

New species of the genus *Apobaetis* Day (Ephemeroptera: Baetidae) from Bolivia and Argentina

C. Nieto

CONICET-INSUE. Facultad de Ciencias Naturales e IML, Miguel Lillo 205, S. M. Tucumán (4000), Tucumán, Argentina. E-mail: macarolina_nieto@yahoo.com.ar

Apobaetis insolitus n. sp., *Apobaetis kallawaya* n. sp. and *Apobaetis niger* n. sp. (Ephemeroptera: Baetidae) are described from nymphs collected in Argentina and Bolivia. *Apobaetis insolitus* can be distinguished by the labrum with anterior margin with a U-shaped emargination, segment II of labial palpi with triangular apically rounded distomedial projection. *Apobaetis kallawaya* can be distinguished by segment II of labial palpi with triangular, slender and apically pointed distomedial projection, the posterior margins of the abdominal terga with blunt spines and paraprocts with blunt spines apically. *Apobaetis niger* can be distinguished by the anterior margin of labrum with medial lobe and segment II of labial palpi with triangular apically rounded distomedial projection. The three new species possess tarsal claws with two rows of denticles. A key to all species known from nymphs is presented.

Keywords : Ephemeroptera, Baetidae, *Apobaetis*, Argentina, Bolivia.

Introduction

The genus *Apobaetis* was originally described by Day (1955) from nymphs and adults from USA. However, the one species described, *A. indeprensus*, was recently synonymized with *A. etowah* (Traver) by Meyer & McCafferty (2003). *Apobaetis etowah* was originally described as *Pseudocloeon etowah* by Traver (1935), but was determined to be a member of *Apobaetis* by Waltz & McCafferty (1986). Until 1997, when Lugo-Ortiz & McCafferty described *A. signifer* from Brazil, the genus was considered endemic to North America. Later, two new species were described, *A. lakota* (McCafferty, 2000) from USA and *A. fiuzai* (Salles & Lugo-Ortiz, 2002) from Brazil, and one North American species was transferred to this genus, *A. futilis* (McDunnough) by Jacobus & McCafferty (2005). In this paper three new species of *Apobaetis* are described from nymphs, two from Argentina and one from Bolivia, recording for the first time the genus *Apobaetis* from these countries. *A. fiuzai* is reported from Argentina. A key to all species known from nymphs is presented.

Apobaetis Day

Apobaetis Day, 1955: 126; Lugo-Ortiz & McCafferty, 1997: 243; McCafferty, 2000: 265.

Type species: *Apobaetis indeprensus* Day, 1955 [synonym of *A. etowah* (Traver, 1935)].

Diagnosis. *Apobaetis* can be characterized from the other genera of the family by the following combinations of characters. In the imago by: 1) turbinate eyes in male tall and narrow, bases nearly contiguous posteriorly and widely divergent anteriorly; 2) hind wings absent; 3) the metanotum with a broad, dorsally projecting, metascutellar hump and a deeply emarginate posterior margin; 4) styliger plate of genitalia with a blunt projection; 5) forceps divergent, basal segments elongate. In the nymph by: 1) labrum laterally expanded, 2 times wider than long, apical margin with a row of long spine-like setae (Fig. 6a); 2) mandibles with incisors cleft in two sets (Figs. 7-8); 3) hypopharynx with lingua without projection apically (Fig. 9); 4) labium with glossae wider than paraglossae (Fig. 11), segment II of palpi with strong projection medially, segment III with long spines on inner margin and partially fused to segment II (Fig. 12); 5) abdominal gills narrow and long, 2-3 times the length of each segment; 6) tarsal claws long, 0.5-1.5 times the length of tarsi (Fig. 14).

The three new species described herein clearly belong to *Apobaetis* by the possession of all generic characters listed above. The diagnostic character of tarsal claws without denticles (Day, 1955) is removed from the generic diagnosis due to the possession of tarsal claws with two rows of denticles in the new species.

Distribution. Argentina, Bolivia, Brazil, Colombia, Mexico, Paraguay and USA.

