Key to the genera of Ephemerelloidea (Insecta: Ephemeroptera) from Brazil

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Abstract

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A key to the Brazilian genera of Ephemerelloidea, nymphs and adults, belonging to the families Coryphoridae, Leptohyphidae and Melanemerellidae is presented. Currently, seven genera of this superfamily are known in Brazil. The Leptohyphidae is the most representative family, with five genera registered from the country, *Leptohyphes* Eaton, 1882, *Leptohyphodes* Ulmer, 1920, *Traverhyphes* Molineri, 2001, *Tricorythodes* Ulmer, 1920 and *Tricorythopsis* Traver, 1958. The families Coryphoridae and Melanemerellidae are monotypic, represented by *Coryphorus* Peters, 1981and *Melanemerella* Ulmer, 1920.

Key words: *Ephemerelloidea, nymphs, adults, illustrated key, Brazil.*

Resumo

Dias, L. G.; Salles, F. F.; Francischetti, C. N.; & Ferreira, P. S. F. **Chave para os gêneros de Ephemerelloidea (Insecta: Ephemeroptera) do Brasil**. *Biota Neotrop*. Jan/Abr 2006, vol. 6, no. 1 http://www.biotaneotropica.org.br/v6n1/pt/abstract?identification-key+bn00806012006. ISSN 1676-0611

Neste trabalho é apresentada uma chave para identificação dos gêneros brasileiros de Ephemerelloidea, ninfas e adultos, pertencentes às famílias Coryphoridae, Leptohyphidae e Melanemerellidae. Atualmente, sete gêneros desta superfamília são conhecidos no Brasil. Leptohyphidae é a família mais representativa, com cinco gêneros registrados para o país, *Leptohyphes* Eaton, 1882, *Leptohyphodes* Ulmer, 1920, *Traverhyphes* Molineri, 2001, *Tricorythodes* Ulmer, 1920 and *Tricorythopsis* Traver, 1958. Coryphoridae e Melanemerellidae são monotípicas, representadas por *Coryphorus* Peters, 1981e *Melanemerella* Ulmer, 1920.

Palavras-chave: *Ephemerelloidea, ninfas, adultos, chave ilustrada, Brasil*

Introduction

The superfamily Ephemerelloidea (Ephemeroptera) is a cosmopolitan and very basal group of mayflies (McCafferty & Wang 2000). Together with the superfamily Caenoidea, the Ephemerelloidea are inserted in the suborder Pannota, a group where the mature nymphs have less than half of their forewingpads freely extended beyond their fusion, although the wingpads remain externally recognizable as do the pro- and mesothoracic mesothoracic segments (McCafferty and Edmunds 1979, McCafferty & Wang 2000).

Other representative of Pannota in South America, besides Ephemerelloidea, is the family Caenidae. Despite the similarity between both groups having operculate gills on segment 2, nymphs of South American Ephemerelloidea can be distinguished from those of Caenidae by the absence of filamentous gills 1. The adults of Ephemerelloidea can be differentiated by lacking an ommation on the mesonotum, the vein MP2 of the forewings not extending to the base and not curving from near the base of MP1, and by the vein CuP strongly curved to the inner margin of the wing (McCafferty & Wang 2000).

Of the three families, eleven genera and 70 species of the superfamily Ephemerelloidea represented in South America (Dominguez et al. 2004, Emmerich 2004), all families, seven genera, and 20 species are registered from Brazil (Molineri 2004, Salles et al. 2004). Coryphoridae and Melanemerellidae are represented by one species, each, whereas Leptohyphidae is the most diverse, with five genera and 18 species (Molineri 2004, Salles et al. 2004).

Coryphoridae, represented only by *Coryphorus aquilus* Peters, 1981, is known in Brazil from the states of Amazonas and Pará, Northern Region. *C. aquilus* Peters, 1981, is also recorded from Colombia (Peters 1981, Molineri et al. 2002) and French Guiana (Orth et al. 2000).

Melanemerellidae is represented by *Melanemerella brasiliana* Ulmer, 1920, endemic to Brazil and reported from the states of São Paulo and Espírito Santo, Southeastern Region (Ulmer 1920, Molineri & Domínguez 2003).

