

## ***Segesta riograndensis*, new genus and species of an Atalophlebiinae (Ephemeroptera: Leptophlebiidae) mayfly from southern Brazil**

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### **Abstract**

A new genus, *Segesta*, is described based on nymphs from the State of Rio Grande do Sul, southern Brazil. The genus is related to *Thraulodes*, *Massartellopsis*, *Meridialaris* and *Secochela* as indicated by the posterolateral spines on abdominal segments 2 to 9, by the long lanceolate gills present on segments 1 to 7, tarsal claws without a large subapical denticle, and general shape of clypeus and labrum. However, the new genus can be distinguished from those related genera by the maxillary and labial palps that are very large and remarkably curved, a shape unique among the Neotropical Atalophlebiinae not belonging to the *Hermanella*-group.

**Key words:** Ephemeroptera, Leptophlebiidae, Atalophlebiinae, new genus, new species, South Brazil

### **Resumo**

O novo gênero *Segesta*, é descrito baseado em ninfas do Estado do Rio Grande do Sul, Sul do Brasil. O gênero é relacionado com *Thraulodes*, *Massartellopsis*, *Meridialaris* e *Secochela*, devido a caracteres tais como espinhos póstero-laterais nos segmentos abdominais 2 a 9, tipo de brânquias presentes nos segmentos 1 a 7, garras tarsais sem um dentículo subapical grande e padrão geral do clipeo e labro. Porém, o novo gênero é distinto destes gêneros pelos palpos maxilares e labiais muito grandes e recurvados, um padrão único entre os Atalophlebiinae neotropicais não pertencentes ao grupo *Hermanella*.

**Palavras-chave:** Ephemeroptera, Leptophlebiidae, Atalophlebiinae, gênero novo, espécie nova, Sul do Brasil

## Introduction

The family Leptophlebiidae is represented in South America by the Gondwanian Atalophlebiinae, the most genera-rich mayfly subfamily of the world (Domínguez *et al.* 1994). In Brazil, this subfamily presents 20 genera, distributed in 44 species (Salles *et al.* 2004).

Within the subfamily, nymphs of *Thraulodes*, *Massartellopsis*, *Meridialaris* and *Secochela* show strong similarities among them, including posterolateral spines on abdominal segments 2 or 3 to 9, long lanceolate gills on segments 1 to 7, tarsal claws without a large subapical denticle, and the general shape of the clypeus and labrum (Traver & Edmunds 1967; Pescador & Peters 1987; Domínguez *et al.* 1994). *Thraulodes* was established by Ulmer 1920 for *Thraululus laetus* Eaton (Lopes *et al.* 2003); at least 50 species are described in *Thraulodes*, but many of these are only known from adults. The known geographical range of this genus is from southern United States to Argentina, including Brazil (Traver & Edmunds 1967; Edmunds *et al.* 1976; Domínguez *et al.* 1994; Lopes *et al.* 2003; Salles *et al.* 2004). Demoulin (1955) established the genus *Massartellopsis*, Peters and Edmunds (1972) established *Meridialaris*, and Pescador and Peters (1982) established *Secochela*, although the nymphs of *Secochela* were not described until 2001 by Pescador and Gonser. A revision of *Massartellopsis* and *Meridialaris* was done by Pescador and Peters (1987), who included seven species in *Meridialaris* and one species in *Massartellopsis*; the work includes new species, with additional data on distribution and phylogeny. *Massartellopsis*, *Meridialaris* and *Secochela* occur in restricted areas in high altitudes of the Andes and in the Patagonian region (Pescador & Peters 1987; Domínguez *et al.* 1994; Pescador & Gonser 2001).

We describe the new genus *Segesta*, based on nymphs from the State of Rio Grande do Sul, Brazil, with tarsal claws and abdominal projections similar to those of the four cited genera, but *Segesta* presents remarkable differences in the mouthparts, especially the large maxillary and labial palps.

The holotype is deposited in the Museum of Zoology of the University of São Paulo (MZSP), São Paulo, Brazil. Paratypes are deposited in the Museum of Natural Sciences of the Zoobotanic Foundation of Rio Grande do Sul (MSNZRS), Porto Alegre, Rio Grande do Sul, Brazil, and in MZSP.