Key to species for nymphs of *Apobaetis*

- 1 Tarsal claws longer than tarsi *A. lakota*
 - Tarsal claws shorter than tarsi 2
- 2 Maxillary palpi long, at least 1.5 times the length of galea-lacinia 3
 - Maxillary palpi shorter, subequal to galea-lacinia (Fig. 23) 5
- 3 Labrum, anterior margin with medial lobe (Fig. 31); labial palpi with segment II with triangular apically rounded distomedial projection (Fig. 37) *A. niger* n. sp.
 - Labrum, anterior margin without medial lobe (Fig. 4a); labial palpi not as above 4
- 4 Labrum, anterior margin with blunt setae near midline (Fig. 4b); segment II of maxillary palpi without a constriction apically. *A. fiuzai*
 - Labrum, anterior margin with simple setae near midline; segment II of maxillary palpi with a constriction apically *A. etowah*
- 5 Labrum, anterior margin with a U-shaped emargination (Figs. 6a-b); segment II of labial palpi with apically rounded distomedial projection (Fig. 12) *A. insolitus* n. sp.
 - Labrum, anterior margin without a U-shaped emargination (Fig. 19); segment II of labial palpi with apically pointed distomedial projection (Fig. 25) . . . 6
- 6 Segment III of labial palpi conical (Fig. 25); labrum, anterior margin with bifid setae near midline (Fig. 19); posterior margins of abdominal terga with blunt spines (Fig. 28); paraprocts with blunt spines apically (Fig. 30) *A. kallawayana* n. sp.
 - Segment III of labial palpi truncate; labrum, anterior margin with simple setae near midline; posterior margins of abdominal terga with pointed spines; paraprocts with sharp spines apically (as in Fig. 44) *A. signifer*

Apobaetis etowah (Traver)

Pseudocloeon etowah Traver, 1935: 726; Meyer & McCafferty, 2003: 249.

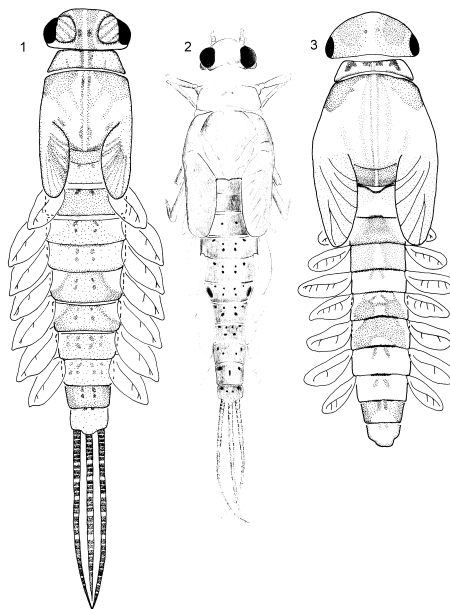
Apobaetis etowah Waltz & McCafferty, 1986: 191; Guenther & McCafferty, 2005: 492.

Apobaetis indeprensus Day, 1955: 127; Edmunds et al., 1976:157.

Diagnosis. *Apobaetis etowah*, known from adults

and nymphs, can be distinguished by the following combination of characters. In the nymphs: 1) labrum, anterior margin with simple setae; 2) palpi of maxillae at least 1.5 times the length of galea-lacinia, segment II with an apical constriction; 3) labium, segment II of palpi with pointed distomedial projection, segment III truncate apically; 4) tarsal claws shorter than tarsi. In the adult, *Apobaetis etowah* is impossible to distinguish from *A. futilis*, the only other species known from adults.

Distribution. Canada, Mexico and USA.



