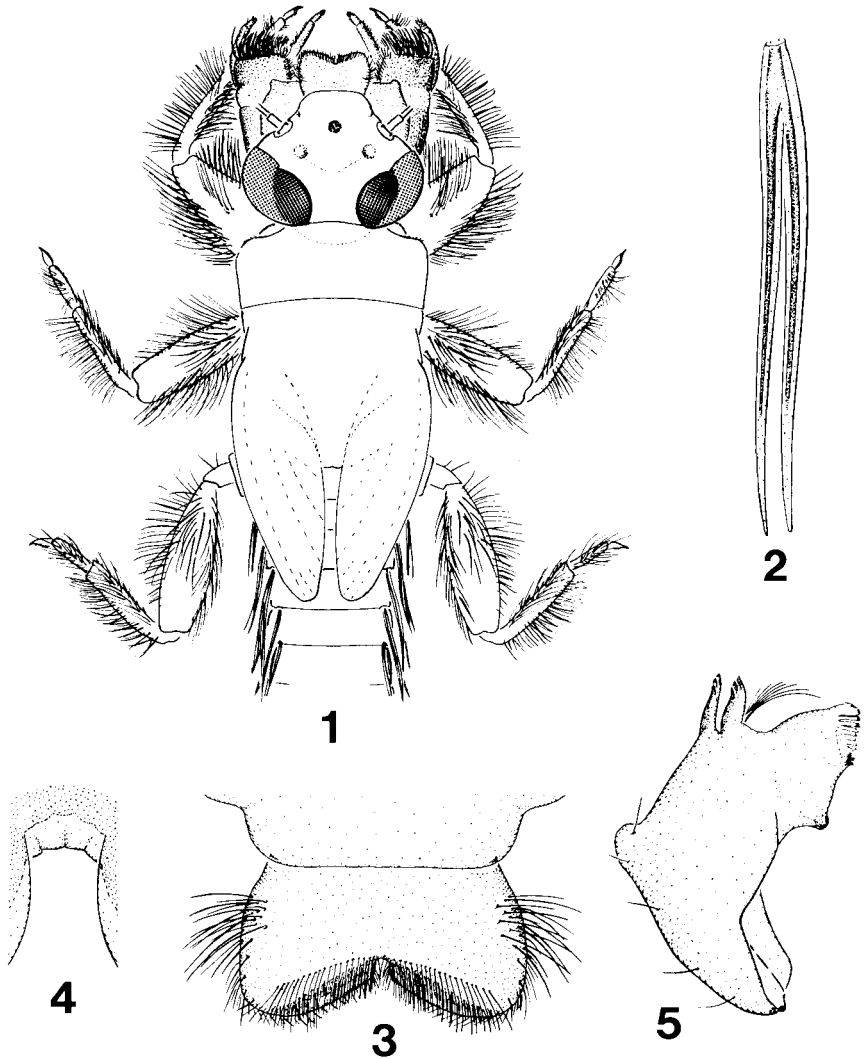
### INTRODUCTION

Recent taxonomic and phylogenetic studies of the Neotropical Leptophlebiidae (Savage and Peters, 1978, in press; Pescador and Peters, 1980a, 1980b, in press) have greatly increased our knowledge of the mayfly fauna of this region. However, there are numerous new genera and species, particularly from the warmer northern areas, that still remain to be defined. Herein a new genus and species, *Perissophlebia flinti*, from the Serra dos Órgãos of southern Brazil is described based upon nymphal specimens collected by C. M. and Dr. O. S. Flint, Jr. Usually, I would hesitate to establish a new genus based solely on the nymphal stage, however, the morphology of the legs and mouthparts observed in *Perissophlebia* is very unusual and the genus is easily defined.

### *Perissophlebia* NEW GENUS

IMAGO: Unknown.

