

## The nymphs of the genus *Camelobaetidius* Demoulin (Ephemeroptera : Baetidae) in Brazil : new species, new records, and key for the identification of the species

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Three new species of *Camelobaetidius* Demoulin (Ephemeroptera : Baetidae), *C. hamadae* sp. n., *C. lassance* sp. n., and *C. maranhensis* sp. n., are described based on nymphs from Brazil. Some of the diagnostic characters of the new taxa are : *C. hamadae* sp. n., two thoracic gills at base of forelegs and claws with 36-37 denticles ; *C. lassance* sp. n., claws with approximately 60 denticles and posterior margin of terga with few, large and elevated spines ; *C. maranhensis* sp. n., pronotum with medial pair of tubercles and terminal filament shorter than 10th abdominal segment. *Camelobaetidius cayumba* (Traver & Edmunds), *C. matilei* Thomas & Perú, and *C. tuberosus* Lugo-Ortiz & McCafferty, are recorded for the first time from Brazil. A key to the species of *Camelobaetidius* recorded from Brazil based on nymphs is presented.

Keywords : Ephemeroptera, Baetidae, *Camelobaetidius*, taxonomy, Brazil.

### Introduction

*Camelobaetidius* Demoulin is a Panamerican genus of small minnow mayflies (Ephemeroptera : Baetidae) with 25 species currently recorded from South America. Except for a few countries, where they are probably not reported due the lack of studies on the fauna of Baetidae (e.g. Ecuador, Chile and Guiana), all South American countries have records of nominal species of *Camelobaetidius* (Traver & Edmunds 1968, Lugo-Ortiz & McCafferty 1999a,b, Dominique et al. 2001, 2002, Dominique & Thomas 2002, Thomas et al. 2003a, b, Nieto 2002, 2003, Salles et al. 2005b).

In Brazil, the following species of *Camelobaetidius* have been reported : *C. anubis* (Traver & Edmunds), *C. billi* Thomas & Dominique in Dominique et al., *C. francischettii* Salles, Andrade & Da-Silva, *C. janae* Dominique & Thomas in Dominique et al., *C. leent-*

*vaari* Demoulin, *C. mantis* Traver & Edmunds, *C. phaedrus* (Traver & Edmunds), and *C. serapis* (Traver & Edmunds) (Traver & Edmunds 1968, Salles & Dias 2004, Salles et al. 2004, Salles et al. 2005a, b). Among material collected in several areas of Brazil, including the poorly documented Northeast and Central-West regions, three new species of *Camelobaetidius*, and three species never reported from the country were found. In the present paper, besides the description and record of these species, we present for the first time a key to separate the nymphs of the Brazilian species of *Camelobaetidius*.

Given the great number of species of the genus, and the amount of undocumented areas within the country, it is probable that some species of *Camelobaetidius* remain to be found and/or described from Brazil. To avoid misidentifications, we also present a diagnosis for the 14 species currently reported from the country. Diagnoses were based primarily on four characters that usually are adequate for distinguishing species of *Camelobaetidius* : shape of the inner margin of the second segment of labial palp ; presence or absence of a thoracic gill at the base of foreleg ; number of denticles

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on the claws ; and the length of the terminal filament. In cases where these characters are not adequate for identification, or the species presents some remarkable features, other characteristics are also presented. The list of the species is presented in alphabetical order. The material is housed in the following institutions : Entomological Collection of the Instituto Nacional de Pesquisas da Amazônia, Amazonas, Brazil (INPA) ; Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil (MNRJ); and Fundación-Instituto Miguel Lillo, Tucumán, Argentina (IFML).

**Results and Discussion**

***Camelobaetidius anubis* (Traver & Edmunds, 1968)**

Diagnosis : inner margin of the second segment of labial palp pointed ; thoracic gill present at base of fo-

relegs ; claws with 20-27 denticles ; terminal filament about as long as cerci ; length of body 6.5-10.0 mm.

Brazilian records (Fig. 1) : Guarapuava and Serra do Purunã, Paraná State ; Seara, Ipumirim and Campos Novos, Santa Catarina State ; Araçuaia and Bocaina de Minas, Minas Gerais State ; Ribeirão Grande, São Paulo State ; Itatiaia and Teresópolis, Rio de Janeiro State.

Remarks : This species was described based exclusively on nymphs from Southern Brazil by Traver & Edmunds (1968). Later, Salles et al. (2003, 2004) extended the known distribution of the species to Northern Brazil, and Nieto (2003) recorded it from Argentina, describing the adults for the first time.

***Camelobaetidius billi* Thomas & Dominique in Dominique et al., 2001**

Diagnosis : inner margin of the second segment of labial palp rounded ; thoracic gill present at base of fo-

