

Research Article

New record and updated checklist of Baetidae (Insecta: Ephemeroptera) from Venezuela

Nuevo registro y lista actualizada de los Baetidae (Insecta: Ephemeroptera) de Venezuela

Belkys Yubiry Pérez-García^{1*}  and Liliana Nieto-Caicedo¹ 

¹Centro de Estudios en Zoología Aplicada - Museo de Zoología, Departamento de Biología, Facultad de Ciencias y Tecnología (FACyT) de la Universidad de Carabobo, 2005, Carabobo, Venezuela. ✉ belperezster@gmail.com

ZooBank: urn:lsid:zoobank.org:pub:40F1F35A-9862-4007-9CA4-4893A773B07F
<https://doi.org/10.35249/rche.49.1.23.13>

Abstract. A species of Baetidae, *Camelobaetidius patricki* is reported for the first time for Venezuela. New state records are given for *Camelobaetidius edmundsi*, *Prebaetodes meredinensis*, and *Varipes sancarlos*. Drawings and photographs illustrating the nymphal diagnostic characters of each species are provided. With the new record of *C. patricki*, the list of baetids from Venezuela increases to 30 species.

Key words: Diversity; freshwater; mayflies, Neotropics; taxonomy.

Resumen. Una especie de Baetidae, *Camelobaetidius patricki* es reportada por primera vez para Venezuela. Se dan nuevos registros estatales para *Camelobaetidius edmundsi*, *Prebaetodes meredinensis* y *Varipes sancarlos*. Se proveen dibujos y fotografías que ilustran los caracteres ninfales diagnósticos de cada especie. Con el nuevo registro de *C. patricki*, la lista de baétidos de Venezuela aumenta a 30 especies.

Palabras claves: Diversidad; insectos acuáticos; neotrópico, taxonomía.

Introduction

Knowledge about the diversity of the Ephemeroptera in Venezuela has improved in the last decades, particularly in the family Baetidae, which is considered as the second most diverse in the Neotropics after Leptophlebiidae (Salles *et al.* 2018). The Venezuelan checklist of Ephemeroptera published by Chacón *et al.* (2009) reported six species of baetids assigned to three genera (*Baetodes* Needham & Murphy, *Camelobaetidius* Demoulin, and *Cloeodes* Traver). Currently, the number of baetids have been increased from six to 29 species belonging to 15 genera. As a result of taxonomic and sampling efforts, 14 species have been registered in the Guayana bioregion (Nieto *et al.* 2011; Nieto & Derka 2011, 2012; Derka & Nieto 2015, 2018); five species in Cordillera de la Costa bioregion (Cruz *et al.* 2012; Pérez-García 2014); three species in Los Andes bioregion (Lugo-Ortiz & McCafferty 1999; Chacón *et al.* 2010, 2013), and one species in Los Llanos bioregion (Castillo & Pérez 2011).

The aim of this paper is to report, for the first time, the presence of *Camelobaetidius patricki* Dominique, Mathuriau & Thomas, 2001 in Venezuela. Besides, new records for

Received 13 January 2023 / Accepted 20 February 2023 / Published online 31 March 2023

Responsible Editor: José Mondaca E.

Camelobaetidius edmundsi Dominique, Mathuriau & Thomas, 2001, *Prebaetodes meredinensis* Chacón, Pescador & Segnini, 2010, and *Varipes sancarlos* (Castillo & Pérez, 2011) are also included.

Material and Methods

The mayflies were collected in different sampling trips (years 2004, 2005, 2007, 2008, 2012, 2014, and 2015), in streams and rivers from Cojedes state (Los Llanos bioregion), and streams of Carabobo and Yaracuy states. Both located in forest ecosystems (from disturbed to pristine) in Cordillera de la Costa bioregions (Figs. 1a, b, c). Maps were elaborated with QGIS Desktop 3.24.0. Nymphal stages were collected using D-Frame and Surber nets in riffles, runs, and pools habitats. All biological materials were preserved in ethanol 70% and later fixed in Khale's fluid. For the identification of the species, mouthparts and tarsal claws were dissected and fixed on microscope slides using Canada balsam. Nymphs were photographed using a Kristall stereomicroscope and a CANON PowerShot SX130 IS (12X optical zoom) camera. The identified specimens were deposited in the Museo de Zoología de la Universidad de Carabobo (MZUC), Valencia, Venezuela.

Results and Discussion

The first and new locality records of Baetidae species from Cordillera de la Costa and Los Llanos bioregions are listed below, in alphabetical order:

Camelobaetidius edmundsi Dominique, Mathuriau & Thomas, 2001
(Figs. 2a, 3a-k)

Distribution. Colombia (Dominique *et al.* 2001; Salinas *et al.* 2012; Forero-Céspedes *et al.* 2014; Salinas *et al.* 2017), Venezuela, Aragua (Cruz *et al.* 2012) and Carabobo (**new state record**).

Material examined. 70 nymphs from: VENEZUELA, Cabriales stream, los Mangos I locality, Naguanagua municipality, Carabobo state, 10°17'41" N 68°00'00" W, 559 mals, 20-II-2004, Belkys Pérez col. 1 nymph, VENEZUELA, San Esteban stream, San Esteban National Park, Municipio Puerto Cabello, Carabobo state, 10°22'43" N, "67°59'58" W, 328 mals, 26-V-2005, col. Belkys Pérez. 1 nymph, VENEZUELA, Cúpira stream, La Cumaca farm, San Diego municipality, Carabobo state, 10°17'40" N, "67°57'03" W, 510 mals, 27-XI-2007, Belkys Pérez col. 10 nymphs: VENEZUELA, Guáquira stream, La Guáquira Farm, La Marroquina locality, San Felipe municipality, Yaracuy state, 10°16'58" N, 68°39'30" W, 143 mals, 25-II-2012, col. Belkys Pérez. 15 nymphs: VENEZUELA, Tirgüa stream, Altos de Palambra locality, Ezequiel Zamora municipality, Cojedes state, 9°43'56" N, 68°37'20" W, 190 mals, 07-II-2014, Belkys Pérez col. All materials are housed at MZUC (wet invertebrate collection).