MATURE NYMPH. Head prognathous (Fig. 1). Antennae  $1 \frac{1}{2} - 2 \frac{1}{2}$  length of head. Mouthparts (Figs. 1, 3-10): clypeus short, length slightly less than  $\frac{1}{3}$  width, shaped as in Fig. 3. Width of labrum approximately equal to



Figs. 1-5. *Perissophebia flinti*: 1, dorsal view of anterior portion of mature male nymph; 2, gill 7; 3, clypeus and labrum; 4, enlargement of denticles on labrum; 5, left mandible.

width of clypeus; maximum length of labrum approximately  $3/5$  maximum width; anterior and anterolateral areas of long, narrow hair-like setae dorsally, submedian and anterior areas of hair-like setae ventrally; anterior margin strongly concave (Fig. 3); anteromedian emargination recessed, rounded, with

4 small, apically flat denticles (Figs. 3-4). Subapical outer margin of mandibles flat, parallel to inner margin, median area of outer margin with large, rounded protuberance as in Fig. 5; subapical inner margin flat with angular bend basally as in Fig. 5; incisors and prostheca of left mandible as in Fig. 5. Lingua of hypopharynx with well developed lateral processes, anterior margin with a median cleft, submedian lobes and setae as in Fig. 7; superlingua of hypopharynx with setae as in Fig. 7. Galea-lacinia of maxillae with a small, round protuberance on outer anterolateral margin (Fig. 6); venter of galea-lacinia with a row of 6-8 pectinate setae on anterolateral corner of the V-shaped ridge, a single large pectinate seta on the inner margin just basal to V-shaped ridge, and long narrow setae on anterior and inner lateral margin as in Fig. 6, dorsum of galea-lacinia with a tuft of long setae on inner anterolateral margin; cardo large, shaped as in Fig. 6, with setae on outer margin as in Fig. 6; segment 2 of maxillary palpi  $1\frac{2}{5}$  to  $1\frac{1}{2}$  length of segment 1; segment 3 of palpi a little more than  $\frac{1}{3}$  to a little more than  $\frac{2}{5}$  length of segment 2; segment 1 of labial palpi with setae as in Fig. 6, segment 2 and 3 of palpi with dense, long hair-like setae on outer margin, segment 3 with short setae on inner margin. Segment 2 of labial palpi from slightly less than  $\frac{4}{5}$  to a little more than  $\frac{4}{5}$  length of segment 1; segment 3 of labial palpi a little less than to a little more than  $\frac{1}{3}$  length of segment 2; palpal segments with long hair-like setae as in Fig. 8, segment 3 with thick peg-like setae as in Fig. 9; glossae dorsal to paraglossae apically (Fig. 10), glossae excavated apically; paraglossae wide, tapering laterally (Fig. 8); paraglossae and glossae with dense, hair-like setae as in Figs. 8, 10; submentum as in Fig. 8. Pronotum with small spines on anterolateral margin (Fig. 1). Legs (Figs. 1, 11-15): maximum width of femora  $2\frac{3}{4}$  times maximum width of tibiae, maximum width of tibiae approximately 2 times maximum width of tarsi, outer margin of femora indented on apical  $\frac{4}{5}$  of inner margin so tibiae can draw partially into femora, tibiae flattened in cross section as in Fig. 12, tarsi cross section as in Fig. 13; femora, tibiae and tarsi with dense, long hair-like setae as in Fig. 11, inner margin of fore and mid tibiae and tarsi with long stiff setae (Fig. 11), inner margin of hind tibiae with short stiff setae, inner margin of hind tarsi with short, thick setae (Fig. 15); apex of claws hooked and narrow with 3 large denticles on inner medial margin, and a recessed row of denticles subapically as in Fig. 14. Gills (Fig. 2): gills on segments 1-7 similar; gills branched near base, dorsal and ventral lamellae slender, smoothly tapered to apex, approximately equal in length; main tracheal trunk branched near base, unbranched apically. Posterolateral spines on abdominal segments 8 and 9 well developed, acute. Terminal filament longer than cerci.

ETYMOLOGY: perissos, Gr., meaning odd, strange; phlebo, Gr., meaning vein, a common ending in the Leptophlebiidae; feminine.

TYPE SPECIES: *Perissophlebia flinti* NEW SPECIES.

*Perissophlebia flinti* NEW SPECIES

IMAGO: Unknown.

MATURE NYMPH (in alcohol). Body length, 6.5-8.0 mm. Eyes: eyes of female black; upper portion of eyes of male orangish-yellow, lower portion black. Head yellowish-brown (Fig. 1). Basal 2/3 of ocelli black, apical 1/3 white. Scape and pedicel yellowish-brown, flagellum brownish-yellow. Thorax: nota yellowish-brown, anterior margin of pronotum and carinae brown, pronotum and anterolateral and lateral margins of mesonotum washed with brownish-black; sterna yellowish-brown, carinae and sutures darker; pleura yellowish-brown, washed with brownish-black. Legs (Figs. 1, 11-15): brownish-yellow, femora washed with brownish-black. Abdomen: terga brownish-yellow, washed with brownish-black. Gills (Fig. 2): membrane translucent, tracheae brownish-black. Caudal filaments pale grey with variable periodic pattern of segments with base darker, segments with dark base progressively farther apart apically (Fig. 16).