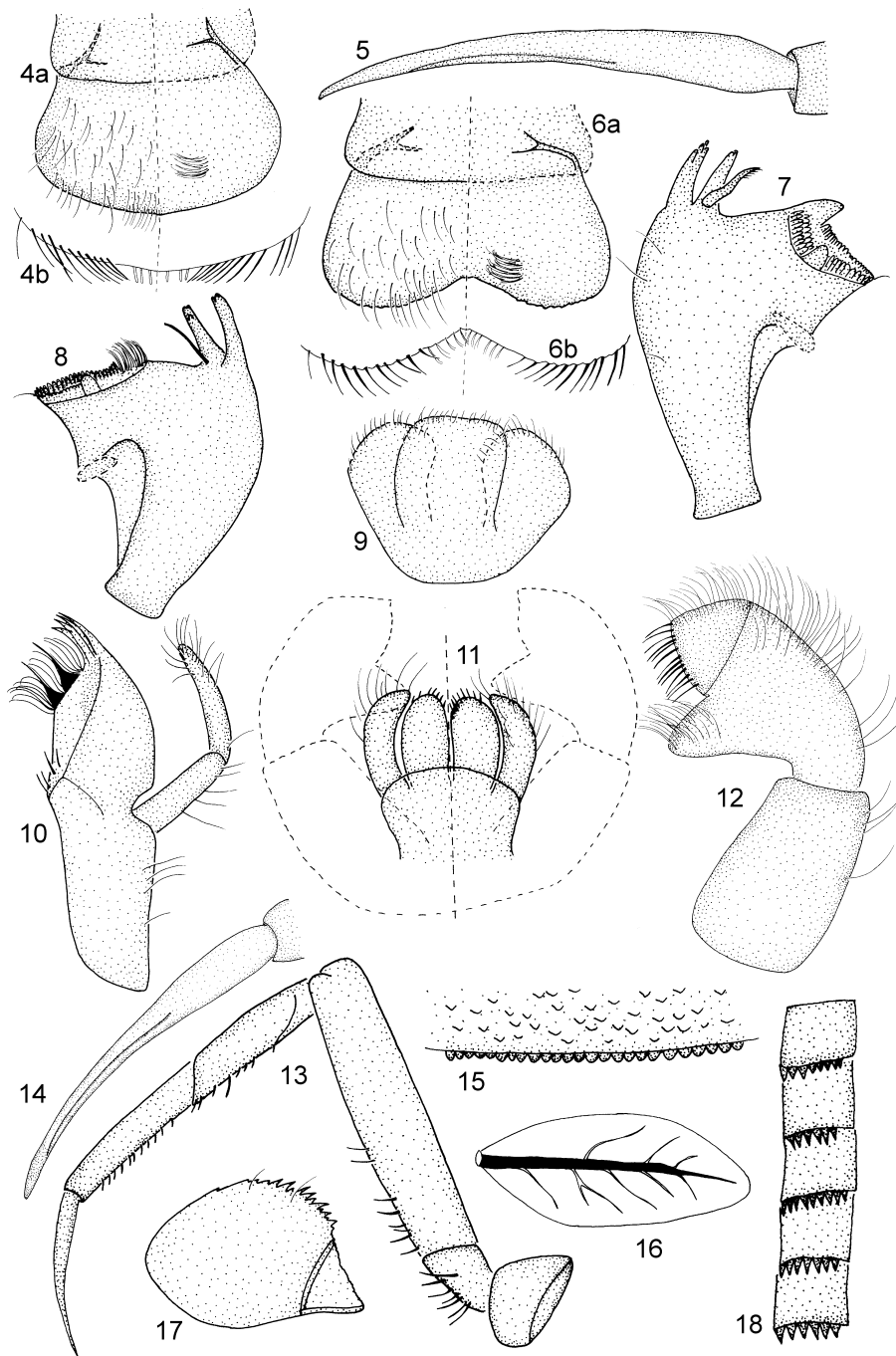
Figs. 1-3. *Apobaetis*. Nymphs. 1, *A. insolitus* n. sp. general view. 2, *A. kallawayana* n. sp., general view. 3, *A. niger* n. sp., general view. (Fig. 2 from Domínguez et al. 2006)

Apobaetis fiuzai Salles & Lugo-Ortiz

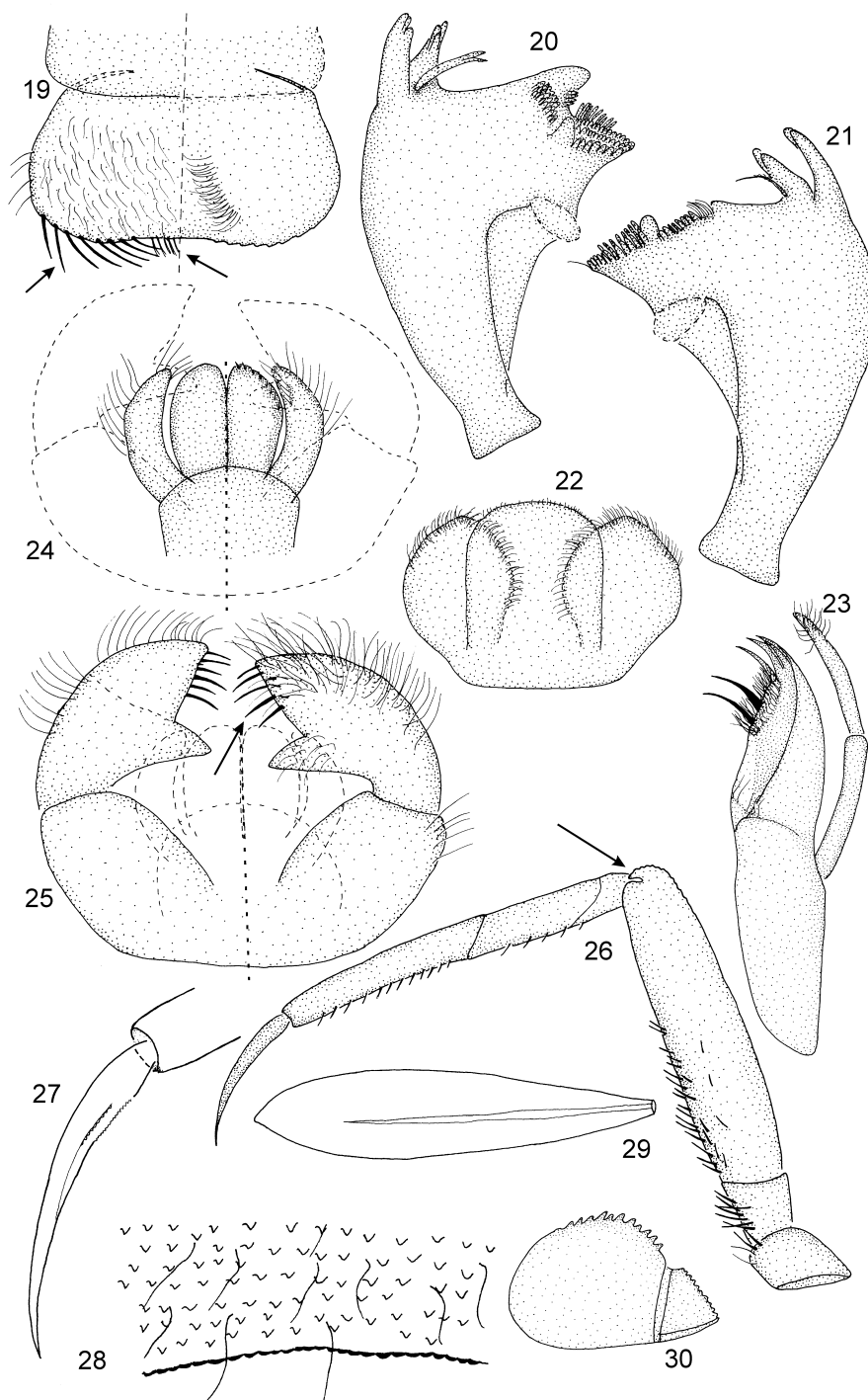
A. fiuzai Salles & Lugo-Ortiz, 2002: 2.