With regard to Leptohyphidae, the genera *Leptohyphes* Eaton, 1982, *Tricorythodes* Ulmer,1920 and *Tricorythopsis* Traver, 1958, have five species each. They are widely distributed in Brazil (Banks 1913, Ulmer 1920, Needham & Murphy 1924, Traver 1959, Allen 1967, 1973, Da-Silva 1993, Molineri 1999, 2001a, 2002, 2003). *Traverhyphes* Molineri, 2001, is represented by two species, one from the Southern Region, and another from the Southeastern Region (Molineri 2001b, 2004). The genus *Leptohyphodes* Ulmer, 1920, is monotypic and known only from Brazil, being represented by *L. inanis* (Pictet, 1843). Although the type-locality of *L. inanis* was referred only to "Brazil" in the original description (Pictet 1843), Traver (1944) described the nymph of the genus, based on specimens from the state of Minas Gerais, Southeastern Region.

In order to contribute to currents and future studies of systematics and ecology of the group in Brazil, a key for the identification of the Brazilian ephemerelloidea genera is necessary. The aim of this paper is to present a key to nymphs and adults of the Ephemerelloidea genera recorded from the country.

Material and methods

All genera of Ephemerelloidea from Brazil were studied for the elaboration of the key. The specimens examined were borrowed from the following institutions: Museu Regional de Entomologia, Universidade Federal de Viçosa, MG and of the Departamento de Zoologia, Instituto de Biologia da Universidade Federal do Rio de Janeiro, RJ. .Drawings were made on white paper with the aid of a Leica camera lucida attached to a MZ8 microscope.

Results

Key to the genera of Ephemerelloidea (Insecta: Ephemeroptera) from Brazil

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Nymphs

1. Eyes elevated (Fig. 1); posterolateral projection of abdominal terga 2-5 curved dorsally (Fig. 2); dorsal tubercles present in all regions of the body (Fig. 2)…Coryphoridae, *Coryphorus*

1'. Eyes not elevated (Fig. 3); posterolateral projection of abdominal terga 2-5 not curved dorsally (Fig. 4-6); tubercles usually absent or present in one or two regions of the body (Figs. 4, 5); if tubercles present in all regions of the body, then tubercles paired (Fig. 6)…2

2(1'). Abdominal terga 2-9 with a pair of submedian tubercles, more evident in the abdominal terga 3-9 (Fig. 6); gills with ventral lamellae fringed (Fig. 7); femora strongly expanded (Fig. 8)…Melanemerellidae, *Melanemerella*

2'. Abdominal terga never with paired tubercles (Figs. 4, 5, 10); ventral gills without fringed lamellae (Figs. 13b, 14b); femora generally not expanded (Fig. 9) …Leptohyphidae …3

3(2'). Operculate gills subquadrangular, internal margins reaching median line (Fig. 10); gills present on abdominal segments 2-5; eyes of males divided (Fig. 11) …*Leptohyphodes*

3'. Operculate gills triangular, oval or rounded (Figs. 12-15), internal margins not reaching median line; gills present on abdominal segments 2–6; eyes of males generally not divided …4

4(3'). Body smaller than 4 mm; operculate gills with a weakly sclerotized transversal line (Fig. 15) …*Tricorythopsis*

4'. Body generally larger than 4 mm; operculate gills without a transversal line (Figs. 12-14) …5

5(4'). Operculate gills generally triangular (Fig. 12); if operculate gills ovoid, then femora circular and bordered with long setae (Fig. 16) ...*Tricorythodes*

5'. Operculate gills ovoid (Figs. 13, 14); femora never bordered with long setae ...6

6(5'). Ventral lamellae of operculate gills with a basal beak-like process (Fig. 13b); operculate gills without dorsal ribs (Fig. 13a) …*Leptohyphes*

6'. Ventral lamellae of operculate gills without a basal beak-like process (Fig. 14b); operculate gills generally with one or two dorsal ribs (Fig. 14a) ...*Traverhyphes*