Comments. In the original description by Dominique *et al.* (2001), the tarsal claws showed with 34-39 denticles, but in our material tarsal claws have 30-31.

Camelobaetidius patricki Dominique, Mathuriau & Thomas, 2001
(Figs. 2B, 4a-i)

Distribution. Colombia (Dominique *et al.* 2001; Forero-Céspedes *et al.* 2014), Venezuela, Carabobo (**new country record**).

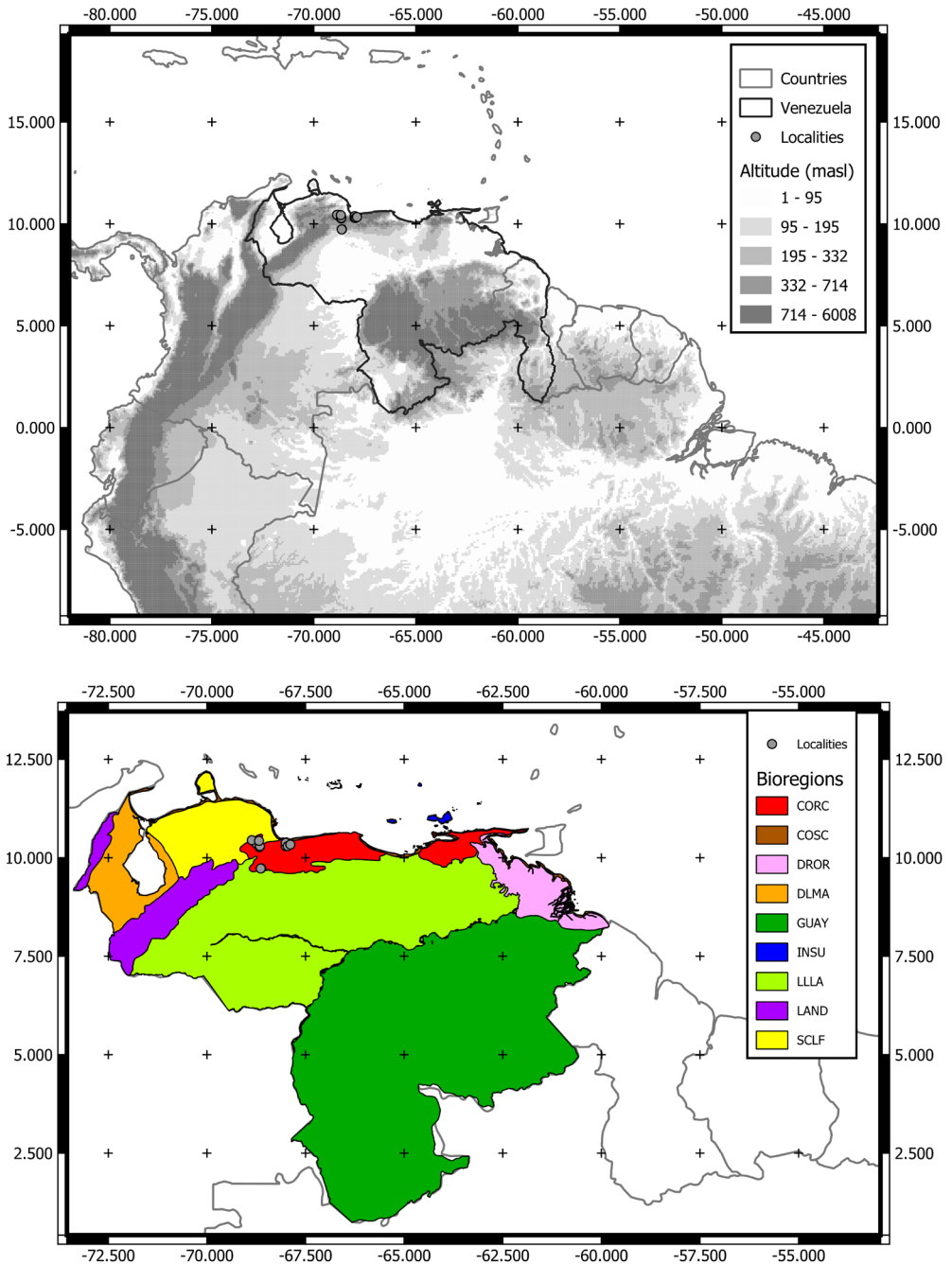


Figure 1. a) Map of Venezuela. **b)** Bioregions of Venezuela: Insular [INSU], Depresión del Lago de Maracaibo [DLMA], Los Andes [LAND], Sistemas de Colinas Lara-Falcón [SCLF], Costera Continental [COSC], Cordillera de la Costa [CORC], Deltaica del Río Orinoco [DROR], and Los Llanos [LLLA, Guayana [GUAY] (Adapted of Ministerio del Ambiente y de los Recursos Naturales 2001). Localities (grey dots): Sampling sites in Carabobo, Yaracuy, and Cojedes states. / **a)** Mapa de Venezuela. **b)** Biorregiones de Venezuela: Insular [INSU], Depresión del Lago de Maracaibo [DLMA], Los Andes [LAND], Sistemas de Colinas Lara-Falcón [SCLF], Costera Continental [COSC], Cordillera de la Costa [CORC], Deltaica del Río Orinoco [DROR], and Los Llanos [LLLA, Guayana [GUAY] (Adaptado de Ministerio del Ambiente y de los Recursos Naturales 2001). Localidades (puntos grises): sitios de muestreo en los estados Carabobo, Yaracuy y Cojedes.