This species was characterized from nymphs by Salles & Lugo-Ortiz (2002). New material was collected assignable to this species and herein it includes the following characteristics that are not in agreement with the original description: 1) labrum, dorsal surface with long setae (Fig. 4a), anterior margin with 3 blunt setae near midline and 10-11 long spine-like setae near lateral margin (Fig. 4b); 2) maxillae with palpi two-segmented; 3) tarsal claws with two rows of minute denticles (Fig. 14).

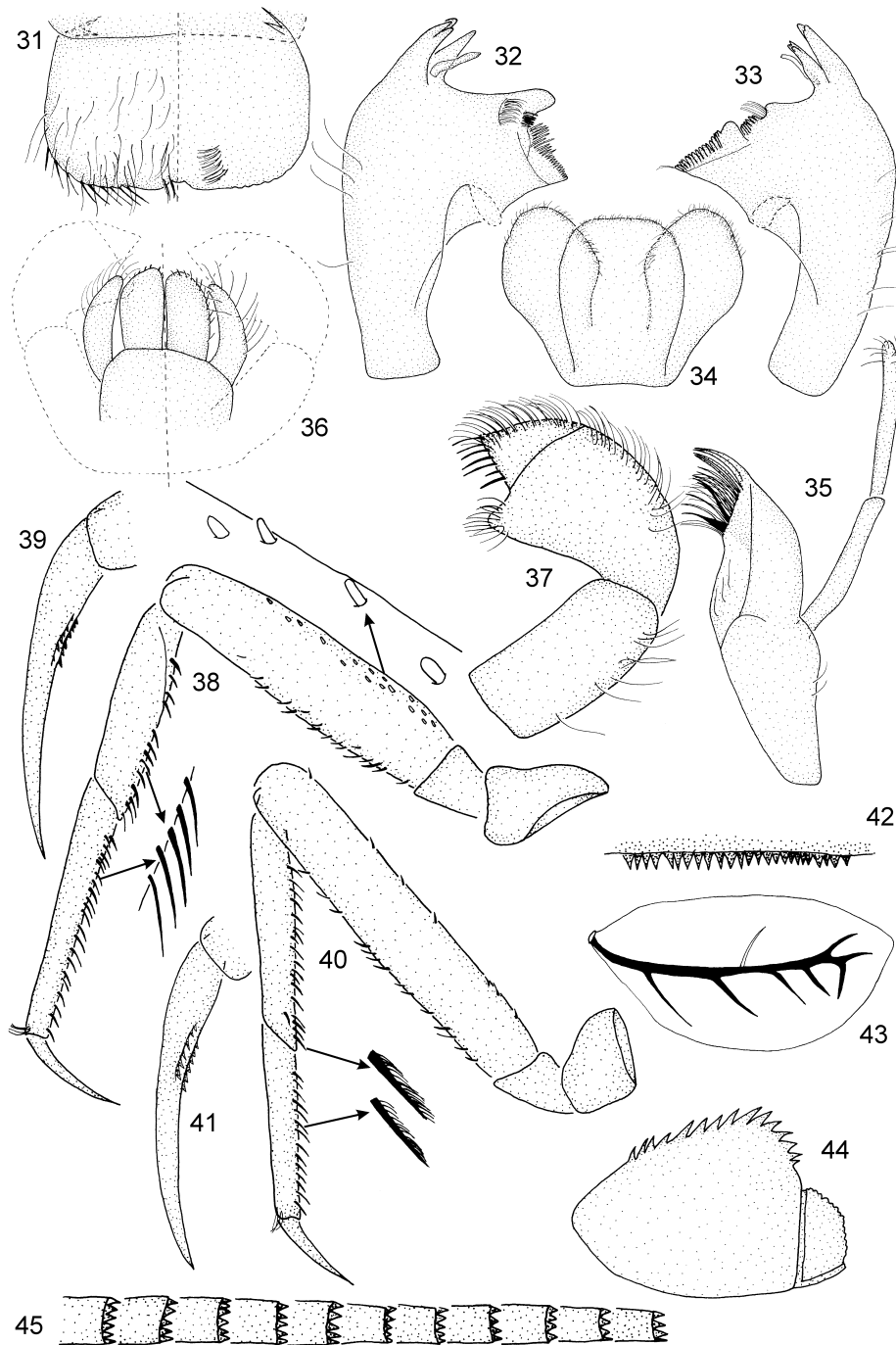
Diagnosis. This species, known from nymphs, can be distinguished by the following combination of cha-



