



ADDITIONS TO THE COLOMBIAN ANACRONEURIA FAUNA (PLECOPTERA: PERLIDAE) WITH DESCRIPTIONS OF SEVEN NEW SPECIES

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ABSTRACT

Seven new species are described from Colombia: *Anacroneuria citara*, *A. otun*, *A. pastora*, *A. quimbaya*, *A. tatama*, *A. tayrona* and *A. tunasi*. The first Colombian records are given for *A. bari* Stark, *A. curiosa* Stark and *A. harperi* Stark; the latter two species were previously known from Mesoamerica and this is their first report from South America. New records, mainly in the Andinum natural region, are presented for 20 previously reported Colombian species. In addition, the unknown females of *A. calima* Baena & Rojas, *A. marta* Zúñiga & Stark and *A. yameo* Stark & Sivec are described, and three unassociated females are described under informal designation.

Keywords: Stoneflies, Plecoptera, *Anacroneuria*, Colombia

INTRODUCTION

Recent studies of *Anacroneuria* have documented the presence of 51 species of this diverse genus in Colombia (Stark et al. 1999; Stark & Zúñiga 2003; Zúñiga & Stark 2002; Zúñiga et al. 2006). Although most of these species are still known only for Colombia, increasingly records are added which indicate some faunal overlap occurs with neighboring countries.

The present collections, mainly from protected areas in Risaralda in the central Andes of Colombia, include the first records of three species previously known from Venezuela (*A. bari* Stark) or

Mesoamerica (*A. curiosa* Stark and *A. harperi* Stark), but also include seven species new for science and additional records for 20 species previously reported for Colombia.

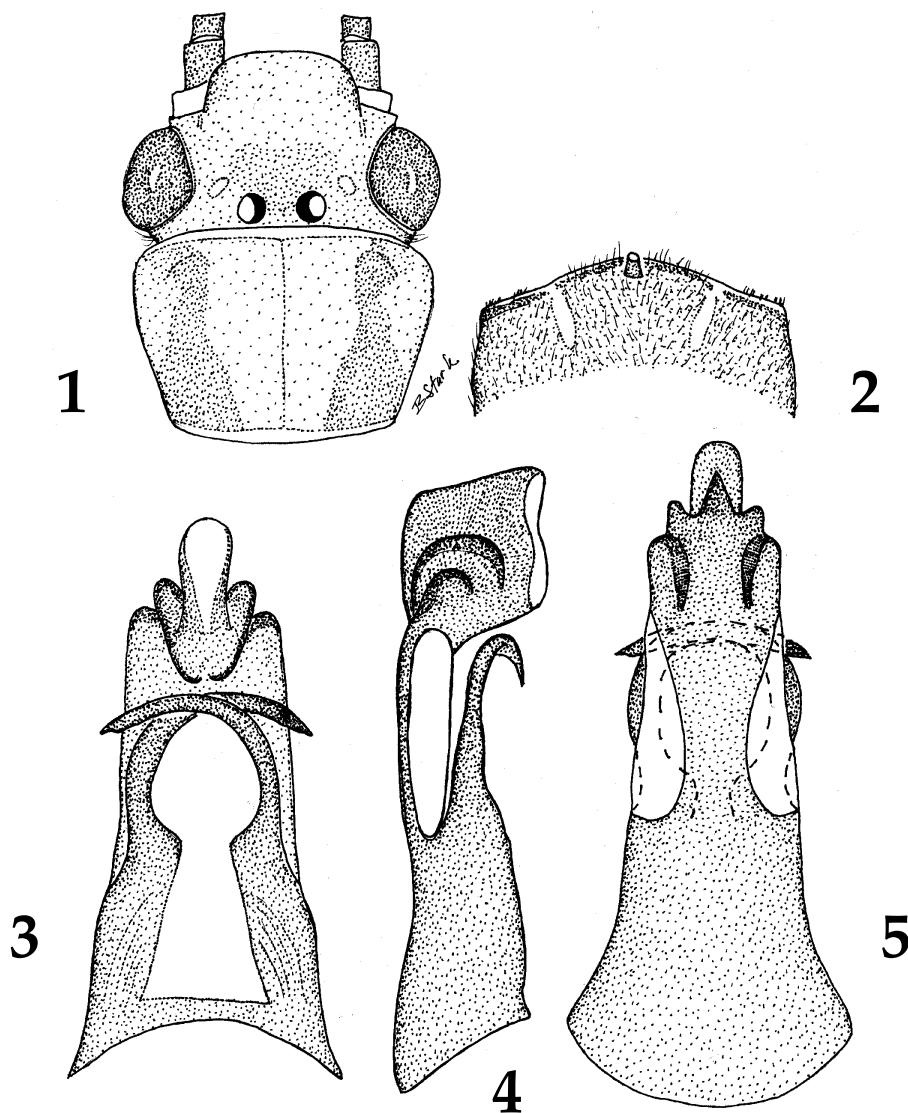
Holotype specimens are deposited in the Museo de Entomología, Universidad del Valle, Cali, Colombia (MEUV), or in the Museo de Entomología "Francisco Luis Gallego", Universidad Nacional, Medellín, Colombia (MEFLG), as indicated in the text. Duplicate paratypes and other specimens are deposited in the following collections: the Museo de Historia Natural, Colección de Entomología, Instituto de Ciencias Naturales-Universidad Nacional, Santafé