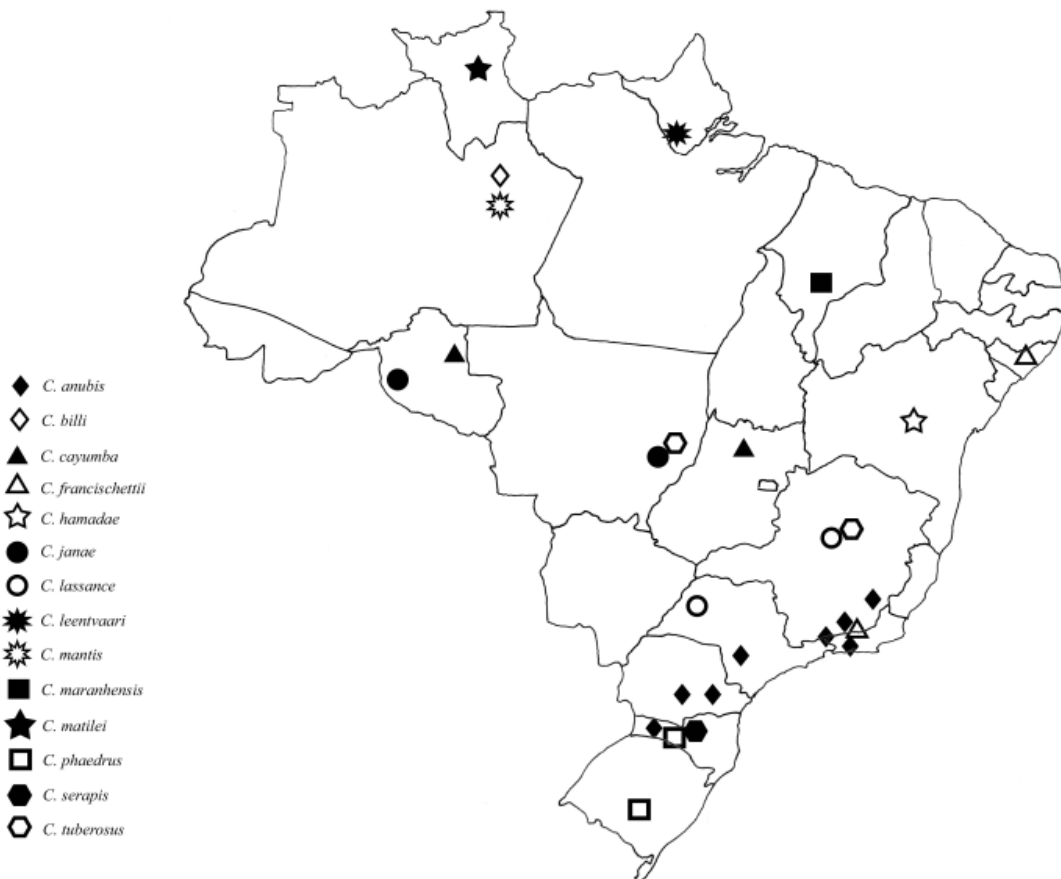


Fig. 1. Geographic distribution of the species of *Camelobaetidius* recorded from Brazil.

relegs ; claws with approximately 31 denticles ; terminal filament reduced.

Brazilian records (Fig. 1) : Presidente Figueiredo, Amazonas State.

Remarks : This species was originally described based on nymphs from French Guiana (Dominique et al. 2001). Salles & Dias (2004) recently described the adults based on material from Northern Brazil.

***Camelobaetidius cayumba* (Traver & Edmunds, 1968)**

Diagnosis : inner margin of the second segment of labial palp pointed ; thoracic gill absent at base of forelegs ; claws with 15-18 denticles ; terminal filament about as long as cerci.

Brazilian records (Fig. 1) : Rio das Almas, Goiás State ; Ji-Paraná, Rondônia.

Remarks : *C. cayumba*, described originally from Peru by Traver & Edmunds (1968), was recently re-described by Thomas et al. (2001). These are the first records of *C. cayumba* from Brazil, extending considerably its known distribution to the south.

Material examined : Goiás, Rio das Almas, between 14° 43' 07" S/49° 01' 24" W and 14° 42' 35" S/49° 01' 56" W, 12/x/1996, 4 nymphs ; Rondônia, Ji-Paraná, Rio Urupá, Balneário Bernardino, 10° 07' 16.9" S, 61° 54' 32.1" W, 02/viii/ 2002, N. Hamada leg., 2 nymphs and 2 nymphal exuvia.

***Camelobaetidius francischettii* Salles, Andrade & Da-Silva, 2005**

Diagnosis : segment two of labial palp with distomedial process rounded and strongly produced ; forefemora with prominent protuberance ; foretibiae with indentation at apex ; ventral margin of forefemora and foretibiae entirely scattered with spines ; claws with 34 to 37 denticles ; small thoracic gill at the base of forelegs ; prosternum with a single, medial protuberance ; terminal filament about as long as the length of the 10<sup>th</sup> abdominal segment.

Brazilian records (Fig. 1) : Piraí, Rio de Janeiro State ; Murici, Alagoas State.

Remarks : *C. francischettii* was described based solely on nymphs from Alagoas and Rio de Janeiro states (Salles et al. 2005b).

***Camelobaetidius hamadae* Salles & Serrão, sp. n. (Figs. 1 -13, 37, 40, 45-46)**

Mature nymph. Body length : 5.6-6.2 mm. Caudal filaments length : broken off in all nymphs, at least 2.3 mm.