Figs 4-18. *Apoabietis fiuzai* (Figs. 4-5). 4a, labrum, left d.v., right v.v.; 4b, labrum: anterior margin, left d.v., right v.v. *Apoabietis insolitus* n.sp. (Figs. 6-18). Nymph. Mouthparts (Figs. 6-12): 6a, labrum, left d.v., right v.v.; 6b, labrum: anterior margin, left d.v., right v.v.; 7, left mandible v.v.; 8, right mandible v.v.; 9, hypopharynx v.v.; 10, maxilla v.v.; 11, labium: glossae and paraglossae, left d.v., right v.v.; 12, labium: palp. 13, leg II; 14, tarsal claw II. 15, posterior margin of tergum IV. 16, gill IV. 17, paraproct d.v. 18, cercus.



Figs. 19-30. *Apobaetis kallawaya* n. sp. Nymph. Mouthparts (Figs. 19-25): 19, labrum, left d.v., right v.v.; 20, left mandible v.v.; 21, right mandible v.v.; 22, hypopharynx v.v.; 23, maxilla v.v.; 24, labium: glossae and paraglossae, left d.v., right v.v.; 25, labium: palps, left d.v., right v.v. 26, leg I; 27, tarsal claw I. 28, posterior margin of tergum IV. 29, gill IV. 30, paraproct d.v. (Figs. 19-26, 29 from Domínguez et al. 2006)



Figs. 31-45. *Apobaetis niger* n. sp. Nymph. Mouthparts (Figs. 31-37): 31, labrum, left d.v., right v.v.; 32, left mandible v.v.; 33, right mandible v.v.; 34, hypopharynx v.v.; 35, maxilla v.v.; 36, labium: glossae and paraglossae, left d.v., right v.v.; 37, labium: palp. 38, leg I; 39, tarsal claw I; 40, leg III; 41, tarsal claw III. 42, posterior margin of tergum IV. 43, gill IV. 44, paraproct d.v. 45, cercus.

acters: 1) labrum, anterior margin with 3 blunt setae (Fig. 4b); 2) palpi of maxillae at least 1.5 times the length of galea-lacinia; 3) labium, segment II of palpi with pointed distomedial projection, segment III truncate apically; 4) tarsal claw I 0.65 times the length of tarsi; 5) abdominal color pattern with complex markings, with a pair of medial spots on segments I, III-VIII and dark brown markings on all segments; 6) posterior margin of abdominal terga with spines; 7) paraprocts with spines apically (as in Fig. 44).

Material. Seven nymphs: ARGENTINA, Tucumán, Acheral, río Aranillas, 366 m, S 27°06'59.9'', W 65° 27'43.9'', 366 m, 5/ VIII/ 2006, Nieto & Molineri cols. Material housed at IFML. This species was collected in a river with slow current and sandy substrate.

Distribution. Argentina: Tucumán, Brazil: Mato Grosso, Minas Gerais.

Apobaetis futilis (McDunnough)

Pseudocloeon futile McDunnough, 1931: 86.

Baetis futile (McDunnough): McCafferty & Waltz, 1990: 775.

Baetis futilis (McDunnough): McCafferty, 1997: 318.

Plauditus futilis (McDunnough): Lugo-Ortiz & McCafferty, 1998: 348.

Apobaetis futilis (McDunnough): Jacobus & McCafferty, 2005: 979.

Apobaetis futilis known from adults was transferred from *Plauditus* to *Apobaetis* by Jacobus & McCafferty (2005). Although these authors included generic characteristics they omitted specific characters to distinguish this species from *A. etowah*.

Distribution. Canada and USA.