Material examined. 53 nymphs from: VENEZUELA, Cabriales stream, los Mangos I locality, Naguanagua municipality, Carabobo state 10°17'41" N, 68°00'00" W, 559 mals, 20-II-2004, Belkys Pérez, col. 13 nymphs. VENEZUELA, same locality except date and collector, 18-VIII-2008, Beatriz Medina col. 1 nymph, VENEZUELA, Cúpira stream, La Cumaca farm, San Diego municipality, Carabobo state, 10°17'40" N, "67°57'03" W, 510 mals, 27-XI-2007, Belkys Pérez col. Thirteen nymphs, VENEZUELA, Vigirima stream, Guacara municipality, Carabobo state, 10°20'04" N, 67°53'05" W, 527 mals, 25-III-2013, Belkys Pérez and Liliana Nieto cols. All materials are housed at MZUC (wet invertebrate collection).

Prebaetodes meredinensis Chacón, Pescador & Segnini, 2010
(Figs. 2C, 5a-f)

Distribution. Colombia (Salinas *et al.* 2019), Venezuela, Mérida (Chacón *et al.* 2010) and Yaracuy (**new state record**).

Material examined. One nymph from: VENEZUELA. Leonor Bernabó Recreative Park, Yurubí National Park, San Felipe municipality, Yaracuy state, 10°21'43" N, 68°45'01" W, 400 mals, 12-XII-2014, Belkys Pérez col. Material housed at MZUC (wet invertebrate collection).

Comments. Chacón *et al.* (2010) and Salinas *et al.* (2019) collected specimens of *P. meredinensis* at 870 to 3056 mals, in Los Andes bioregion. This report expands the altitudinal distribution of the species to lower elevations, 400 mals in Cordillera de la Costa bioregion. The specimen was collected in a step-pool reach, characterized by a predominance of fast water, habits rough, at 21 °C, conductivity 243 µS, pH 8.25, and 13.08 mg/L dissolved oxygen concentrations.

Varipes sancarlos Castillo & Pérez, 2011
(Fig. 2e).

Distribution. Venezuela, Cojedes (Castillo & Pérez 2011) and Yaracuy (**new state record**).

Material examined. 5 nymphs from: VENEZUELA, pasture of Guáquira stream, la Guáquira farm, La Marroquina locality, San Felipe municipality, Yaracuy state, 10°16'58" N, 68°39'30" W, 143 mals, 21-I-2012, Belkys Pérez col. 50 nymphs: VENEZUELA, Tirgüa stream, Altos de Palambra locality, Ezequiel Zamora municipality, Cojedes state, 9°43'56" N, 68°37'20" W, 190 mals, 07-I-2014, Belkys Pérez, Liliana Nieto, José Henriquez cols. All material are housed at MZUC (wet invertebrate collection).

Update checklist of family Baetidae from Venezuela

The first and only known checklist of Ephemeroptera from Venezuela was published by Chacón *et al.* (2009), who reported six species of baetids assigned to three genera (*Baetodes*, *Camelobaetidius*, and *Cloeodes*). This paper formally updates the checklist by Chacón *et al.* (2009) for the family Baetidae and adds new information to the list of Ephemeroptera species in South America (Dominguez *et al.* 2022). Thus, the records of the family Baetidae from Venezuela increased to 16 genera and 30 species (Tab. 1).

Table 1. Update checklist of the family Baetidae from Venezuela. The first capital letters indicate the Venezuelan states and the capital in square brackets the bioregions. Uppers letters ^a or ^b, on the species name indicate reported species in the Chacón *et al.* (2009) and Domínguez *et al.* (2022) lists, respectively. / Lista actualizada de las especies de la familia Baetidae presentes en Venezuela. Las primeras letras en mayúscula indican el estado y las letras mayúsculas dentro de los corchetes indican la biorregión. Las letras en superíndice, ^a o ^b, indican las especies registradas en las listas de Chacón *et al.* (2009) y Domínguez *et al.* (2022), respectivamente.