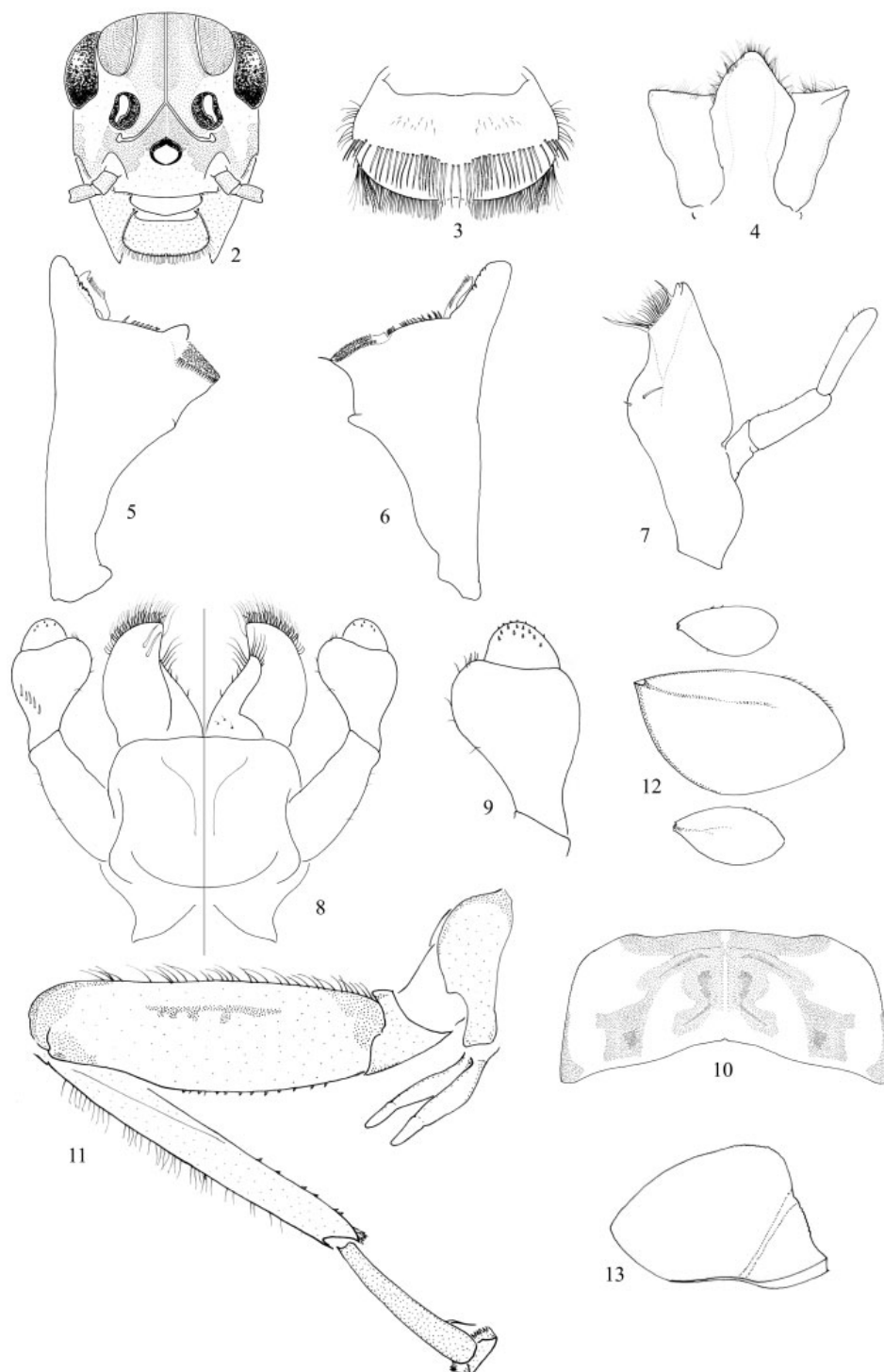
Head. General coloration yellowish, with brownish and whitish marks as in Fig. 2 ; turbinate portion of male compound eyes orange. Antennae brownish-translucent. Labrum (Fig. 3) with anterodorsal row of 22 long, fine, simple setae, and with few short, fine, simple setae, scattered over surface. Hypopharynx as in Fig. 4. Left mandible (Fig. 5) with incisors protruded and fused, with seven denticles ; prosthema robust, apically denticulate ; eight minute, spiniform setae, occasionally bifid, between prosthema and subtriangular process ; subtriangular process wide at base, not strongly produced. Right mandible (Fig. 6) with incisors protruded and strongly fused, with five to six denticles ; prosthema robust, narrower than left prosthema and with row of minute spines ; 16 minute, spinelike setae, between prosthema and mola. Maxillae (Fig. 7) with palp segment one cylindrical ; segment two subequal in length to segment one ; medial hump with 1+1 fine, simple, setae. Labium (Figs. 8, 9) with glossae presenting seven fine, simple setae medially, and eight fine, simple setae distally ; paraglossae longer than glossae, apically with two rows of long, apically pectinate setae, dorsally with two robust, simple setae ; segment two of labial palp with distomedial process rounded and strongly produced, inner margin with few, fine, simple setae, and dorsally with five long, fine, simple setae ; segment three scattered with few spine-like setae over surface.

Thorax. Pronotum (Fig. 10) and mesonotum yellowish, with brown marks. Metanotum brown. Pleurae yellowish to light brown. Sterna yellowish. Legs (Fig. 11) with two thoracic gills at base ; femora light brown, with whitish and dark brown marks as in Fig. 11 ; tibiae light brown, ventral margin scattered with few short, acute, simple setae, becoming more abundant and longer at the apex ; tarsi brown, ventral margin lighter, with 12 short, acute, simple setae, one subdistal long, robust, simple seta, and one distal robust, simple setae ; claws (Fig. 40) with 36-37 denticles.

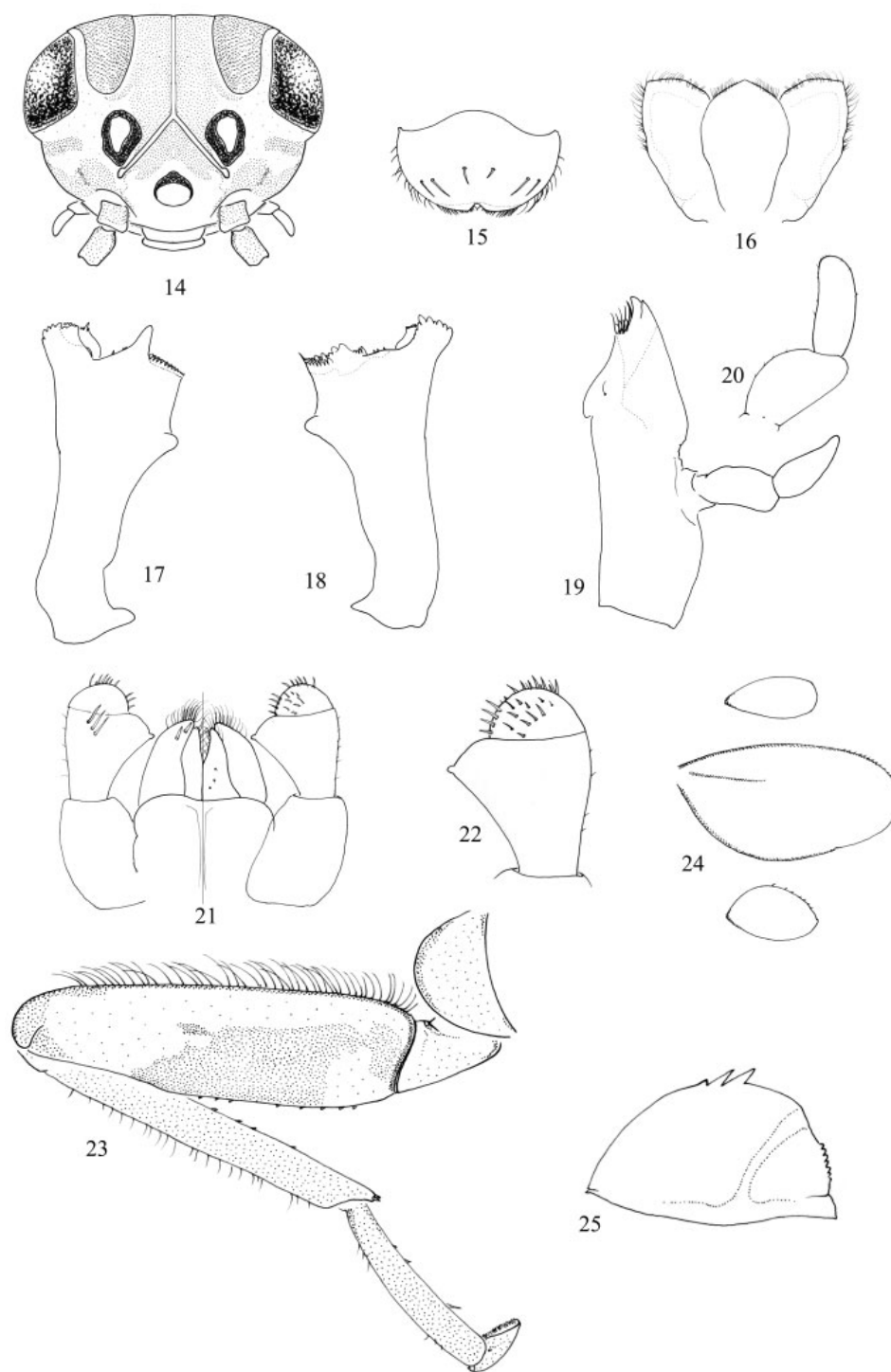
Abdomen. General coloration yellowish, with light brown to brownish marks as in Fig. 37. Posterior margin of terga (Figs. 45, 46) with triangular spines. Sterna yellowish. Gills (Fig. 12) whitish, with main trachea pigmented to poorly pigmented. Paraprocts as in Fig. 13. Terminal filament about as long as cerci.