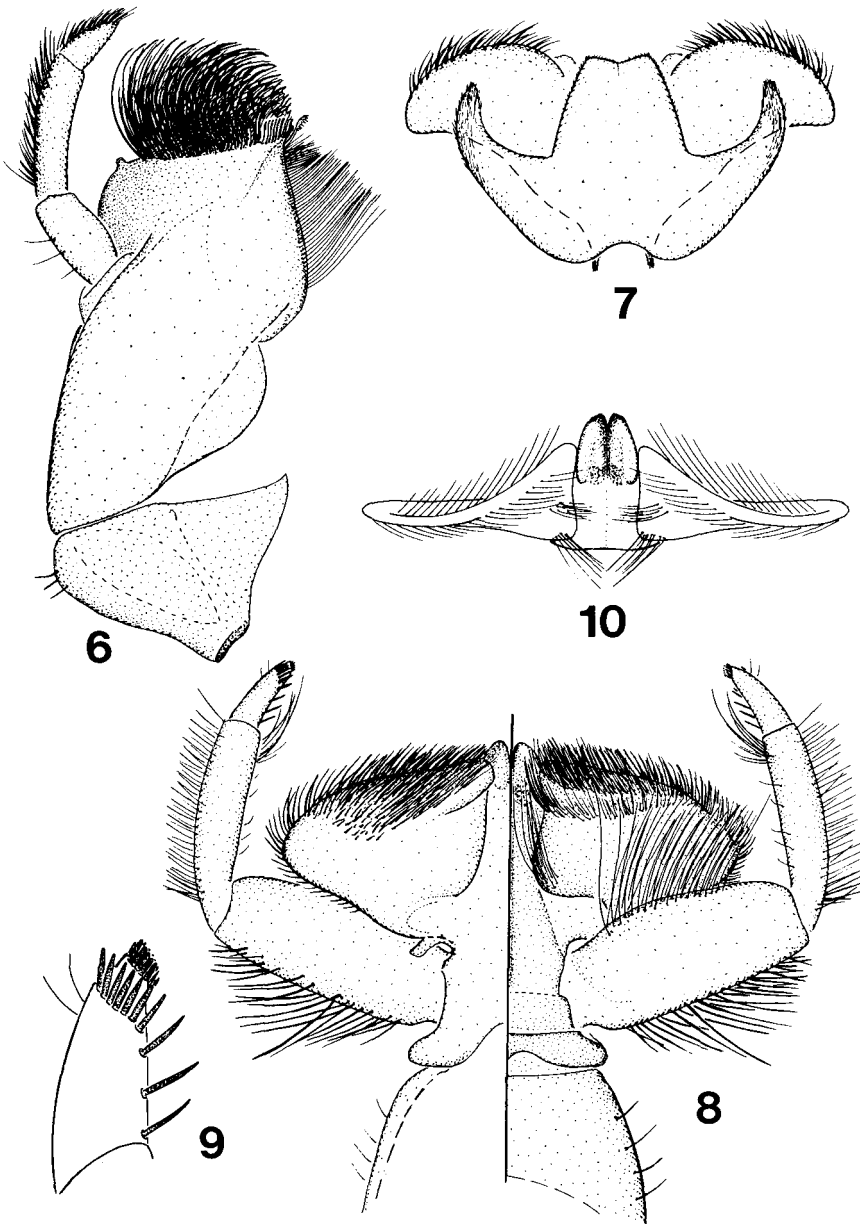
SPECIMENS EXAMINED: Holotype mature nymph, BRAZIL: Rio de Janeiro State, 11 km E. of Nova Friburgo, municipal water supply, 950 m, 20 April 1977, C. M. and O. S. Flint, Jr. Paratypes: 2 mature nymphs, same data as holotype.

Holotype is deposited in collections of Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil. One paratype is deposited in collections of National Museum of Natural History, Washington, D.C., and one paratype is deposited in collections of Florida A and M University, Tallahassee.

ETYMOLOGY: Species is named for Dr. O. S. Flint, Jr., National Museum of Natural History, Washington, D.C.