Species	State [Bioregion]	References
1. <i>Andesiops peruvianus</i> (Ulmer, 1920) ^b	ME [LAND]	Lugo-Ortiz and McCafferty (1999)
2. <i>Baetodes arawak</i> (Traver, 1943) ^{a,b}	DC [CORC]	Traver (1943)
3. <i>Baetodes levis</i> Mayo, 1968 ^b	AR [CORC]	Cruz <i>et al.</i> (2012)
4. <i>Baetodes peniculus</i> Mayo, 1968 ^{a,b}	ME [LAND]	Mayo (1973)
5. <i>Baetodes proietus</i> Mayo, 1973 ^b	BO [GUAY]	Nieto <i>et al.</i> (2011)
6. <i>Baetodes spinifer</i> Traver, 1943 ^{a,b}	DC [CORC]	Traver (1943)
7. <i>Callibaetis radiatus</i> Navas, 1920 ^b	CA [CORC]	Pérez-García (2014)
8. <i>Camelobaetidius alcyoneus</i> (Traver, 1943) ^{a,b}	DC [CORC]	Traver (1943)
9. <i>Camelobaetidius billi</i> Thomas & Dominique, 2000 ^b	BO [GUAY]	Nieto <i>et al.</i> (2011)
10. <i>Camelobaetidius edmundsi</i> Dominique, Mathuriau & Thomas, 2001 ^b	AR, CA, YA [CORC], CO [LLLA]	Cruz <i>et al.</i> (2012) New state record
11. <i>Camelobaetidius janae</i> Dominique & Thomas, 2000 ^b	BO [GUAY]	Nieto <i>et al.</i> (2011)
12. <i>Camelobaetidius leentvaari</i> Demoulin, 1966 ^b	BO [GUAY]	Nieto <i>et al.</i> (2011)
13. <i>Camelobaetidius mathuriae</i> Dominique & Thomas, 2001 ^b	BO [GUAY]	Nieto <i>et al.</i> (2011)
14. <i>Camelobaetidius patricki</i> Dominique, Mathuriau & Thomas, 2001 ^c	CA [CORC]	New country record
15. <i>Cloeodes anduzei</i> (Traver, 1943) ^a	DC [CORC]	Traver (1943)
16. <i>Cryptonympha copiosa</i> Lugo-Ortiz & McCafferty, 1998 ^b	BO [GUAY]	Nieto <i>et al.</i> (2011)
17. <i>Cryptonympha tracheata</i> Derka & Nieto, 2018 ^b	BO [GUAY]	Derka and Nieto (2018)
18. <i>Harpagobaetis gulosus</i> Mol, 1986 ^b	BO [GUAY]	Nieto <i>et al.</i> (2011)
19. <i>Mayobaetis ellenae</i> (May, 1973) ^b	AR [CORC] CA [CORC]	Cruz <i>et al.</i> (2012); Pérez-García (2014)
20. <i>Nanomis rasmussenii</i> Chacón, Pescador & Segnini, 2013 ^b	ME [LAND]	Chacón <i>et al.</i> (2013)
21. <i>Paracloeodes pacawara</i> Nieto & Salles, 2006 ^b	YA [CORC]	Pérez-García (2014)
22. <i>Parakari auyanensis</i> Nieto & Derka, 2011 ^b	BO [GUAY]	Nieto & Derka (2011); Derka <i>et al.</i> (2012)
23. <i>Parakari churiensis</i> Nieto & Derka, 2011 ^b	BO [GUAY]	Nieto & Derka (2011); Derka <i>et al.</i> (2012)
24. <i>Parakari roraimensis</i> Derka, Nieto & Svitok, 2015 ^b	BO [GUAY]	Derka & Nieto (2015); Derka <i>et al.</i> (2019)

25. <i>Prebaetodes meridinensis</i> Chacón, Pescador & Segnini, 2010 ^b	ME [LAND], YA [CORC]	Chacón <i>et al.</i> (2010) New state record
26. <i>Rivudiva venezuelensis</i> (Traver, 1943) ^{a,b}	DC [CORC]	Traver (1943)
27. <i>Spiritiops silvudus</i> Lugo-Ortiz & McCafferty, 1998 ^b	BO [GUAY]	Nieto <i>et al.</i> (2011)
28. <i>Spiritiops tepuiensis</i> Nieto & Derka, 2012 ^b	BO [GUAY]	Nieto & Derka (2012), Derka <i>et al.</i> (2019)
29. <i>Vvaripes sancarlos</i> Castillo & Pérez, 2011 ^b	CO [LLLA], YA [CORC]	Castillo & Pérez (2011) New state record
30. <i>Zelusius principalis</i> Lugo-Ortiz & McCafferty, 1998 ^b	BO [GUAY]	Nieto <i>et al.</i> (2011)

States of Venezuela: Aragua (AR), Bolivar (BO), Carabobo (CA), Cojedes (CO), Distrito Capital (DC), Mérida (ME), Yaracuy (YA); Bioregions of Venezuela (Fig. 1b): Los Andes [LAND], Cordillera de la Costa [CORC], Los Llanos [LLLA], and Guayana [GUAY] (MARN 2001).

In this study the presence of *Camelobaetidius patricki* is reported for the first time in the country, which increases the number of baetid species to 30. Currently, in Venezuela, the number of species of the family Baetidae is higher than that for Leptophlebiidae species; being the latter the most diverse family in the Neotropics. This is probably due as a result of major taxonomic and sampling efforts in some bioregions such as Guayana and the Cordillera de la Costa. However, even all through the knowledge of the Venezuelan biodiversity of Baetidae has increased in the last 10 years; greater sampling efforts seem to be required in other bioregions. Therefore, the updated check list indicates that it is necessary to continue research in the following unexplored bioregions: Insular [INSU], Depresión del Lago de Maracaibo [DLMA], Sistemas de Colinas Lara-Falcón [SCLF], Costera Continental [COSC], and Deltaica del Río Orinoco [DROR].

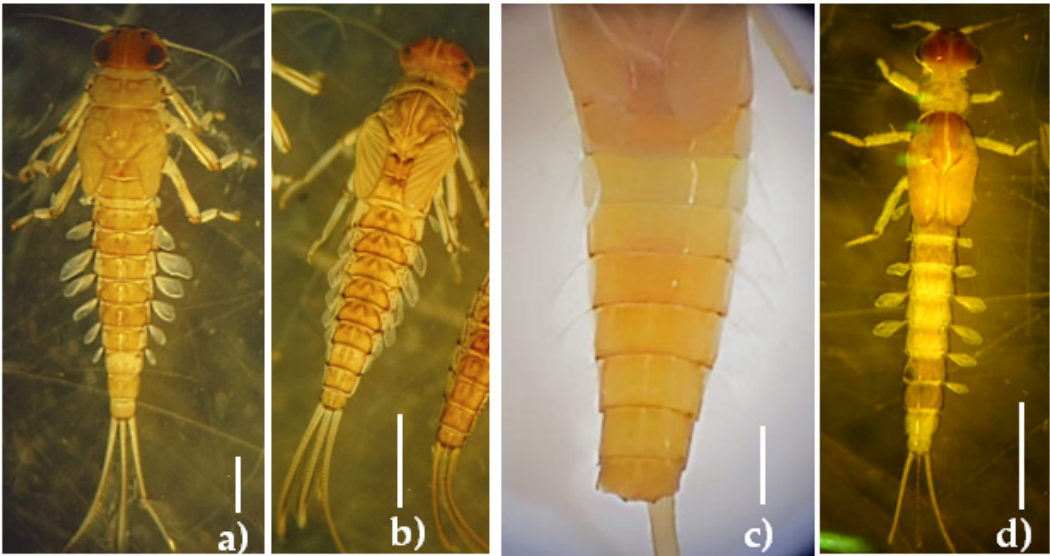


Figure 2. Nymphs, dorsal habitus. **a)** *Camelobaetidius edmundsi*. **b)** *Camelobaetidius patricki*. **c)** *Prebaetodes meridinensis*. **d)** *Vvaripes sancarlos*. Scale barr: 1 mm. / Ninfas, vista dorsal. **a)** *Camelobaetidius edmundsi*. **b)** *Camelobaetidius patricki*. **c)** *Prebaetodes meridinensis*. **d)** *Vvaripes sancarlos*. Barra de escala: 1 mm.