### *Segesta* Siegloch & Polegatto n. gen.

**Nymph, mature, female.** *Head.* Prognathous. Clypeus (Fig. 1): narrower than labrum, i.e. width ca. 2/3 of the width of labrum, with slightly divergent and sinuous margins. Labrum (Fig. 1): expanded laterally, with rounded margins, anterior margin with shallow emargination; three rounded denticles on anterior emargination (Fig. 2); length of labrum 1/3 of width; large dorsal row of fine setae closer to anterior margin and a group of setae

on dorsal surface; on ventral surface, anterior and middle area with short setae, relatively long setae at wide area of margins. Mandibles (Figs. 3–6): Semilunar in shape and with round margins; setae present on whole extension of lateral margin; a small ventral V shaped row of fine setae (Fig. 5); right mandible with relatively slender incisors, the anterior one with three apical denticles, the posterior one with two apical denticles and minute marginal spines; prosthema slender with two portions, one long hard spine-like setae, and one group of fine setae on a projected base (Fig. 6); a row of about 9 setae closer to mola; left mandible with more robust incisors, both with three apical denticles, the posterior one with minute marginal spines; prosthema with two portions, one projection with a pectinate and a simple setae, and one projection with a group of fine setae; setae closer to mola absent. Maxillae (Figs. 7–9): General shape rectangular, stipes with minute posterior prominence on outer margin, brush of setae on apical margin of galealacinia and fine median setae as found in other Atalophlebiinae; maxillary palp well developed, attached at mid length of maxillae, with various setae, long and short, curved inwards; first segment with rectangular shape, with margins slightly curved; second segment subequal in size to first segment; third segment about two times the length of second segment; third segment with row of long fine setae on lateral margin, same kind of setae on ventral surface, and relatively short setae on median margin in two different rows; third segment curved inwards (Fig. 8). Hypopharynx: Lingua and superliguae as in Fig. 10. Labium (Fig. 11): Glossae with numerous ventral short setae and some dorsal short setae; paraglossae with dorsal rows of setae of different sizes and ventral row of subequal fine setae; prementum small, with labial palps attached at anterior area of lateral margin; postmentum without lateral setae, with minute ventral setae on posterior area; length of paraglossae about half of width; labial palp well developed, first segment long and rectangular, length slightly larger than width of paraglossae; second segment very long, about two times the first segment and curved inwards, with long fine setae on lateral margin and other setae as in Fig. 11; third segment reduced to about 1/6 of length of first segment, with few fine setae (Fig. 12).

*Thorax.* Legs: Forelegs with long fine setae on femur, and hard spatulate setae of varied sizes, long fine setae on tibiae and tarsi, other short setae as in Fig. 13. Midlegs and hindlegs similar to forelegs, but with spatulate setae on hind tibiae (Figs. 14, 15). Tarsal claws (Fig. 16) with small subequal denticles, without large subapical denticle. Hind wingpads present.

*Abdomen.* Posterolateral spines on segments 2 to 9, those on 7 to 9 progressively larger. Gills on segments 1 to 7; gills slender, with main tracheae visible without ramifications, minute setae on margins of gills (Fig. 20).

The new genus can be distinguished from other genera of Atalophlebiinae by the following combination of characters: clypeus slightly divergent with sinuous margin; labrum with shallow emargination and three non-prominent denticles; maxillary palp very large and curved with setae in varied combinations; labial palp very long and curved, with

long setae; paraglossae wider than long; abdominal posterolateral spines gradually longer posteriorly.

**Type-species:** *Segesta riograndensis*

**Adults:** unknown

**Etymology:** *Segesta* is a goddess of harvests; the name refers to shape of the maxillary and labial palps, that recalls sickles used in harvesting.

***Segesta riograndensis* Siegloch & Polegatto n. sp.**

**Nymph, mature, female** (in alcohol). Body length: 6mm; terminal filament: 7mm, cerci: about 6/7 of length of terminal filament; general coloration gray spotted.

*Head.* Dorsum of head orange-brown, with a narrow transverse dark brown band between ocelli extending to anterior base of eyes. Mouthparts: orange-brown, lighter in ventral surface; cardo and base of mandibles darker. Labrum (Fig. 1): dorsal row of about 50 long fine setae, very close to anterior margin; a group of about 9 dorsal curved setae on each half. Mandibles as in figures 3–6. Maxillae (Figs. 7–9): Cardo with about 6 short setae; stipes with minute basal posterior prominence on outer margin; anterior margin of galealacinia completely occupied by hard brush of setae; in ventral anteromedian area, about 15 pectinate setae, with apical comb, and one large pectinate setae with complete comb (Fig. 9). Hypopharynx as in Fig. 10. Labium as in Fig. 11.