Apobaetis insolitus n. sp. (Figs. 1, 6-18)

Nymph (Fig. 1). Length: body, 4.1-4.3 mm; cerci, 1.7-1.8 mm; terminal filament, 1.5-1.6 mm. Antennae, 1.1-1.2 mm, 1.5 times the head capsule. Head yellowish brown, compound eyes in male nymphs yellow with transverse brown bands. Antennae yellowish brown. Mouthparts (Figs. 6-12): labrum (Figs. 6a-b), anterior margin with a U-shaped emargination, with 6 bifid setae near midline and 10-11 long spine-like setae near lateral margin. Left mandible (Fig. 7) with incisors cleft in two groups of 3-4 denticles, prosthema robust with minute setae. Right mandible (Fig. 8) with incisors cleft in two groups of 3 denticles, prosthema elongate.

Hypopharynx (Fig. 9): apical margin of lingua straight and subequal in length to superlinguae. Maxillae with palpi two-segmented and subequal in length to galea-lacinia (Fig. 10). Labium (Figs. 11-12), segment II of palpi with triangular apically rounded distomedial projection, segment III conical with 15-17 long spines.

Thorax yellowish brown, apical margin of mesonotum brown. Pleurae and sterna brown. Legs yellowish brown. Femora (Fig. 13) with ventral edge with long spines on basal half. Tarsi I longer than tibia, tarsi II-III subequal in length to tibiae. Tarsal claw I 0.8 times and tarsal claws II-III 0.9 times the length of tarsi. Tarsal claws with two rows of minute denticles (Fig. 14).

Abdomen yellowish brown, segments I-IX with small brown spots, segment II and IX brown (Fig. 1). Posterior margin of each segment with blunt spines (Fig. 15). Sterna pale yellow, except segment IX brown. Gills whitish, 2.5 times the length of each segment, main branch of trachea pigmented (Fig. 16). Paraprocts with sharp spines apically (Fig. 17). Caudal filaments yellowish brown, with posterior margin of each segment with spines (Fig. 18), internal margins of cerci and lateral margins of terminal filament with long setae.

Adults. Unknown.

Etymology. *Insolitus*, latin word which means unusual. It refers to the place where this species was collected.

Diagnosis. *Apobaetis insolitus* n. sp. can be distinguished by the following combination of characters: 1) labrum (Figs. 6a-b), anterior margin with a U-shaped emargination, with 6 bifid setae near midline; 2) maxillae with palpi subequal in length to galea-lacinia (Fig. 10); 3) labial palpi (Fig. 12) with distomedial projection of segment II triangular and apically rounded, segment III conical with 15-17 long spines; 4) tarsal claws 0.8-0.9 times the length of tarsi and with two rows of minute denticles (Fig. 14); 5) abdominal color pattern as in Fig. 1; 6) posterior margin of each terga with blunt spines (Fig. 15); 7) paraprocts with sharp spines apically (Fig. 17)

Material. Holotype male nymph: ARGENTINA, Tucumán, Acheral, río Aranillas, 366 m, S 27°06'59.9'', W 65° 27'43.9'', 366 m, 5/ VIII/ 2006, Nieto & Molineri cols. Paratypes: 17 nymphs same data. Holotype and 12 nymphs housed in IFML (Fundación-Instituto Miguel Lillo, Tucumán, Argentina). Other paratypes housed in FAMU (Florida A & M University, Tallahassee, Florida, USA). This species was collected in a river with slow current and sandy substrate.

***Apobaetis kallawayae* n. sp. (Figs. 2, 3-30)**

Female nymph (Fig. 2). Length: body, 2.8-3.2 mm; cerci, 1.0-1.1 mm; terminal filament, 1.0 mm. Antennae, 0.8-0.9 mm, 2 times the head capsule. Head and antennae pale yellow. Mouthparts (Figs. 19-25): labrum (Fig. 19), anterior margin with 4-5 bifid setae near midline and with 8-9 long spine-like setae near lateral margin. Left mandible (Fig. 20) with incisors cleft in two groups of three denticles, prosthema robust and bifid. Right mandible (Fig. 21) with incisors cleft in two groups of two denticles, prosthema elongate and with minute setae. Hypopharynx (Fig. 22) with lingua rounded apically and subequal in length to superlinguae. Maxillae with palpi two-segmented and subequal in length to galea-lacinia (Fig. 23). Labium (Figs. 24-25), segment II of palpi with triangular, slender and apically pointed distomedial projection, segment III conical with 5-6 long spines.

Thorax yellow, mesonotum pale brown. Pleura pale brown, sterna pale yellow. Legs pale yellow. Apex of femora with a deep incision (Fig. 26). Femora with ventral edge with long spines on basal half. Tarsi I longer than tibia, tarsi II-III subequal in length to tibiae. Tarsal claw I 0.7 times the length of tarsi, tarsal claws II-III 0.8 times the length of tarsi. Tarsal claws with two rows of numerous small denticles (Fig. 27).