Adults

1. Forewings with 2-3 detached marginal intercalaries between apex of main intercalary veins (Fig. 17a); hind wings present in both sexes (Fig. 17b) ...Melanemerellidae, *Melanemerella*

1'. Forewings without marginal intercalaries (Fig.18a, 20, 23, 24); hind wings variable, present only in males, absent in both sexes, or, rarely, present in both sexes ...2

2(1'). Compound eyes of male greatly enlarged and undivided, separated on dorsum of head by width of an eye (Fig. 19); cubital area of fore wings without intercalaries (Fig. 20); penis large, fused and distally broadened (Fig. 21) ...Coryphoridae, *Coryphorus*

2'. Eyes of male similar to females, usually not enlarged (Fig. 22); if so, then eyes divided and close to each other in dorsal view; intercalaries present on cubital area (Figs. 18, 23, 24); penis not as above (Figs. 25-29) ...Leptohyphidae ...3

3(2'). Mesoscutellum with relatively long membranous filaments (Fig. 30); base of male forewings not broadened (Fig. 18) ...4

3'. Mesoscutellum without membranous filaments (Fig. 31); male forewings broadened at base (Fig.23, 24) ...6

4(3). Eyes of males divided (Fig. 32); forceps two-segmented; hind wings absent in both sexes ...*Leptohyphodes*

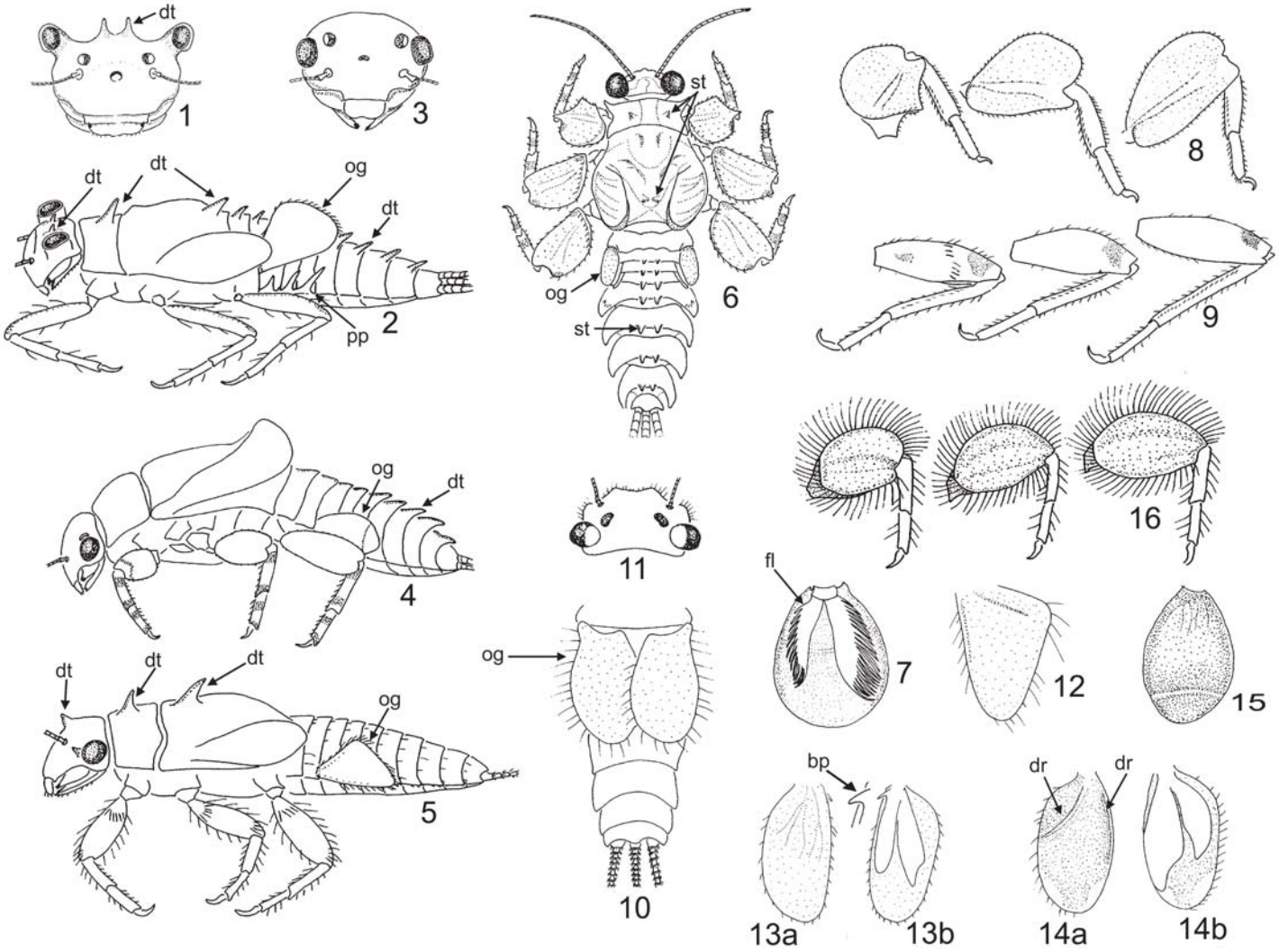
4'. Eyes of males usually not divided (Fig. 22); forceps three-segmented; hind wings present at least in males (Fig. 18) ...5