*Thorax.* Dorsum of thorax orange-brown with dark spots at anterior and posterolateral margins of pronotum, and at the base of fore wingpad. Pronotum with row of about 8 spine-like setae on anterolateral margin. Legs: Orange-brown, dorsal surface of coxae with small dark spots; ventral surface of fore femora with two basal gray spots and two other apical; ventral surface of middle and hind femora with an apical gray spot. Forelegs (Fig. 13) with long fine setae on posterior margin of femora, and hard spatulate setae of various sizes, ca. 6 long, and ca. 14 short; short setae on anterior margin of femora and short spatulate setae on dorsal surface; long fine setae on posterior margin of tibiae and tarsi, and short spine-like setae on anterior margin of tibiae and tarsi; midlegs (Fig. 14) similar to forelegs, but femora with ca. 8 long and ca. 3 short spatulate setae on femora; hindlegs (Fig. 15) similar to those described before, but femora with ca. 8 long and ca. 14 short spatulate setae, and spatulate setae also on tibiae, ca. 6 long and 8 short. Tarsal claws (Fig. 16) with small subequal denticles, about 6 apical and 6 basal; a big subapical denticle absent; apical denticle curved.

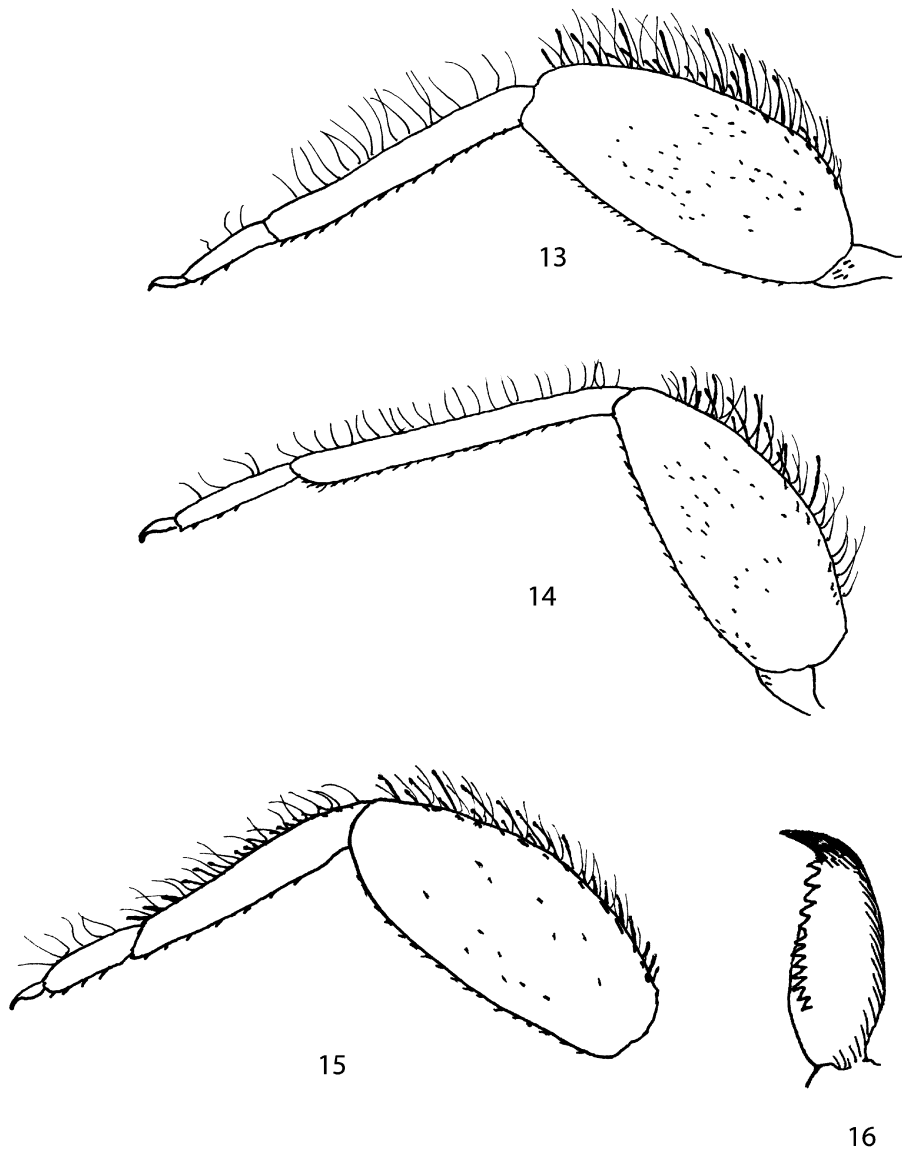
*Abdomen.* Gray spotted, as in Fig. 17. Margin of tergum 5 as in Fig. 19. Shape of caudal filaments as in Fig. 18.