Adults. Unknown.

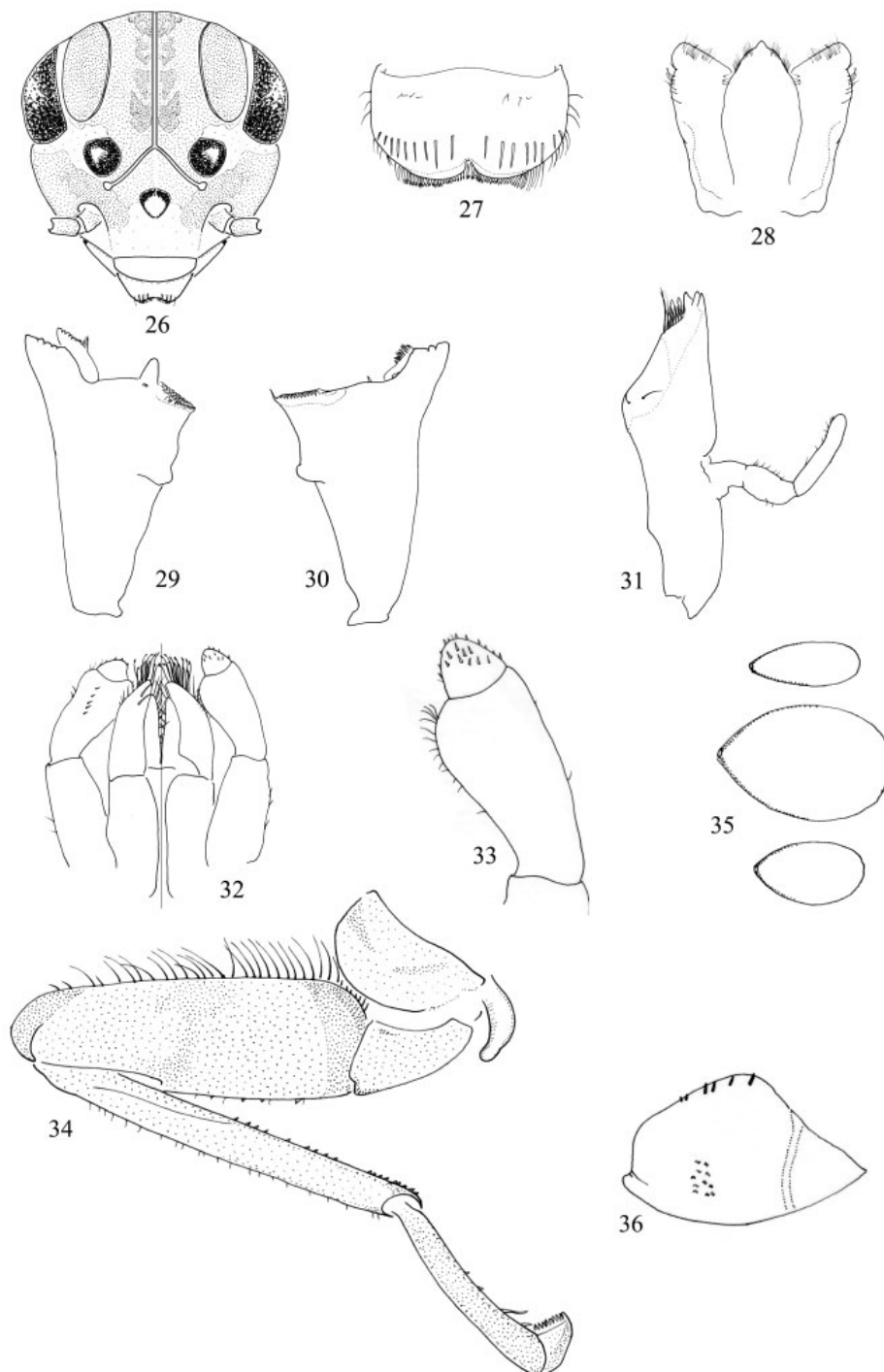
Type material. Holotype : female mature nymph, body in alcohol, legs and mouthparts mounted on slides. Bahia, Estrada Andaraí - Lençóis. Rio Roncador, 12° 41' 58.5" S 41° 21' 28.1" W. N. Hamada (INPA). Paratypes : 12 nymphs, Bahia, Palmeiras, Córrego Conceição dos Gatos, N. Hamada (6 nymphs in INPA, 6 in MNRJ) ; 5 nymphs, Bahia, Mucugê, Rio Cumbuca, 04/viii/2005, N. Hamada (IFML).



Figs 2-13. *Camelobaetidius hamadae* sp. n., mature nymph. 2. Head (frontal). 3. Labrum (dorsal). 4. Hypopharynx. 5. Left mandible. 6. Right mandible. 7. Maxilla. 8. (left-dorsal; right-ventral). 9. Labium (detail of labial palp segments two and three). 10. Pronotum. 11. Foreleg. 12. Gills 1, 4, and 7. 13. Paraproct.