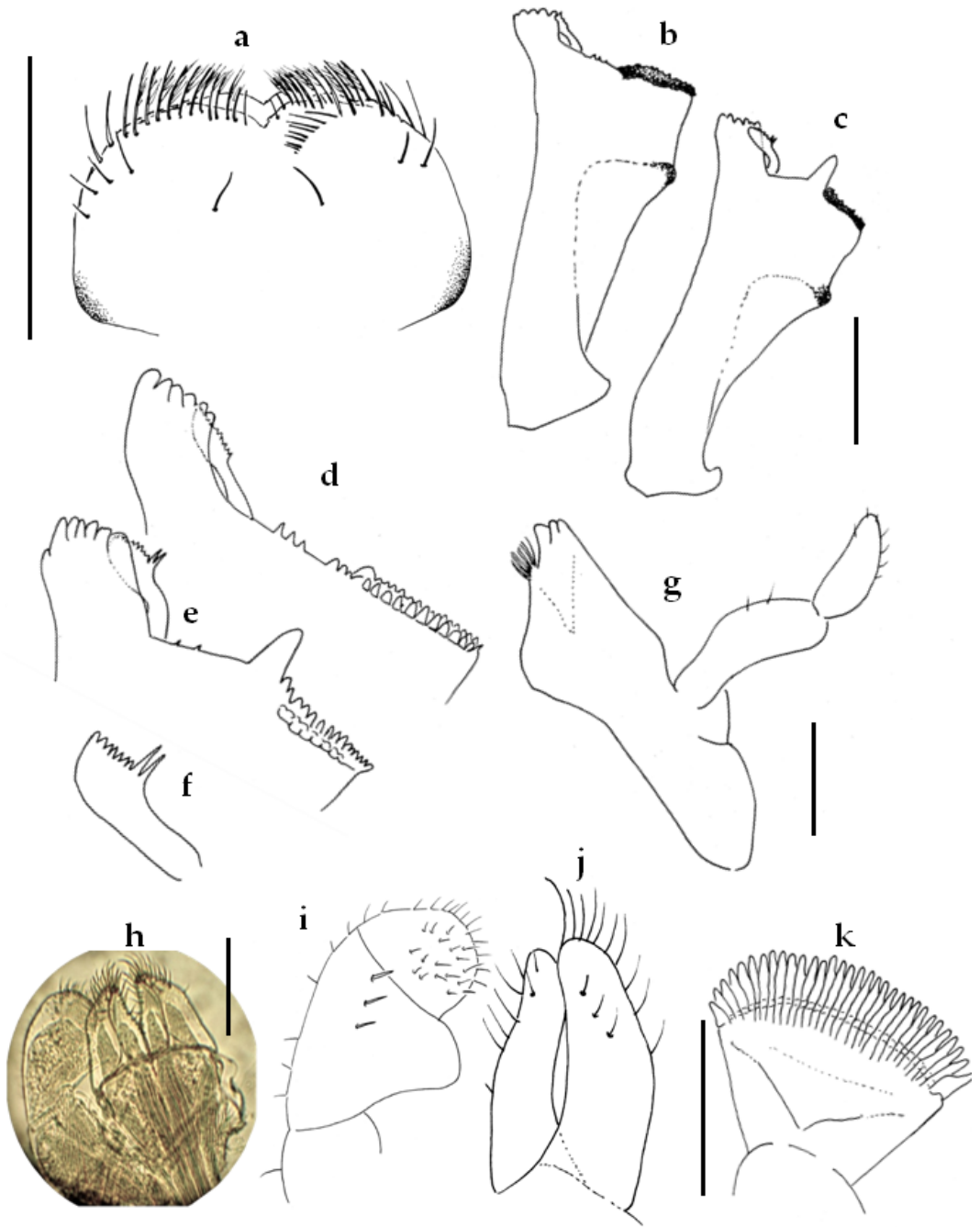


Figure 3. *Camelobaetidius edmundsi*. **a)** Labrum dorsal view. **b)** Right mandible. **c)** Left mandible. **d)** Right mandible: detail of incisors, prosthema, and mola. **e)** Left mandible: detail of incisors, prosthema, and mola. **f)** Left mandible: detail of palp segments. **g)** Maxillae. **h)** Labium. **i)** Labium: detail of glossa and, paraglossa. **j)** Labium: detail of segments palpal. **k)** Tarsal claw. Scale barr: 0.1 mm / *Camelobaetidius edmundsi*. **a)** Labro en vista dorsal. **b)** Mandíbula derecha. **c)** Mandíbula izquierda. **d)** Mandíbula derecha: detalle de los incisivos, prosteca y mola. **e)** Mandíbula izquierda: detalle de los incisivos, prosteca y mola. **f)** Mandíbula izquierda: detalle de la prosteca. **g)** Maxila. **h)** Labio. **i)** Labio: detalle de los segmentos palpales. **j)** Labio: detalle de la glosa y paraglosa. **k)** Uña tarsal. Barra de escala: 0,1 mm.