de Bogotá, Colombia (MHN-ICN), the Museo de Entomología, Universidad de Antioquia, Colombia (MEUA), Stark collection at Mississippi College, Clinton, USA (BPS), the Monte L. Bean Museum, Brigham Young University, Provo, USA (BYU). Other museums mentioned in the text include the Carnegie Museum of Natural History, Pittsburgh, USA (CMNH), the United States National Museum of Natural History, Washington, USA (USNM) and the Museum für Naturkunde der Humboldt Universität, Berlin, Germany (MNHU).

RESULTS AND DISCUSSION

Anacroneuria citara sp. nov., Stark & Ortega (Figs. 1-5)

Material examined. Holotype ♂ and 1♂ paratype from COLOMBIA, Antioquia, Municipio de Betania, Farallones de Citará, Vereda La Oculta, Quebrada Agualinda, at light, 7 August 1996, O. E. Ortega (Holotype: MEFLG, paratype: MEUV).



Figs. 1-5. *Anacroneuria citara*. 1. Head and pronotum, 2. Male sternum 9, 3. Aedeagus, ventral (right basal area and hook “restored” in drawings), 4. Aedeagus, lateral, 5. Aedeagus, dorsal.

Adult habitus. General color yellow brown patterned with brown. Head mostly yellow but dusky over ocelli; lappets brown (Fig. 1). Pronotum with wide, pale mesal band and darker lateral bands, but pattern obscured by specimen condition. Wings pale amber, veins dark amber with darker R veins. Legs pale except narrow, apical band on femora dark.

Male. Forewing length 13 mm. Hammer thimble shaped, height greater than basal diameter (Fig. 2). Aedeagal base damaged, but intact apex, in lateral aspect, sharply upturned at a 90° angle and bearing small basal and larger mesal ear shaped lobes (Fig. 4). Apex in ventral aspect with large ear lobes extending forward giving the apex a trilobed appearance; basal lobes give the shoulders a slight bulging projection (Fig. 3). Dorsal aspect with prominent transverse keel connecting to smaller, ventrally directed triangular keel on meson; basal ear lobes form a pair of small shelf-like projections (Fig. 5). Right hook and base of aedeagus are broken but are stored in the abdominal tip of the specimen.

Female. Unknown.

Larva. Unknown.

Etymology. The species name, used as a noun in apposition, is based on the type locality in Farallones de Citará.

Diagnosis. This species is similar to *A. albimacula* Klapálek and *A. rugosa* Stark in general aedeagal structure (Stark et al. 1999; Stark 2001). The former species has a distinctive clear “window” at the cord in the wing pigment pattern and the aedeagus lacks the smaller, basal ear lobes, whereas the latter species has the lateral ear lobes projecting beyond the mesoapical lobe (see Fig. 99 in Stark 2001).

Ecological notes. The type locality in northwest Colombia is part of Región Natural Andina on the east slope of Cordillera Occidental.