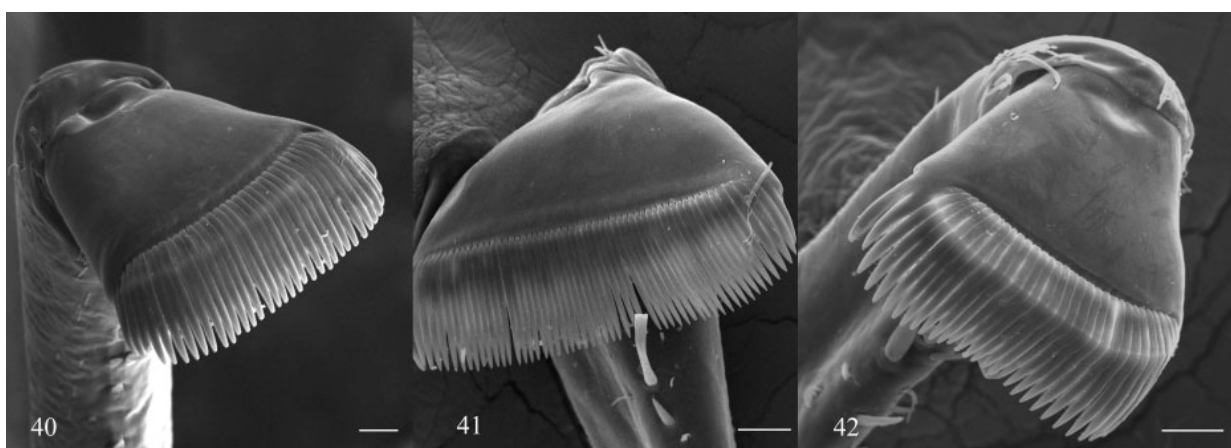
Figs 14-25. *Camelobaetidius lassance* sp. n., mature nymph. 14. Head (frontal). 15. Labrum (dorsal). 16. Hypopharynx. 17. Left mandible. 18. Right mandible. 19. Maxilla. 20. Maxillary palp segments one and two. 21. Labium (left-dorsal; right-ventral). 22. Labium (detail of labial palp segments two and three). 23. Foreleg. 24. Gills 1, 4, and 7. 25. Paraproct.



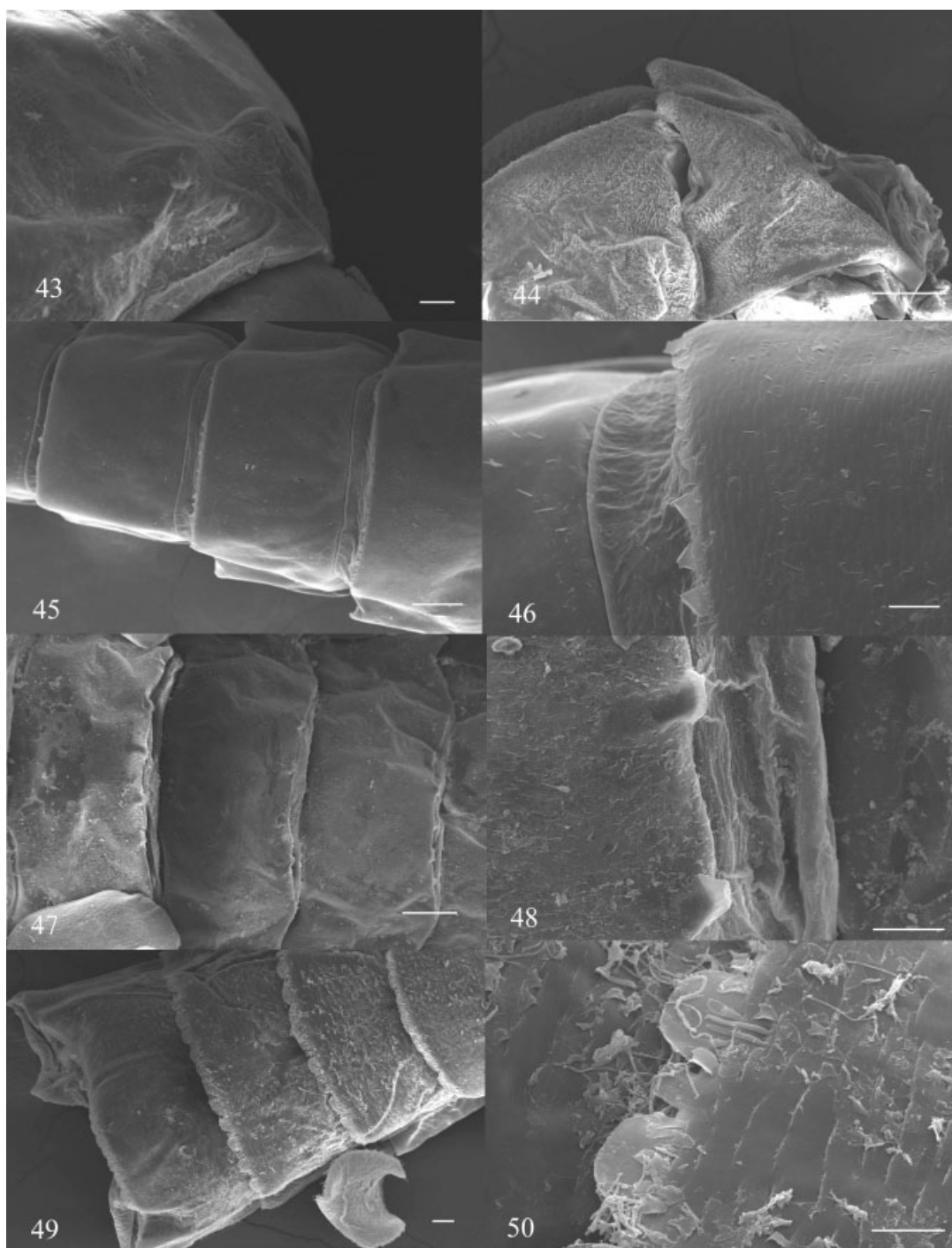
Figs 26-36. *Camelobaetidius maranhensis* sp. n., mature nymph. 26. Head (frontal). 27. Labrum (dorsal). 28. Hypopharynx. 29. Left mandible. 30. Right mandible. 31. Maxilla. 32. Labium (left-dorsal; right-ventral). 33. Labium (detail of labial palp segments two and three). 34. Fore-leg. 35. Gills 1, 4, and 7. 36. Paraproct.