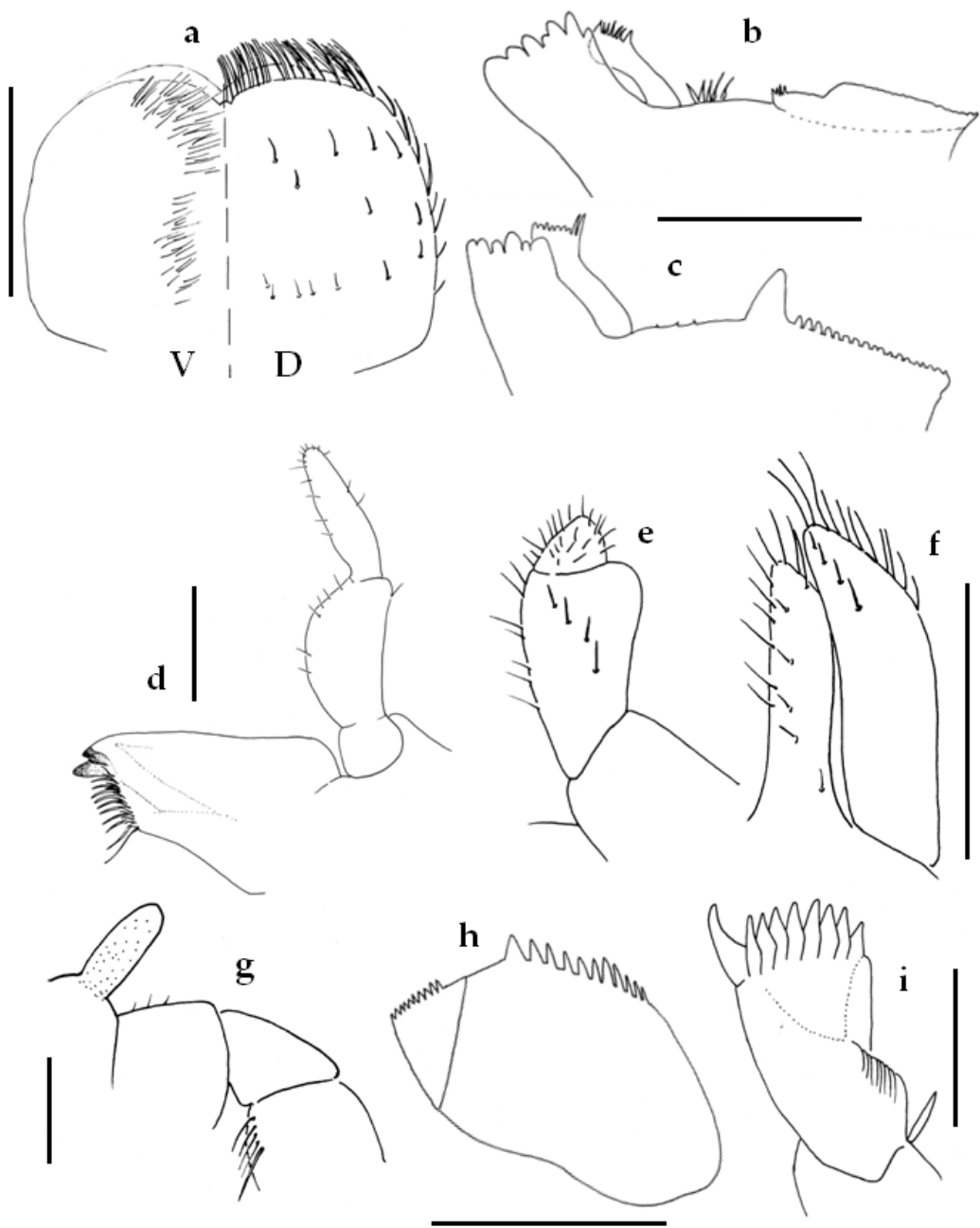


Figure 4. *Camelobaetidius patricki*. **a)** Labrum (V, ventral and D, dorsal views). **b)** Right mandible: detail of incisors, prosthema and, mola. **c)** Left mandible: detail of incisors, prosthema and mola. **d)** Maxillae. **e)** Detail of palp segments. **f)** Detail of glossa and, paraglossa. **g)** Gill protocoxal. **h)** Paraprocts. **i)** Tarsal claw. Scale barr: 0.1 mm. / *Camelobaetidius patricki*. **a)** Labro (V, vista ventral y D, vista dorsal). **b)** Mandíbula derecha: detalle de los incisivos, prosteca y mola. **c)** Mandíbula izquierda: detalle de los incisivos, prosteca y mola. **d)** Maxila. **e)** Detalle de los segmentos palpaes. **f)** Detalle de la glosa y paraglosa. **g)** Branquia protocoxal. **h)** Paraproctos. **i)** Uña tarsal. Barra de escala: 0,1 mm.