## DISCUSSION

Imagos of *Perissophlebia* are unknown. However, mature nymphs of *Perissophlebia* can easily be distinguished from all other genera of Leptophlebiidae by the following combination of characters: (1) maximum width of labrum is approximately equal to width of clypeus; anterior margin of labrum is strongly concave with anteromedian emargination recessed, rounded (Fig. 3); (2) subapical outer margin of mandibles is flat and parallel to inner margin; median area of outer margin has a large, rounded protuberance as in Fig. 5; (3) galea-lacinia of maxillae has a small, round protuberance on outer anterolateral margin, and a row of 6-8 pectinate setae on anterolateral corner of the V-shaped ridge (Fig. 6); (4) paraglossae of labium are wide, tapered laterally (Fig. 8); glossae are excavated apically; labial palpi have setae as in Fig. 8; (5) fore legs are shaped as in Fig. 11, with dense long hair-like setae; (6) claws have 3 large denticles on inner medial margin and a recessed row of denticles subapically (Fig. 14); (7) gills on segments 1-7 are similar; gills branch near base, dorsal and ventral portions are slender and smoothly taper to apex (Fig.



Figs. 6-10. *Perissophlebia flinti*: 6, right maxilla; 7, hypopharynx; 8, labium, dorsal (left) and ventral (right); 9, enlarged dorsal view of labial palpi segment 3; 10, glossae and paraglossae of labium, anterior view.

2); and (8) posterolateral spines on abdominal segments 8 and 9 are well developed and acute.

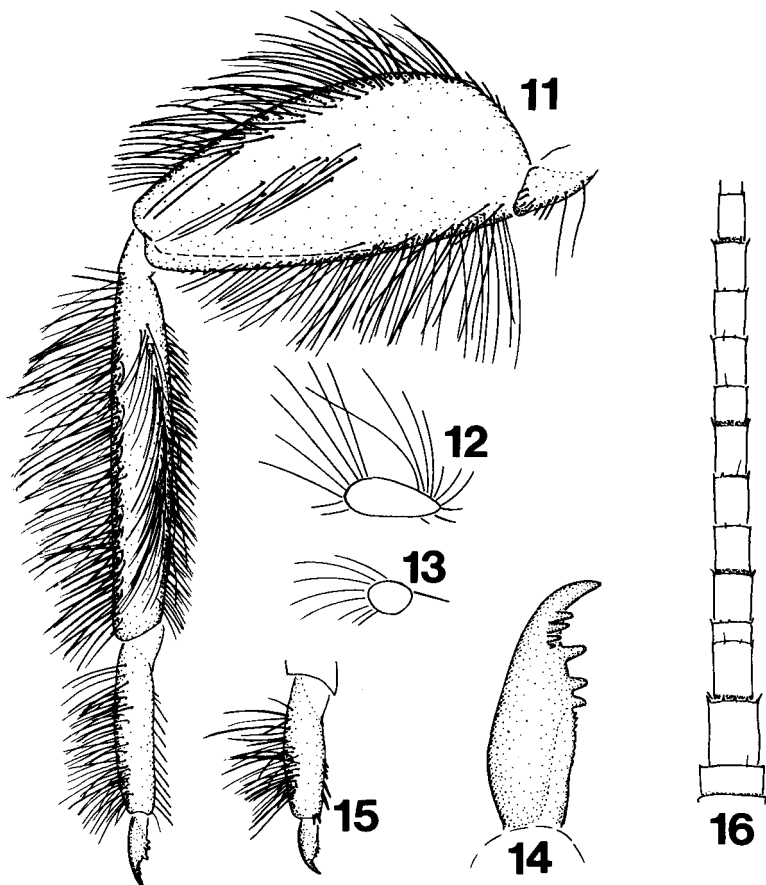
Gills 2-6 and the abdominal color pattern are poorly preserved in specimens of *P. flinti*. Therefore, description of the gills was based primarily on gills 1 and 7 (Fig. 2), while a detailed description of the abdominal color pattern awaits collection of additional material.

The description of the maxillae requires some clarification. Generally, generic descriptions of Leptphlebiidae report the number of pectinate setae in the subapical row of the galea-lacinia (Savage and Peters, 1978). However, in *P. flinti* the subapical row of setae is not apparent and even difficult to detect on slide mounted material. This difficulty results from an anterior shift in the V-shaped ridge on which the setae are inserted, combined with the small number of setae present, approximately 7. Thus, this important character is reported as the number of pectinate setae on the anterolateral corner of the V-shaped ridge.