Figs 37-39. *Camelobaetidius* spp. n. Abdominal color pattern. 37. *C. hamadae* sp. n. 38. *C. lassance* sp. n. 39. *C. maranhensis* sp. n.



Figs 40-42. *Camelobaetidius* spp. n., SEM photographs. Claw of nymphs. 40. *C. hamadae* sp. n. 41. *C. lassance* sp. n. 42. *C. maranhensis* sp. n. Scale bars = 20  $\mu$ m.



Figs 43-50. *Camelobaetidius* spp. n., SEM photographs. Nymphal thorax and abdomen. 43. *C. lassance* sp. n. (detail of tubercles on pronotum). 44. *C. maranhensis* sp. n. (detail of tubercles on pronotum). 45. *C. hamadae* sp. n. (partial view of abdominal terga). 46. *C. hamadae* sp. n. (detail of posterior margin of terga). 47. *C. lassance* sp. n. (partial view of abdominal terga). 48. *C. lassance* sp. n. (detail of posterior margin of terga). 49. *C. maranhensis* sp. n. (partial view of abdominal terga). 50. *C. maranhensis* sp. n. (detail of posterior margin of terga). Scale bars = 100  $\mu$ m (figs. 44-45, 47), 30  $\mu$ m (fig. 48), 20  $\mu$ m (figs. 43, 46, 49), 10  $\mu$ m (fig. 50).



Etymology. We are pleased and honored to name this species after Dr. Neusa Hamada, our colleague in the field of aquatic entomology, and responsible for supplying us with the majority of the material treated in the present work.

Diagnosis : inner margin of the second segment of labial palp rounded, strongly produced (Figs. 8, 9) ; two thoracic gills present at base of forelegs (Fig. 11) ; claws with 36-37 denticles (Fig. 40) ; terminal filament about as long as cerci.

Brazilian records (Fig. 1): Corredeira do Mucujezinho, Palmeiras and Mucugê, Bahia State.

Remarks : *C. hamadae* sp. n. is a distinctive species of *Camelobaetidius*. The presence of two thoracic gills at the base of forelegs is unique among species of the genus ; the shape of the second segment of the labial palp, and the morphology and setation of the labrum, are not usually found in species of *Camelobaetidius* with the terminal filament as long as the cerci. These characteristics are found in four other species, all of them with the terminal filament reduced. These include *C. francischettii*, *C. mantis*, *C. leentvaari*, and, to a lesser extent, *C. ipaye* Nieto.

***Camelobaetidius janae* Dominique & Thomas in Dominique et al., 2001**

Diagnosis : inner margin of the second segment of labial palp rounded, strongly produced ; maxillary palp bifid ; thoracic gill absent at base of forelegs ; claws with approximately 21 denticles ; terminal filament about as long as cerci.

Brazilian records (Fig. 1) : Nova Xavantina, Mato Grosso State ; Guajará-mirim, Rondônia State.

Remarks : This species was originally described based on nymphs from French Guiana (Dominique et al. 2001). Salles et al. (2004) reported some nymphs from the state of Mato Grosso, West-Central Brazil. In the present paper, we present data for material collected from the state of Rondônia, Northern Brazil.

Material examined : Rondônia, Guajará-mirim, Rio Mamori, 11/ix/2002, N. Hamada leg, 2 nymphs.

***Camelobaetidius lassance* Salles & Serrão, sp. n. (Figs. 1, 14-25, 38, 41, 43, 47-48)**

Mature nymph. Body length : 4.4-5.8 mm. Caudal filaments length : 1.7-2.0 mm.

Head. General coloration pale brown, with brownish marks as in Fig. 14. Turbinate portion of male compound eyes brown. Antennae with scape and pedicelum whitish brown, flagellum brown. Labrum (Fig. 15) with two to three lateral, long, fine, simple setae,

and with one submedial long, fine, simple setae ; intermediary setae absent. Hypopharynx as in Fig. 16. Left mandible (Fig. 17) with incisors with eight denticles ; prosthema robust, apically denticulate ; one minute, acute seta, between prosthema and subtriangular process. Right mandible (Fig. 18) with incisors with seven denticles ; prosthema robust, narrower than left prosthema ; 3 minute, acute setae, between prosthema and mola. Maxillae (Fig. 19) with palp segment one medially produced ; segment two subequal in length to segment one ; medial hump with one fine, simple, setae ; apex of galea-lacinia small, with few setae. Labium (Figs. 21, 22) with glossae with six fine, simple setae medially, and five to six fine, simple setae distally ; paraglossae slightly longer than glossae, apically with two rows of long, apically pectinate setae, dorsally with two robust, simple setae ; segment two of labial palp with proximal margin of distomedial process slightly concave and apical margin convex, culminating in a small finger like process, outer margin with few, fine, simple setae, and dorsally with three long, fine, simple setae ; segment three scattered with long, fine, simple setae over surface.

Thorax. Pro, meso, and metanotum yellowish-brown, marked with brown ; pronotum color pattern as in Fig. 10 ; pro and mesonotum eventually with two small tubercles at posterior margin (Fig. 43), more common in younger nymphs. Pleurae brown. Sterna yellowish-white. Legs (Fig. 23) without thoracic gills at base ; femora yellowish-white, outlined with dark brown, except for ventral margin, and marked with brown as in Fig. 23 ; tibiae light brown, ventral margin scattered with approximately four short, acute, simple setae plus two short, acute, simple setae at apex ; tarsi light brown at base, becoming darker distally, with inner margin with four short, acute, simple setae, one subdistal long, robust, simple seta, and one distal robust, simple setae ; claws (Fig. 41) with 59-62 denticles.

Abdomen. General coloration yellowish-brown, with brown marks as in Fig. 38. Posterior margin of terga (Figs. 47, 48) with three to four large and elevated spines. Sterna yellowish-white. Gills (Fig. 24) whitish, with margins and main trachea brownish. Paraprocts as in Fig. 25. Terminal filament about as long as cerci.

Adults. Unknown.