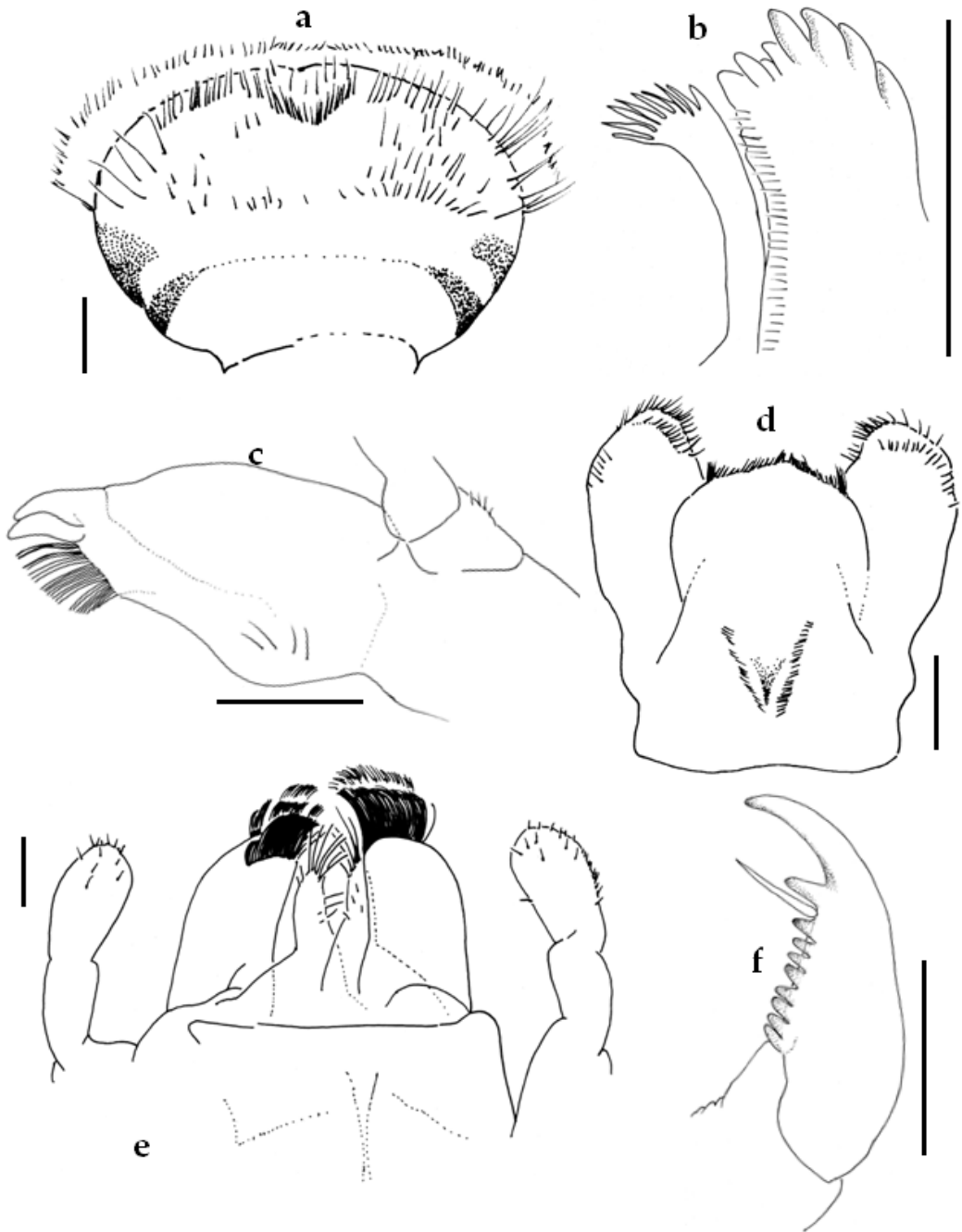


Figure 5. *Prebaetodes meredinensis*. **a)** Labrum. **b)** Left mandible: detail of incisors and prostheca. **c)** Maxillae: detail of galea-lacinia. **d)** Hypopharynx. **e)** Labium. **f)** Tarsal claw. Scale barr: 0.1 mm. / *Prebaetodes meredinensis*. **a)** Labro. **b)** Mandíbula izquierda: detalle de los incisivos y prosteca. **c)** Maxila: detalle de la galea-lacinia. **d)** Hipofaringe. **e)** Labio. **f)** Uña tarsal. Barra de escala: 0,1 mm.

Acknowledgements

This work was supported by the Consejo de Desarrollo Científico y Humanístico, Universidad de Carabobo, Venezuela (CDCH-UC No. 134-2014). We thank Hector Silva, Franger García and José Henriquez for their assistance in field, and Dr. Jonathan Liria, Universidad Regional Amazónica de Ikiam (Ecuador) for the design of maps. We thank Oscar Valbuena and Sharon Basso, Universidad de Carabobo for the grammatical revision of the manuscript.