Abdomen yellow, segments I-X with small brown spots, lateral margins of segment V with 2 larger yellowish brown spots, segment IX yellowish brown (Fig. 2). Posterior margins of terga with blunt spines (Fig. 28). Sterna pale yellow. Gills whitish and long, 3 times the length of each segment, main branch of trachea opaque (Fig. 29). Paraprocts with blunt spines apically (Fig. 30). Caudal filaments pale yellow, posterior margin of each segment smooth, internal margins of cerci and lateral margins of terminal filament with long setae.

Adults. Unknown.

Etymology. *Kallawayae* is the name of one of the small ethnic groups that inhabits Bolivia, widely known in the region for their excellent traditional physicians.

Diagnosis. *Apobaetis kallawayae* n. sp. can be distinguished by the following combination of characters: 1) labrum (Fig. 19), anterior margin with 4-5 bifid setae near midline; 2) maxillae with palpi subequal in length to galea-lacinia (Fig. 23); 3) labial palpi (Fig. 25) with distomedial projection of segment II triangular, slender and apically pointed, segment III conical with 5-6 long spines; 4) tarsal claws 0.7-0.8 times the length of tarsi and with two rows of numerous small denticles (Fig.

27); 5) abdominal color pattern as in Fig. 2; 6) posterior margin of abdominal terga with blunt spines (Fig. 28); 7) paraprocts with blunt spines apically (Fig. 30).

Material. Holotype female nymph: BOLIVIA, río Bugres, 30 km W de San Matías, S 16° 22' 13.7, W 58° 42' 59.7, 1000 m, 21/ VI/ 2000, E. Domínguez col. Paratypes: 3 nymphs same data. Holotype and 1 nymph housed in UMSA (Universidad Mayor de San Andrés, La Paz, Bolivia). Other paratypes housed in IFML (Fundación-Instituto Miguel Lillo, Tucumán, Argentina).

***Apobaetis lakota* McCafferty**

A. lakota McCafferty, 2000: 265; Meyer & McCafferty, 2003: 249.

Diagnosis. *Apobaetis lakota*, known from nymphs, can be distinguished by the following combination of characters: 1) labrum, anterior margin with simple apical setae near midline; 2) maxillae with palpi at least 1.5 times the length of galea-lacinia; 3) segment II of labial palpi with a strong and rounded distomedial projection; 4) tarsal claws longer than tarsi; 5) paraprocts with spines apically.

Distribution. USA: Kansas, Nebraska, and North Dakota.

***Apobaetis niger* n. sp. (Figs. 3, 31-45)**

Nymph. Length: 3.6 mm; caudal filaments partially broken. Antennae broken, at least 2 times the head capsule. Head yellowish brown, compound eyes in male nymphs orange-brown. Antennae yellowish. Mouthparts (Figs. 31-37): labrum (Fig. 31), anterior margin with medial lobe and with 2 bifid setae near midline and 9-10 long spine-like setae near lateral margin. Left mandible (Fig. 32) with incisors cleft in two groups of 2-3 denticles, prosthema with 2 denticles. Right mandible (Fig. 33) with incisors cleft in two groups of 3 denticles, prosthema elongate with 2 denticles. Hypopharynx (Fig. 34): apical margin of lingua straight and shorter than superlinguae. Maxillae with palpi two-segmented and almost 2 times the length of galea-lacinia (Fig. 35). Labium (Figs. 36-37), segment II of palpi with triangular apically rounded distomedial projection, segment III conical with 6-7 long spines.

Thorax: pronotum and first third of mesonotum with dark brown spots. Fore wing pads yellow, metanota brown. Pleura brown, sterna white. Legs pale yellow. Leg I with dorsal edge of femur with short blunt spines

(Fig. 38), ventral margin with spines on basal 2/3, tarsi longer than tibia, both with long spines. Tarsi II-III subequal in length to tibiae (Fig. 40) and with pectinate spines. Tarsal claw I 0.5 times the length of tarsi, tarsal claws II-III 0.6 times the length of tarsi. Tarsal claws with two rows of numerous small denticles (Figs. 39, 41).

Abdomen: segments I, IV, VII-VIII and X pale yellow, remaining segments brown as in Fig. 3. Posterior margin of each segment with spines (Fig. 42). Sterna white, except segment IX brown, anterior margin of each sternum brown. Gills (Fig. 43) whitish, 2 times the length of each segment, main branch of trachea and a few secondary branches pigmented. Paraprocts with sharp spines apically (Fig. 44). Caudal filaments pale yellow, with posterior margin of each segment with spines (Fig. 45), internal margins of cerci and lateral margins of terminal filament with long setae.

Adults. Unknown.

Etymology. Niger, latin word which means black or dark. It refers to the general coloration of the nymph.