Type material. Holotype : female mature nymph, body in alcohol, legs and mouthparts mounted on slides. Brazil, Minas Gerais State, Lassance, Rio das Velhas, 17°52'25.8''S, 44°32'56.2''W, 31-vii-2003, F.F. Salles, N. Hamada, S.R.M. Couceiro, J.O. Silva (IN-PA). Paratypes : 16 nymphs, same data as holotype (4

nymphs in IFML, 4 in INPA, 4 in MNRJ); one nymph, São Paulo State, Valparaíso, 21°27'16,6''S, 50°55'03,7''W (INPA).

**Etymology.** Name of the city where most of the material was collected.

**Diagnosis :** segment two of labial palp with proximal margin slightly concave and apical margin convex, culminating in a small finger like process (Figs. 21-22); thoracic gill absent at base of forelegs (Fig. 23); claws with approximately 60 denticles (Fig. 38); posterior margin of terga with few, large and elevated spines (Figs. 47-48); terminal filament about as long as cerci.

Brazilian records (Fig. 1): Lassance, Minas Gerais State; Valparaíso, São Paulo State.

**Remarks :** *C. lassance* sp. n. has approximately 60 denticles on the claw, which is the highest number found on any *Camelobaetidius* species. Besides this characteristic, the posterior margin of the terga, with few, large and elevated spines, is also exclusive among *Camelobaetidius*. The small tubercles on the posterior margin of the pro and mesonotum are absent in mature nymphs. However, this characteristic may help in the identification of younger nymphs of *C. lassance* sp. n. The morphology of the second segment of the labial palp is also very characteristic, and resembles the labial palp of *C. ortizi* Dominique & Thomas. However, several other characteristics, such as body size, number of denticles on the claws, among others (see Dominique & Thomas 2002), separates this French Guyanese species from *C. lassance* sp. n.

#### ***Camelobaetidius leentvaari* Demoulin, 1966**

**Diagnosis :** segment two of labial palp with distomedial process rounded and strongly produced; forefemora with prominent protuberance and foretibiae with an indentation at apex; ventral margin of forefemora and foretibiae entirely scattered with spines; small thoracic gill present at base of forelegs; claws with 17 to 23 denticles; prosternum with a single, medial protuberance; and terminal filament as long as the length of the 10<sup>th</sup> abdominal segment.

Brazilian records (Fig. 1): Laranjal do Jari, Amapá State.

**Remarks :** *C. leentvaari* was described based on six nymphs from Suriname (Demoulin 1966). Traver & Edmunds (1968) stated, based on Demoulin's figures, that this species probably possesses nine denticles on the claws, contrasting with the 25 denticles found in its sister species, *C. mantis*. However, the redescription of *C. leentvaari*, based on the type material and additio-

nal nymphs from Brazil (Salles et al. 2005a), demonstrates that this species has 17 to 23 denticles on the claws, a number of denticles very close to those found in *C. mantis*.

#### ***Camelobaetidius mantis* Traver & Edmunds, 1968**

**Diagnosis :** segment two of labial palp with distomedial process rounded; forefemora with prominent protuberance and foretibiae with an indentation at apex, with spines on its margin; thoracic gill absent at base of forelegs; claws with approximately 25 denticles; gills with main trachea and few lateral branches pigmented; terminal filament as long as the length of the 10<sup>th</sup> abdominal segment.

Brazilian records (Fig. 1): Manaus, Amazonas State.

**Remarks :** This species was described based on one immature nymph from Manaus, Brazil (Traver & Edmunds 1968). Thomas et al. (2003b) found two possible nymphs of *C. mantis* in French Guyana, but the specimens were immature and the identification was not confirmed. Salles et al. (2005a) have pointed out that the redescription of *C. mantis* based on its type material is needed. The simplicity of the original description and the similarity between the number of denticles on the claws of *C. mantis* and *C. leentvaari* (see above) confounds its identification at the present time.

#### ***Camelobaetidius maranhensis* Salles & Serrão, sp. n. (Figs. 1, 26-36, 39, 42, 44, 49-50)**

Mature nymph. Body length: 2.7-3.1 mm. Caudal filaments length: 2.3-2.8 mm.

Head. General coloration brown, with brownish and whitish marks as in Fig. 26. Turbinate portion of male compound eyes orange. Antennae pale whitish-brown. Labrum (Fig. 27) with anterodorsal row of nine, fine, simple setae, becoming longer toward midline, and with few, subbasal, short, fine, simple setae. Hypopharynx as in Fig. 28. Left mandible (Fig. 29) with incisors with five denticles; prosthema robust, apically denticulate; two minute, acute setae, between prosthema and subtriangular process. Right mandible (Fig. 30) with incisors with six denticles; prosthema robust, apically denticulate; one minute, acute seta, between prosthema and mola. Maxillae (Fig. 31) with palp segment one cylindrical; segment two subequal in length to segment one; medial hump with 1+1 fine, simple, setae. Labium (Figs. 32, 33) with glossae with ten fine, simple setae medially; paraglossae longer than glossae, apically with two rows of long, apically pectinate setae, dorsally with two robust, simple setae; segment two of labial palp with distomedial process rounded, inner margin with few, fine, simple setae, and dorsally

with five long, fine, simple setae ; segment three scattered with few acute setae over surface.

Thorax. Pro and mesonotum light brown, color pattern of pronotum as in Fig. 10. Metanotum and pleurae yellowish. Sterna yellowish-white. Pronotum with medial pair of tubercles (Fig. 44). Legs (Fig. 35) with one thoracic gill at base ; femora yellowish-white, with brownish marks as in Fig. 35 ; tibiae yellowish-white, ventral margin scattered with acute, simple setae, becoming more abundant and longer at the apex, dorsal margin with row of short, fine, simple setae ; tarsi whitish at base, becoming brown toward apex, ventral margin with seven to eight long, acute, simple setae, one subdistal long, robust, simple seta, and one distal robust, simple setae ; claws (Fig. 42) with 31-32 denticles.

Abdomen. General coloration yellowish-brown, with brownish marks as in Fig. 39, in one female the first and second abdominal terga are lighter than in males. Posterior margin of terga (Figs. 49, 50) with subquadrate spines. Sterna yellowish-white, light brown at lateral margins. Gills (Fig. 34) whitish, with main trachea poorly pigmented. Paraprocts as in Fig. 36. Terminal filament shorter than the 10th abdominal segment.

Adults. Unknown.