Anacroneuria otun sp. nov., Stark & Zúñiga
(Figs. 6-10)

Material examined. Holotype ♂ and 3♂ paratypes from COLOMBIA, Risaralda, Municipio de Pereira, Parque Nacional Natural Los Nevados, El Jordán, Río Otún headwater basin, 3100 m, N 04° 42' 32", W 75° 29' 37", 27-28 June 2006, light trap, M. del C. Zúñiga, W. Cardona, G. Zabala, Cardozo- Zúñiga (Holotype and 2 paratypes: MEUV, paratype: BPS).

Adult habitus. General color dark brown patterned with yellow. Head covered mostly with dark brown but M-line with three prominent pale areas; occiput dusky brown except for pale post- ocellar area. Pronotum brown with narrow median pale band and scattered dark rugosities (Fig. 6). Wing membrane transparent, veins dark brown. Legs brown, tibia darker than femora, except narrow, dark, apical femoral band.

Male. Forewing length 18 mm. Hammer cylindrical, height greater than diameter (Fig. 7). Aedeagal apex short, slightly longer than wide, and rounded; venter with a pair of small membranous lobes, shoulders broad (Fig. 8). Dorsal keel steep, composed of a pair of narrow ridges which end slightly beyond mid length of apical area (Fig. 10). Membranous areas dorsad and basal to hooks bulging. Lateral aspect of apex about as wide as long (Fig. 9).

Female. Unknown.

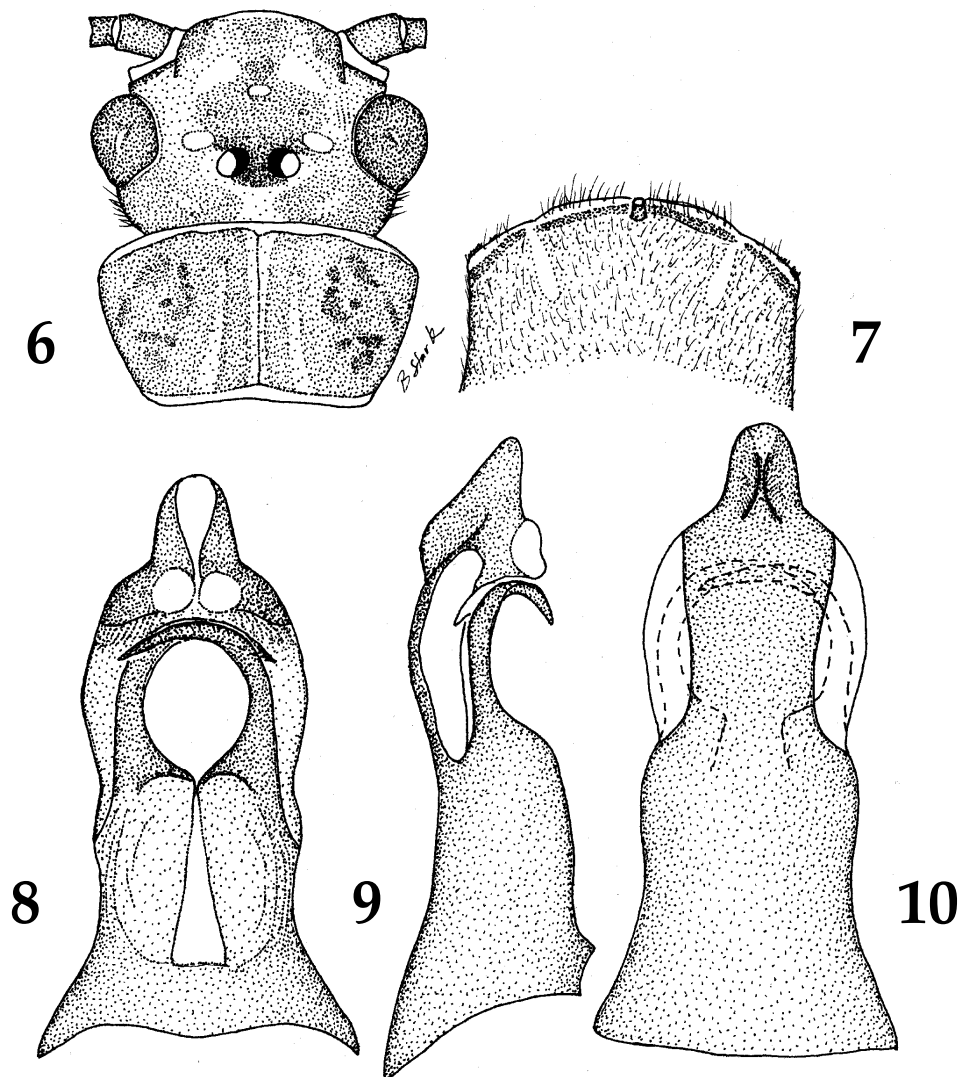
Larva. Unknown.