Diagnosis. *Apobaetis niger* n. sp. can be distinguished by the following combination of characters: 1) labrum (Fig. 31), anterior margin with medial lobe and with 2 bifid setae near midline; 2) maxillae (Fig. 35) with palpi almost 2 times the length of galea-lacinia; 3) labial palpi segment II with triangular apically rounded distomedial projection, segment III conical with 6-7 long spines (Fig. 37); 4) tarsal claws 0.5-0.6 times the length of tarsi with two rows of numerous small denticles (Figs. 39, 41); 5) abdominal color pattern as in Fig. 3; 6) posterior margin of abdominal terga with spines (Fig. 42); 7) paraprocts with sharp spines apically (Fig. 44).

Material. Holotype male nymph: ARGENTINA, Salta, P.N. El Rey, A° Aguas Negras, S 24°41'39'', W 64°36'46'', 905 m, 10/ XI/ 2005, Molineri col. Paratypes: 2 nymphs same data. Holotype and paratypes housed at IFML. This species was collected in the yungas area or mountain rain forest. The river was narrow, with rocky substrate and high water temperature.

Apobaetis signifer Lugo-Ortiz & McCafferty

A. signifer Lugo-Ortiz & McCafferty, 1997: 245.

Diagnosis. This species, known from nymphs, can be distinguished by the following combination of characters: 1) labrum, anterior margin with simple setae near midline; 2) maxillae with palpi subequal in length to galea-lacinia; 3) segment II of labial palpi with pointed distomedial projection, segment III truncate; 4) tar-

sal claws 0.75 times the length of tarsi; 5) abdominal color pattern: segments I-IV and VI-IX with light brown lateral markings, segment V with elongate light brown markings; 6) posterior margin of abdominal terga with spines; 7) paraprocts with spines apically.

Distribution. Brazil: Pará, Colombia and Paraguay: Cordillera.

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References

- Day W.C. 1955. – New genera of mayflies from California. *Pan-Pacific Entomologist*, 31, 121-137.
- Domínguez E., Molineri C., Pescador M.L., Hubbard M.D. & Nieto C. 2006. – Ephemeroptera of South America. 650 pp. Aquatic Biodiversity of Latin America. Vol. 2. Adis J., Arias J.R., Wantzen K. & Rueda G. (eds.). Pensoft Press, Sofia and Moscow.
- Edmunds G.F. Jr, Jensen S.L. & Berner L. 1976. – The Mayflies of North and Central America. University of Minnesota Press, Minneapolis. 330 pp.
- Guenther J.L. & McCafferty W.P. 2005. – Mayflies (Ephemeroptera) of the Great Plains. III: North Dakota. *Trans. Amer. Entomol. Soc.*, 131, 491-508.
- Jacobus L.K. & McCafferty W.P. 2005. – *Apobaetis futilis* (McDunnough), a new combination in Nearctic Baetidae (Ephemeroptera). *Proc. Entomol. Soc. Washington*, 107, 979.
- Lugo-Ortiz C.R. & McCafferty W.P. 1997. – First report and new species of the genus *Apobaetis* (Ephemeroptera: Baetidae) from South America. *Aquat. Insect.*, 19, 243-246.
- Lugo-Ortiz C.R. & McCafferty W.P. 1998. – A new North American genus of Baetidae (Ephemeroptera) and key to *Baetis* complex genera. *Entomol. News*, 109, 345-353.
- McCafferty W.P. & Waltz R.D. 1990. – Revisionary synopsis of the Baetidae (Ephemeroptera) of North and Middle America. *Trans. Amer. Entomol. Soc.*, 116, 769-799.
- McCafferty W.P. 1997. – Name adjustments and a new synonym for North American Ephemeroptera species. *Entomol. News*, 108 (4): 318.
- McCafferty W.P. 2000. – A new nearctic *Apobaetis* (Ephemeroptera: Baetidae). *Entomol. News*, 111, 265-269.
- McDunnough J. 1931. – New species of North American Ephemeroptera. *Can. Entomol.*, 63, 82-93.
- Meyer M.D. & McCafferty W.P. 2003. – New Synonym of *Apobaetis etowah* (Traver) (Ephemeroptera: Baetidae). *Pan-Pacific Entomol.*, 79, 249.
- Salles F.F. & Lugo-Ortiz C.R. 2002. – A distinctive new species of *Apobaetis* (Ephemeroptera: Baetidae) from Mato Grosso and Minas Gerais, Brazil. *Zootaxa*, 35, 1-6.
- Traver J.R. 1935. – Part II, Systematic. Pages 237-739 in Needham J.G., Traver J.R. & Hsu Y.C. The Biology of Mayflies. Comstock Publishing, Ithaca, New York.
- Waltz R.D. & McCafferty W.P. 1986. – *Apobaetis etowah* (Traver), a new combination in Nearctic Baetidae (Ephemeroptera). *Proc. Entomol. Soc. Washington*, 88, 191.