5(4'). Penis "Y" shaped, with apical spine and without dorsal spine (Fig. 25) ...*Leptohyphes*

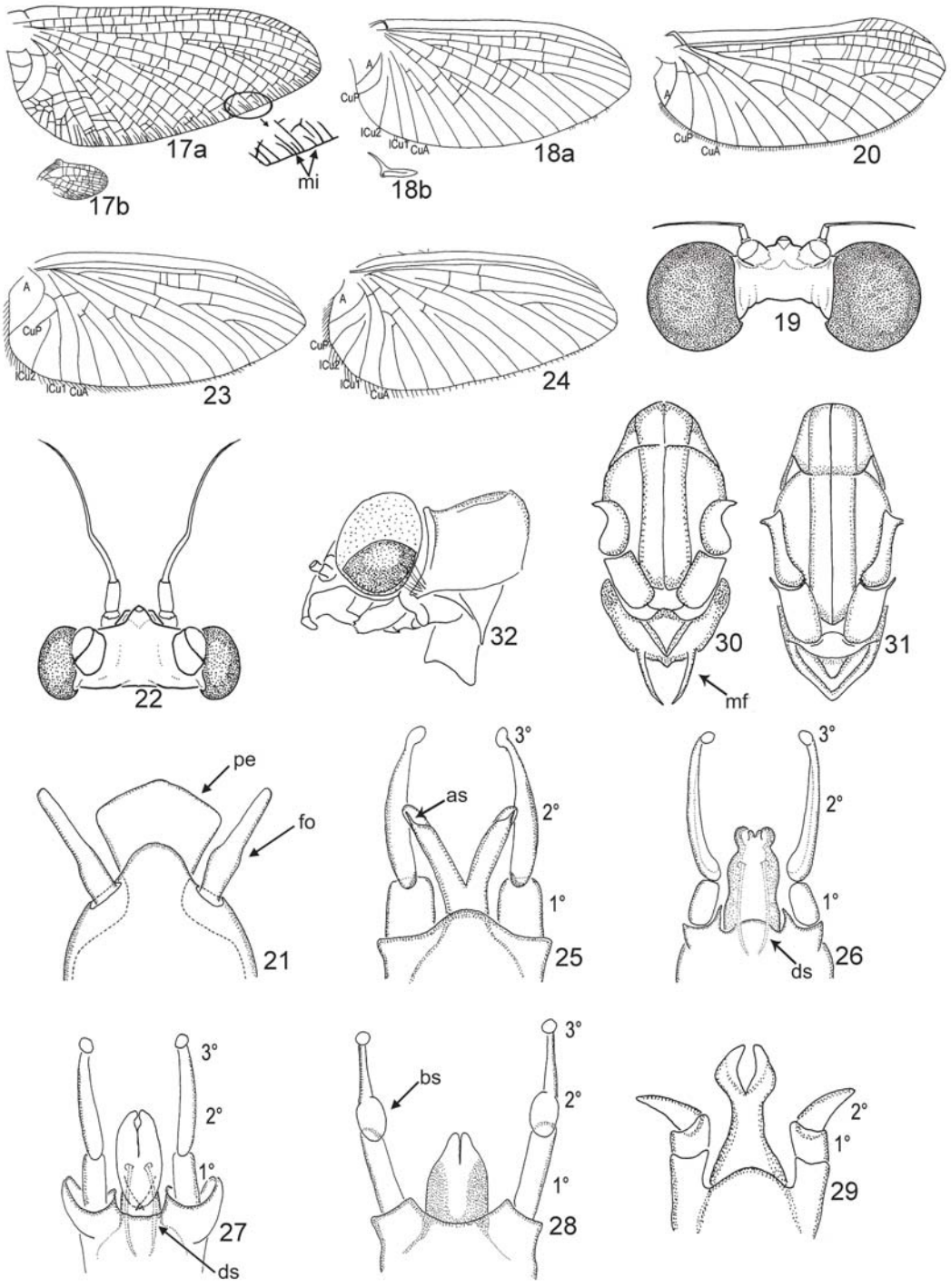
5'. Penis not as above (almost totally fused), without apical spine and with dorsal spine (Fig. 26, 27) …*Traverhyphes*