Etymology. The species name, used as a noun in apposition, is based on Río Otún, the type locality.

Diagnosis. The aedeagus of this species is most similar to that of *A. cajas* Zúñiga & Vimos, a recently described Ecuadorian species (Zúñiga et al. 2006). The aedeagal apex of *A. cajas* is more pointed and the dorsal keel is significantly weaker than in *A. otun*. In addition, the pronotum of *A. cajas* has dark pigment adjacent to the median suture, whereas in *A. otun* a narrow, median pale band occurs.

Ecological notes. The type locality is in the headwaters of Río Otún in the highest mountains of the Cordillera Central and is part of Región Natural Andina de Colombia. This small second order stream is about 8 m wide and 0.4-0.5 m deep, with a mixed substrate composed of boulders, stones, patches of gravel and sands, and riffle zones primarily. The water quality is in optimum environmental condition, the temperature was 10°C and the air, 12°C at the time of collection. Natural riparian vegetation is present, the zone receives 1900 mm mean annual rainfall and is covered by a very humid montane forest, in accordance with Holdridge life zones system (Espinal & Montenegro 1963). These specimens were collected during the dry season.

Anacroneuria pastora sp. nov., Stark & Cardona
(Figs. 11-15)



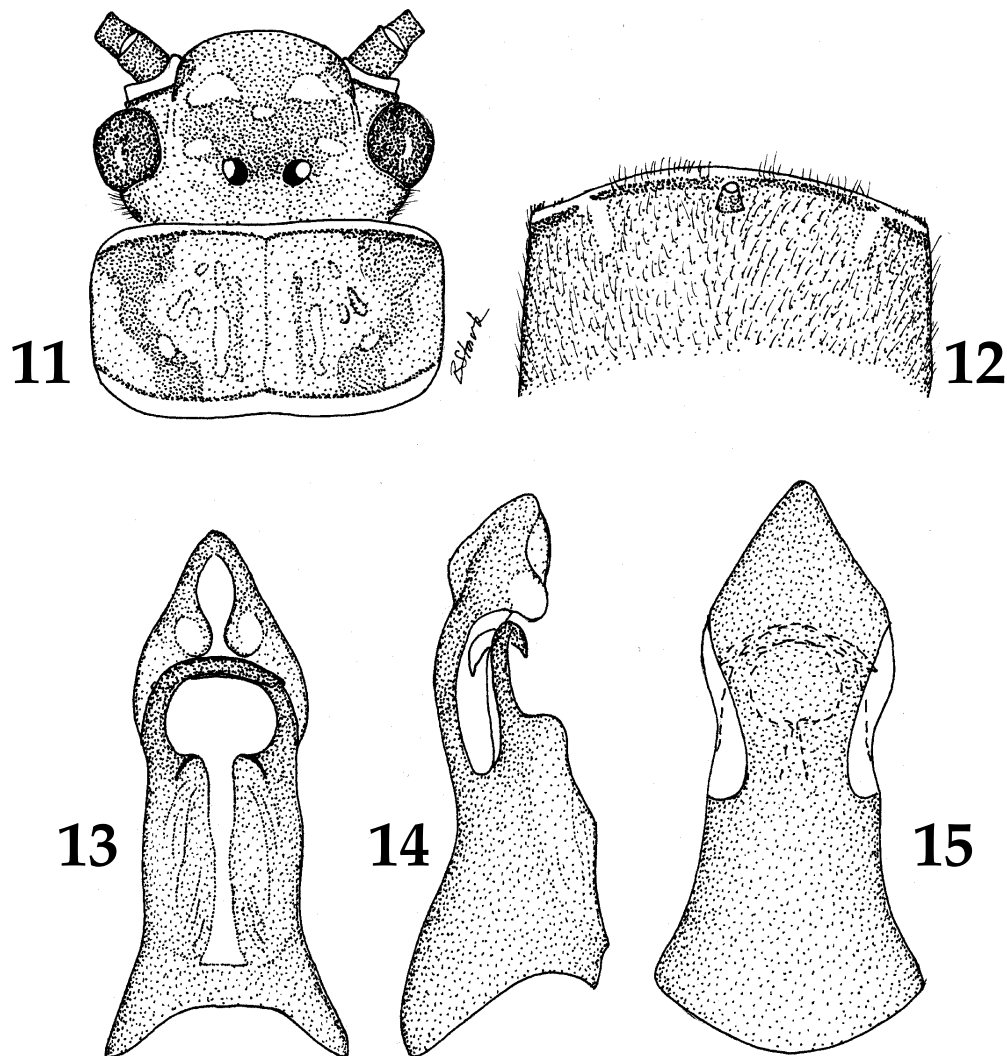
Figs. 6-10. *Anacroneuria otun*. 6. Head and pronotum, 7. Male sternum 9, 8. Aedeagus, ventral, 9. Aedeagus, lateral, 10. Aedeagus, dorsal.