Literature Cited

- Castillo, M.M. and Pérez, B. (2011) *Varipes* (Ephemeroptera: Baetidae) en Venezuela: descripción de nueva especie. *Revista Colombiana de Entomología*, 37(1): 346-349.
- Chacón, M.M., Pescador, M.L. and Segnini, S. (2010) The adult and redefinition of the genus *Prebaetodes* Lugo-Ortiz and McCafferty (Ephemeroptera: Baetidae), with description of a new species from Venezuela. *Aquatic Insects*, 32(2): 143-157. <https://doi.org/10.1080/01650424.2010.482940>
- Chacón, M.M., Pescador, M.L. and Segnini, S. (2013) New species of *Nanomis* Lugo-Ortiz and McCafferty, 1999 (Ephemeroptera: Baetidae) from Venezuela. *Aquatic Insects: International Journal of Freshwater Entomology*, 35: 1-14. <https://doi.org/10.1080/01650424.2014.948455>
- Chacón, M.M., Pescador, M.L., Hubbard, M.D. and Segnini, S. (2009) Mayflies (Insecta: Ephemeroptera) from Venezuela. *Check List*, 5(3): 723-731.
- Cruz, P.V., Boldrini, R., Quinto, C.F. and Frontado, H. (2012) New Baetidae (Insecta: Ephemeroptera) records from Venezuela and nymph description of an unnamed *Fallceon* species. *International Journal of Zoology*, 2012: 1-6. <https://doi.org/10.1155/2012/837092>
- Derka, T., Nieto, C. and Svitok, M. (2012) Mayflies (Ephemeroptera) of the Pantepui biogeographical province. *Boletín de la Asociación Española de Entomología*, 36(1-2): 119-135.
- Derka, T. and Nieto, C. (2015) A new species of *Parakari* (Ephemeroptera: Baetidae) from Guiana Highlands. *Zootaxa*, 4028(2): 296-300. <http://dx.doi.org/10.11646/zootaxa.4028.2.9>
- Derka, T. and Nieto, C. (2018) A new species of *Cryptonympha* Lugo-Ortiz and McCafferty (Ephemeroptera, Baetidae) from Cerro Duida (Venezuela). *Zootaxa*, 4377(4): 587-592. <https://doi.org/10.11646/zootaxa.4377.4.9>
- Derka, T., Zamora-Muñoz, C. and de Figueroa, J.M.T. (2019). *Biodiversity of Pantepui: The Pristine "Lost World" of the Neotropical Guiana Highlands*. Chapter 8. In: Rull, V., Vegas-Vilarrúbia, T., Huber O and Señaris, C. (Eds.): *Biodiversity of Pantepui: The Pristine "Lost World" of the Neotropical Guiana Highlands, Part III*. Academic Press – Elsevier, London, United Kingdom. <https://doi.org/10.1016/B978-0-12-815591-2.00019-7>.
- Domínguez, E., Molineri, C., Nieto, C. and Zúñiga M. del C. (2022) Lista de especies de Ephemeroptera sudamericanos. Accessed on: 21.10.2022. Available at: <http://ibn.conicet.gov.ar/>
- Domínguez, E., Molineri, C., Pescador, M.L., Hubbard, M.D. and Nieto, C. (2006) *Ephemeroptera of South America*. In: Adia, J., Arias, J.R., Rueda-Delgado, G. and Wantzen, K.M. (Eds.): *Aquatic Biodiversity of Latin America* (ABLA Series), Vol 2. Pensoft, Sofía-Moscow. 646 pp.
- Dominique, Y., Mathuriau, C. and Thomas, A. (2001) Étude systématique du genre *Camelobaetidis* Demoulin, 1966 em Colombie (Ephemeroptera, Baetidae). *Bulletin de la Société d'histoire naturelle de Toulouse*, 137: 17-32.

- Forero-Céspedes, A.M., Gutiérrez, C. and Reinoso-Flórez, G. (2014)** Nuevos registros de Baetidae (Ephemeroptera: Insecta) para Colombia y el Departamento del Tolima. *Revista de la Asociación Colombiana de Ciencias Biológicas*, 26: 59-67.
- Lugo-Ortiz, C.R. and McCafferty, W.P. (1999)** Three new genera of small minnow may flies (Insecta: Ephemeroptera: Baetidae) from the Andes and Patagonia. *Studies on Neotropical Fauna and Environmental*, 34: 88-104. <https://doi.org/10.1076/snfe.34.2.88.2102>
- MARN [Ministerio del Ambiente y de los Recursos Naturales] (2001)** Estrategia Nacional sobre Diversidad Biológica y su plan de acción. República Bolivariana de Venezuela, Oficina Nacional de Diversidad Biológica. Caracas: Fondo para el Medio Ambiente Mundial (FMAM) y Programa de las Naciones Unidas para el Desarrollo (PNUD). 135 pp.
- Mayo, V.K. (1973)** Four new species of the genus *Baetodes* (Ephemeroptera: Baetidae). *Pan-Pacific Entomologist*, 49(4): 308-314.
- Nieto, C. and Derka, T. (2011)** *Parakari* a new genus of the family Baetidae (Insecta: Ephemeroptera) from Guyana highlands. *Zootaxa*, 3032: 47-49.
- Nieto, C. and Derka, T. (2012)** A new species of the genus *Spiritiops* Lugo-Ortiz and McCafferty (Ephemeroptera, Baetidae) from the Pantepui biogeographical province. *Zootaxa*, 3256: 58-63.
- Nieto, C., Grillet, M., Domínguez, E., Molineri, C. and Guerrero, E. (2011)** The family Baetidae (Insecta: Ephemeroptera) from Venezuelan Guayana's Uplands. *Zootaxa*, 2808: 1-17. <https://doi.org/10.5281/zenodo.277093>
- Pérez-García, B. (2014)** Nuevos registros de *Callibaetis* Eaton, *Mayobaetis* Mayo y *Paracloeodes* Day (Insecta, Ephemeroptera, Baetidae) para Venezuela. *Entomotropica*, 29(1): 39-47.
- Salinas, L.G., Dias, L.G., Bacca, T., Zúñiga, M.C. and Rodríguez, M. (2012)** Primeros registros de Ephemeroptera (Insecta) para el Departamento de Putumayo, Colombia. *Boletín Científico Centro de Museos. Museo de Nacional de Historia Natural*, 16(2): 198-208.
- Salinas, L.G., Villegas, P.A., Salles, F.F. and Román-Valencia, C. (2019)** First record of *Prebaetodes meridinensis* Chacón, Pescador and Segnini, 2010 (Ephemeroptera, Baetidae) from Colombia. *Check List*, 15(2): 323-325. <https://doi.org/10.15560/15.2.323>
- Salinas-Jiménez, L.G., Rojas-Peña, J.I., Osorio-Ramírez, D.P. and Caro-Caro, C.L. (2017)** New records of Ephemeroptera from the Colombian Orinoco river basin of the Meta department. *Revista Colombiana de Entomología*, 43(2): 271-276. <https://doi.org/10.25100/socolen.v43i2.5958>
- Salles, F.F., Domínguez, E., Molineri, C., Boldrini, R., Nieto, C. and Dias, L.G. (2018)** Ephemeroptera, chapter 3. Pp. 61-117. In: Thorp, J.H. and Rogers, D.C. (Eds.), *Thorp and Covich's Freshwater Invertebrates: Ecology and General Biology*. Fourth Edition. Elsevier, Amsterdam. <https://doi.org/10.1016/B978-0-12-804223-6.00003-2>
- Traver, J.R. (1943)** New Venezuelan mayflies. *Boletín de Entomología Venezolana*, 2(2): 79-98.