**Nymph, mature, male.** *Eye.* Lower portion black, upper portion orange-brown. Body length 6,3mm.

**Adults:** unknown.



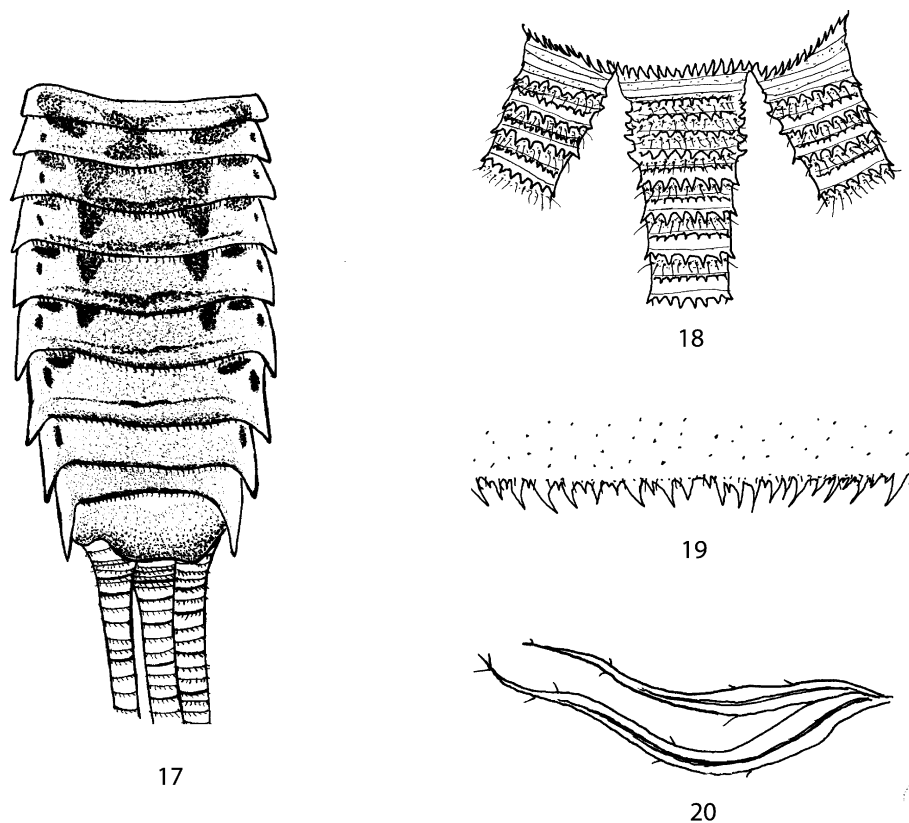
**FIGURES 1–12.** *Segesta riograndensis* n. sp.: 1, labrum, left dorsal view, right ventral view. 2, anteromedian emargination of labrum; 3, left mandible, dorsal view. 4, right mandible, dorsal view. 5, right mandible, partial, ventral view. 6, mandibles details; left and right incisors and prostheca. 7, maxillae, ventral view. 8, maxillary palp, detail, dorsal view. 9, pectinate setae of galealacinia, ventral view. 10, hypopharynx, left ventral view, right dorsal view. 11, labium, left ventral view, right dorsal view, some setae omitted. 12, segment 3 of labial palp.



**FIGURES 13–16.** *Segesta riograndensis* n. sp.: 13, foreleg. 14, midleg. 15, hindleg. Legs in dorsal view. 16, Tarsal claw.

**Material examined:** Holotype, female nymph, Brazil, State of Rio Grande do Sul, Independência, Santa Rosa River, A.E. Siegloch, I.2005, deposited at MZSP. Paratypes, 7 nymphs; 2 nymphs same data as holotype, but 1 male and 4 female, XIII.2005; 1 male and 2 female deposited in MZSP, and 4 female at MSNZRS.

**Geographical distribution:** The type-species was collected in northwestern Rio Grande do Sul, southern Brazil. There is also a record of a similar nymph (undescribed) for Nova Xavantina, State of Mato Grosso, western Brazil.