The nymphal stage of *P. flinti* presents a conglomeration of highly derived character states, which appear to be correlated with a sprawling habit and the use of the legs for collecting-gathering perhaps in a fashion similar to that found in the Euthyplociidae. Many of the derived character states observed in *P. flinti* such as the abundance of hair on the legs, the concave anterior margin of the labrum, the protuberance on the outer margin of the mandibles, the enlarged maxillae with an anterolateral protuberance on the galea-lacinia and the medial extension of the cardo, and the enlarged, hairy labium with paraglossae which taper laterally are unique or rarely encountered among the Leptophlebiidae, while derived states shared with other taxa such as the straight glossae may represent parallel evolution. Therefore, it is not possible at the present time to associate nymphs of *Perissophlebia* with other taxa by the presence of shared derived character states as is necessary for the delineation of monophyletic groups. Ancestral character states observed in nymphs of *P. flinti* such as a narrow labrum which lacks basal setae along its lateral margins, the small number of pectinate setae on the V-shaped ridge of the galea-lacinia of the maxillae, and large peg-like setae on labial palpi segment 3 are shared with members of the *Hapsiphlebia* and *Penaphlebia* lineages and the northern South American genera *Terpides* and *Fittkaulus*. Due to the large number of unique derived character states the phylogenetic placement of *P. flinti* will remain enigmatic until male imagos become available for study. However, the shared ancestral character states suggest that *P. flinti* is a very specialized lineage that shares a common ancestry with *Fittkaulus*, *Terpides* and members of the *Hapsiphlebia* and *Penaphlebia* lineages.

## BIOLOGY

Nymphs of *Perissophlebia flinti* were collected in April from a clear, fast flowing stream (Fig. 17) which is approximately 5 m wide and 0.15 to 0.36 m



Figs. 11-16. *Perissophlebia flinti*: 11, prothoracic leg; 12, cross section of prothoracic tibia; 13, cross section of prothoracic tarsus; 14, enlargement of prothoracic claw; 15, metathoracic tarsus and claw; 16, basal portion of caudal filament.

deep, with substrate consisting of boulders, rubble, gravel and bedrock (Dr. O. S. Flint, Jr., pers. comm.).

#### RESUMEN

Se describe un nuevo género y especie de Atalophlebiinae, *Perissophlebia flinti*, basándose en ninfas coleccionadas en Serra dos Ôrgãos, en el sur de Brasil. Las ninfas de *P. flinti* exhiben un gran número de caracteres derivados que parecen estar correlacionados con el hábito de permanecer con las patas extendidas y con el uso de las patas delanteras para recoger alimento (collecting-gathering).

Los imagos de *Perissophlebia* son desconocidos. Sin embargo, las ninfas maduras de *Peris-*



Fig. 17. Type locality of *Perissophlebia flinti*, 11 km east of Nova Friburgo, Rio de Janeiro State.

*sophlebia* pueden ser fácilmente diferenciadas de todos los otros géneros de Leptophlebiidae mediante la siguiente combinación de caracteres: 1) El ancho máximo del labro es aproximadamente igual al ancho del clipeo; el margen anterior del labro es marcadamente cóncavo y la emarginación anteromediana tiene una muesca redondeada (Fig. 3); 2) El margen subapical externo de las mandíbulas es plano y paralelo al margen interno; el área media del margen externo tiene una gran protuberancia redondeada como en la Fig. 5; 3) La galea-lacinia de las maxilas tienen una protuberancia pequeña y redondeada en el margen externo anterolateral, y una fila subapical de 6 a 8 setas pectinadas, sobre el ángulo anterolateral interno (Fig. 6); 4) Las paraglosas del labium son anchas, adelgazadas lateralmente (Fig. 8), las glosas son excavadas apicalmente; el palpo labial tiene setas como en la figura 8; 5) Las patas anteriores semejantes a la Fig. 11, con densas y largas setas, con forma de pelo; 6) Las uñas tienen 3 grandes denticulos en la parte media ventral y una fila subapical de denticulos ubicados interiormente (Fig. 14); 7) Las branquias de los segmentos 1 a 7 son similares; se ramifican cerca de la base y sus porciones dorsal y ventral son delgadas y suavemente afinadas hacia el ápice (Fig. 2); y 8) Las espinas posterolaterales de los segmentos abdominales 8 y 9 son agudas y están bien desarrolladas.

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