Material examined. Holotype ♂ from COLOMBIA, Risaralda, Municipio de Pereira, Parque Regional Natural Ucumarí, Estación La Pastora, Río Otún headwater basin, 2400 m, N 04° 42' 32", W 75° 29' 37", on vegetation, 11 March 2007, M. del C. Zúñiga, W. Cardona, G. Zabala, C. Cultid (MEUV).

Adult habitus. General color dark brown patterned with pale yellow. Head dusky to dark brown over most of central occiput and frons; lappets dark brown, M-line distinct as three pale areas (Fig. 11). Pronotum dusky brown over most of disc with a

narrow, pale median band and a dark midlateral band. Wings with dark brown tint, veins dark brown. Legs brown, darker on outer margins; femora with narrow, dark apical band; tibiae darker than femora. **Male.** Forewing length 13 mm. Hammer cylindrical, height slightly greater than diameter (Fig. 12). Aedeagal apex broadly triangular and not clearly offset from shoulders (Fig. 13); ventral membranous lobes obscure. Dorsal keel absent (Fig. 15), apex about as wide as long in lateral aspect (Fig. 14).

Female. Unknown.



Figs. 11-15. *Anacroneuria pastora*. 11. Head and pronotum, 12. Male sternum 9, 13. Aedeagus, ventral, 14. Aedeagus, lateral, 15. Aedeagus, dorsal.