Type material. Holotype : female mature nymph, body in alcohol, legs and mouthparts mounted on slides. Brazil, Maranhão, Riachão, Riacho Cocal, Cachoeira Santa Bárbara, 07°13'462''S, 46°27'246''W, 07/viii/2001, N. Hamada (INPA). Paratypes : three nymphs, same data as holotype (2 nymphs in INPA, 1 in IFML).

Etymology. After Maranhão, the name of the state where the species was found.

Diagnosis : inner margin of the second segment of labial palp rounded (Figs. 32-33) ; pronotum with medial pair of tubercles (Fig. 44) ; thoracic gill present at base of forelegs (Fig. 34) ; claws with 31-32 denticles (Fig. 39) ; terminal filament shorter than 10th abdominal segment.

Brazilian records (Fig. 1): Riachão, Maranhão State.

Remarks : Besides *C. maranhensis* sp. n., only *C. tuberosus* has tubercles on the pronotum. Nevertheless, nymphs of *C. tuberosus* also have a single blunt tubercle on the mesonotum and the terminal filament is not reduced as in *C. maranhensis* sp. n. Although younger nymphs of *C. lassance* sp. n. also possess small tubercles on pro and mesonotum, they are not posteriorly pointed as those of *C. maranhensis* sp. n. and *C. tuberosus*.

***Camelobaetidius matilei* Thomas & Péru, in Thomas et al., 2003**

Diagnosis : segment two of labial palp with distomedial process poorly developed ; apex of segment 3 of labial palp truncate ; hind wing pads absent ; thoracic gill absent at base of forelegs ; claws with 13-15 denticles ; terminal filament about as long as cerci.

Brazilian records (Fig. 1): Boa Vista, Roraima State.

Remarks : *C. matilei* was recently described based on nymphs from French Guyana (Thomas et al. 2003b). Besides being the first record of this species from Brazil, *C. matilei* is also reported for the first time from outside of French Guyana.

Material examined : Roraima, Boa Vista, Rio Cauamé, 24/x/2001, N. Hamada leg., 3 nymphs.

***Camelobaetidius phaedrus* (Traver & Edmunds, 1968)**

Diagnosis : incisors of mandible strongly protruded ; segment two of labial palp with distomedial process rounded ; thoracic gill present at base of forelegs ; claws with 7-11 denticles ; terminal filament about as long as cerci.

Brazilian records (Fig. 1) : Ipumirim, Santa Catarina State ; Caçapava do Sul and Cachoeira do Sul, Rio Grande do Sul State.

Remarks : Traver & Edmunds (1968) described this species based on nymphs from Brazil. Nieto (2003) recorded it from Argentina, and described the adults for the first time.

***Camelobaetidius serapis* (Traver & Edmunds, 1968)**

Diagnosis : segment two of labial palp with distomedial process pointed ; small thoracic gill present at base of forelegs ; claws with 30-40 denticles ; terminal filament about as long as cerci ; length of body 4.5-5.0 mm.

Brazilian records (Fig. 1): Ipumirim and Seara, Santa Catarina State.

Remarks : *C. serapis*, unlike the other South-American species described by Traver & Edmunds (1968), has no other records since its original description. The species was described based solely on nymphs from Santa Catarina State, Brazil.

***Camelobaetidius tuberosus* Lugo-Ortiz & McCafferty, 1999**

Diagnosis : inner margin of the second segment of labial palp rounded ; pronotum with medial pair of tubercles, and mesonotum with a single tubercle ; thora-

cic gill present at base of forelegs ; claws with 15-17 denticles ; terminal filament about as long as cerci.

Brazilian records (Fig. 1) : Lassance, Minas Gerais State ; Nova Xavantina, Mato Grosso State.

Remarks : *C. tuberosus* was described based on one nymph from Paraguay (Lugo-Ortiz & McCafferty 1999a). Nieto (2003) redescribed the species based on additional material from Argentina, and described the adults for the first time. We report this species for the first time from Brazil, extending the known distribution of *C. tuberosus* northward.

Material examined : Minas Gerais, Lassance, Rio das Velhas, 17°52'25.8"S, 44°32'56.2"W, 31-vii-2003, F.F. Salles, N. Hamada, S.R.M. Couceiro, J.O. Silva legs., 1 nymph. Mato Grosso, Nova Xavantina, Córrego Cachoeira, 16/vii/2004, H. Cabette leg., 1 nymph.

#### KEY TO NYMPHS OF BRAZIL

1. Terminal filament reduced, about the size of the 10th abdominal segment ..... 2
- 1'. Terminal filament not reduced, about as long as cerci ..... 6
2. Forefemora with a prominent protuberance ..... 3
- 2'. Forefemora without a protuberance ..... 5
3. Thoracic gill absent at base of forelegs ; prosternum without a medial protuberance ; gills with main trachea and few lateral branches pigmented. .... *C. mantis*
- 3'. Small thoracic gill present at base of forelegs; prosternum with a medial protuberance; gills untracheated ..... 4
4. Claws with 17-23 denticles ..... *C. leentvaari*
- 4'. Claws with 35-37 denticles ..... *C. francischettii*
5. Pronotum with medial pair of tubercles ..... *C. maranhensis* sp. n.
- 5'. Pronotum without tubercles ..... *C. billi*
6. Thoracic gill absent at base of forelegs ..... 7
- 6'. Thoracic gill present at base of forelegs ..... 10
7. Maxillary palp bifid ..... *C. janae*
- 7'. Maxillary palp simple ..... 8
8. Claws with 13-18 denticles ..... 9
- 8'. Claws with approximately 60 denticles ..... *C. lassance* sp. n.
9. Hind wing pads present; tarsal claw with 17-18 denticles ..... *C. cayumba*
- 9'. Hind wing pads absent; claws with 13-15 denticles ..... *C. matilei*

10. Two thoracic gills at base of forelegs

..... *C. hamadae* sp. n.

10'. One thoracic gill at base of forelegs ..... 11

11. Pro and mesonotum with tubercles .. *C. tuberosus*

11'. Thorax without tubercles ..... 12

12. Claws with 7-11 denticles ; incisors of mandible strongly protruded ..... *C. phaedrus*

12'. Claws with 20-40 denticles ; incisors not protruded ..... 13

13. Claws with 30-40 denticles; thoracic gill at base of forelegs small ..... *C. serapis*

13'. Claws with 20-27 denticles; thoracic gill at base of forelegs of normal size ..... *C. anubis*

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