6(5'). Forceps three-segmented, basal swelling usually present at base of second joint (Fig. 28) ...*Tricorythodes*

6'. Forceps two-segmented, basal swelling absent at base of second joint (Fig. 29) …*Tricorythopsis*



Figures 1-16. *Ephemerelloidea, nymphs: 1.* Coryphorus aquilus *(head, frontal view); 2.* C. aquilus *(lateral view); 3.* Tricorythopsis gibbus *(head, frontal view); 4.* T. gibbus *(lateral view); 5.* Tricorythodes bullus *(lateral view); 6.* Melanemerella brasiliana *(dorsal view); 7.* M. brasiliana *(operculate gill in ventral view); 8.* M. brasiliana *(legs: fore, middle and hind); 9.* Traverhyphes sp. *(legs: fore, middle and hind); 10.* Leptohyphodes inanis *(abdomen in dorsal view); 11.* L. inanis *(head, dorsal view); 12.* Tricorythodes sp. *(operculate gill, dorsal view); 13.* Leptohyphes plaumanni *(a — operculate gill, dorsal view, b — operculate gill, ventral view); 14.* Traverhyphes sp. *(a — operculate gill, dorsal view, b — operculate gill, ventral view); 15.* Tricorythopsis sp. *(operculate gill, dorsal view); 16* Tricorythodes santarita *(legs: fore, middle and hind). Abbreviations: bp - basal beak-like process, dr – dorsal ribs, dt - dorsal tubercles, fl – fringed lamella, og – operculate gills, pp - posterolateral projection of abdominal, st – submedian tubercles.*



Figures 17-32. *Ephemerelloidea, adults: 17.* Melanemerella brasiliana *(a – forewing, b - hind wing); 18.* Traverhyphes sp. *(a – forewing, b - hind wing); 19.* Coryphorus aquilus *(head, dorsal view); 20.* C. aquilus *(forewing); 21.* C. aquilus *(genitalia); 22. Leptohyphidae (head, dorsal view); 23*. Tricorythodes bullus *(forewing); 24*. Tricorythopsis sp. *(forewing); 25*. Leptohyphes plaumanni *(genitalia); 26*. Traverhyphes (Mocohyphes) sp. *(genitalia); 27.* Traverhyphes (Traverhyphes) pirai *(genitalia); 28.* Tricorythodes sp. *(genitalia); 29.* Tricorythopsis sp. *(genitalia); 30.* Traverhyphes sp. *(thorax, dorsal view); 31.* Tricorythodes sp. *(thorax, dorsal view); 32.* Leptohyphodes inanis *(head, lateral view). Abbreviations: as – apical spine, bs - basal swelling of second joint, ds - dorsal spine, fo – forceps, mf – membranous filaments, mi – marginal intercalaries, pe - penis.*