**FIGURES 17–20.** *Segesta riograndensis* n. sp.; 17, abdomen with color pattern. 18, base of caudal filaments. 19, posterior margin of tergum 5. 20, gill of first abdominal segment.

**Habitat:** The nymphs were found on rocks and stones in the river, at an altitude of about 300 m.

**Etymology:** The epithet *riograndensis* refers to State of Rio Grande do Sul, where the species was collected.

## Discussion

*Segesta* seems most closely related to a group of genera that includes *Meridialaris*, *Massartellopsis*, *Secochela* and *Thraulodes* based on the following combination of characters: i) clypeus divergent apically, ii) lateral margins of postmentum without setae, iii) posterolateral projections present on abdominal segments 2–9; iv) claws without large apical denticle, v) gills on segments 1–7 similar in shape, lanceolate (Traver & Edmunds 1967; Pescador & Peters 1987; Domínguez *et al.* 1994; Pescador & Gonser 2001). In all these genera, the labrum can be rounded or angular, and it is always wider than the clypeus, but the clypeus has divergent margins in *Massartellopsis*, *Meridialaris* and

*Secochela*. The anterior margin of labrum has a hooded emargination in *Massartellopsis*, *Meridialaris* and *Secochela*, but is more variable with different combinations of denticles in *Thraulodes* (Traver & Edmunds 1967; Edmunds *et al.* 1976). Mandibles are semilunar in shape with round or angular margins, and they have lateral tufts or rows of setae in *Massartellopsis*, *Meridialaris* and *Secochela*. Maxillae are generally broad, especially in *Thraulodes*. In all these genera, the maxillary palps are similar to those of other Atalophlebiinae that do not belong to *Hermanella* group, e.g. *Massartella*, *Farrodes* etc. The labial palp has spine-like setae on third segment in *Massartellopsis*, *Meridialaris* and *Secochela*, and the third segment can be reduced in *Thraulodes* (Traver & Edmunds 1967; Lopes *et al.* 2003). Gills are lanceolate, sometimes very slender (Traver & Edmunds 1967; Pescador & Peters 1987), with only main tracheae visible, as in some *Meridialaris* and *Secochela*, or with ramifications, as in *Massartellopsis* and some *Thraulodes*, or many ramifications, as in some *Meridialaris* (Pescador & Peters 1987). The shape of gills varies in *Thraulodes* (Traver & Edmunds 1967), and it was used for trying to separate *Massartellopsis* from *Meridialaris* by Pescador and Peters (1987), both genera are very similar in the nymphal stage.

*Segesta* can be distinguished from other genera of Atalophlebiinae by the cited combination of characters: the size and shape of the maxillary and labial palps, remarkable among the Neotropical Atalophlebiinae that do not belong to the *Hermanella* group; the maxillary palp with segment 3 almost twice the length of segment 2 (Fig 7); the very small third segment of the labial palp (Fig. 11, 12); the regular row of long setae distributed uniformly on the maxillary and labial palps; labrum with a shallow emargination with three rounded denticles. Other details, such as the shape and position of the setae of the maxillary and labial palps and a small posterior prominence on the stipes are additional differences. On the other hand, there are important similarities with the related genera, such as the size of the labrum and its margins; the shape of the hypopharynx, similar to those of *Meridialaris*, *Massartellopsis* and *Secochela*; the gills similar to those of *Meridialaris*, including minute setae on margins (Pescador & Peters 1987); the tarsal claws similar to the four cited genera; and the great number of spines on abdominal segments, although the spines in *Segesta* increase gradually. Spatulate setae on the legs of *Segesta* are also similar to some setae found in *Meridialaris* (Pescador & Peters 1987). However, a shallow emargination of the labrum, the heavy row the setae on the apical half of the mandibles at base of outer incisors, and color pattern would suggest that *Segesta* is closer to *Thraulodes* than to the “cool-adapted genera” of the Andes (Savage 1987). It is important to note that different species of *Thraulodes* are distributed in different altitudes, and that it has a wide geographical distribution (Edmunds *et al.* 1976). The differences between *Segesta* and the group that includes *Massartellopsis*, *Meridialaris* and *Secochela*, regarding distribution and altitude, suggest distinct ecological trends for *Segesta*. *Segesta*, found in relatively low altitudes, ca. 300 m, seems sparsely distributed in Brazil, considering the possible record for the West of the country.



As for the number of species in the four genera cited, *Thraulodes* are more numerous, followed by *Meridialaris*, while *Massartellopsis*, *Secochela* and *Segesta* have one species each.

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