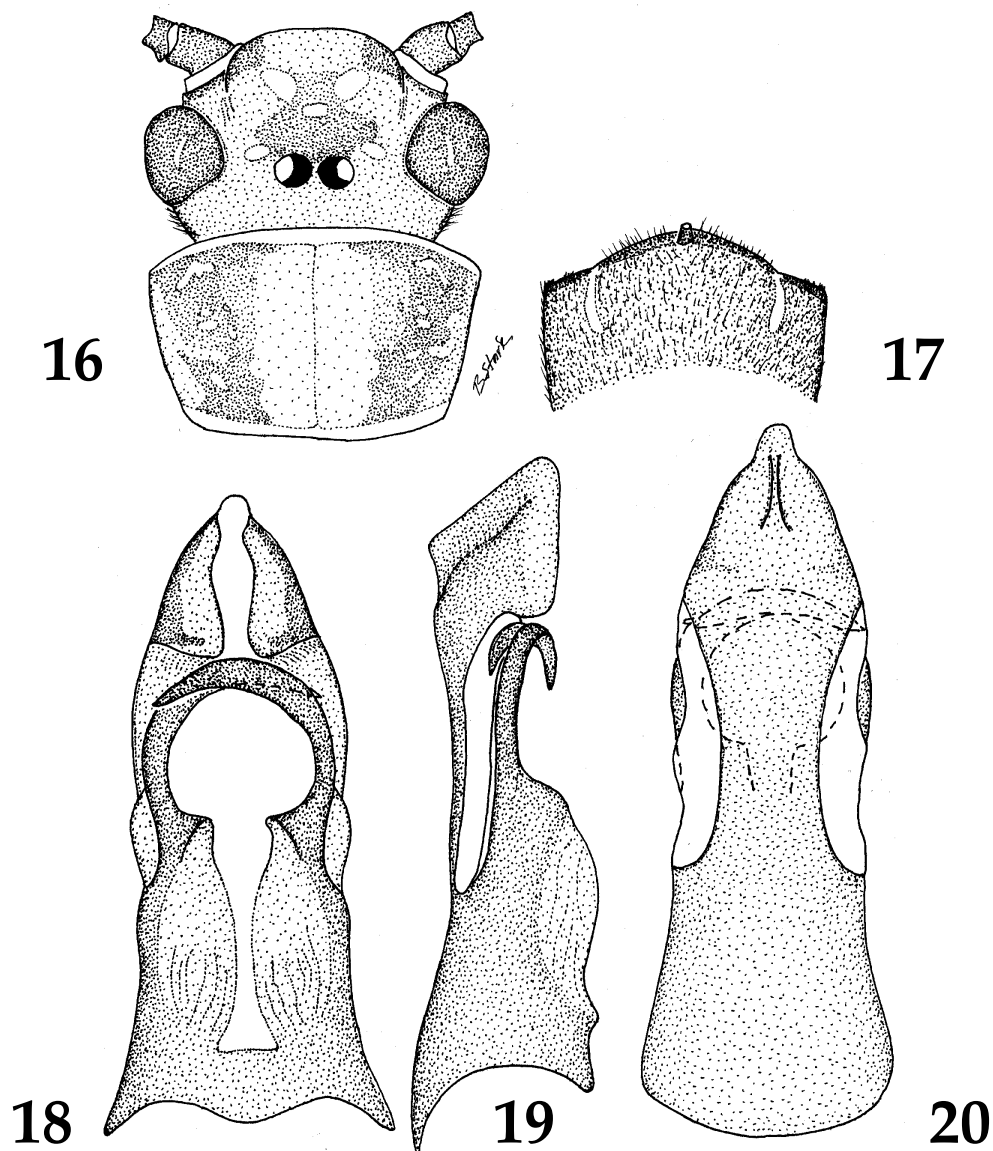
Larva. Unknown.

Etymology. The species name, used as a noun in apposition, is based on the name of the Biological Station in the Parque Regional Natural Ucumarí.

Diagnosis. The general aedeagal shape is similar to that of *A. llana* Stark from Venezuela (Stark 1995), but the absence of a dorsal keel and the lack of an apical constriction to offset the shoulders from the apex distinguish these species.

Ecological notes. The type locality is in the Cordillera Central and is part of Región Natural Andina of Colombia. The zone receives 2630 mm mean annual

rainfall and a bimodal pluviometric regimen, with rain peaks in April and October and dry period in July and August. The locality is covered by a mosaic of small pastures, patches of forest and "alisos" plantations (*Alnus acuminata*). In the Holdridge life zone system, this site is classified as very humid low montane forest (Espinal & Montenegro 1963). The specimen was collected at the beginning of the wet season and it was actively flying on the vegetation at daylight. The air temperature at the time of collection was 16°C.



Figs. 16-20. *Anacroneuria quimbaya*. 16. Head and pronotum, 17. Male sternum 9, 18. Aedeagus, ventral, 19. Aedeagus, lateral, 20. Aedeagus, dorsal.

Anacroneuria quimbaya sp. nov., Zúñiga & Stark
(Figs. 16-20)

Material examined. Holotype ♂ and 2♂ paratypes from COLOMBIA, Risaralda, Municipio de Pereira, Parque Regional Natural Ucumarí, Estación La Pastora, Río Otún headwater basin, 2400 m, N 04° 42' 32", W 75° 29' 37", 10-11 March 2007, light trap, M.

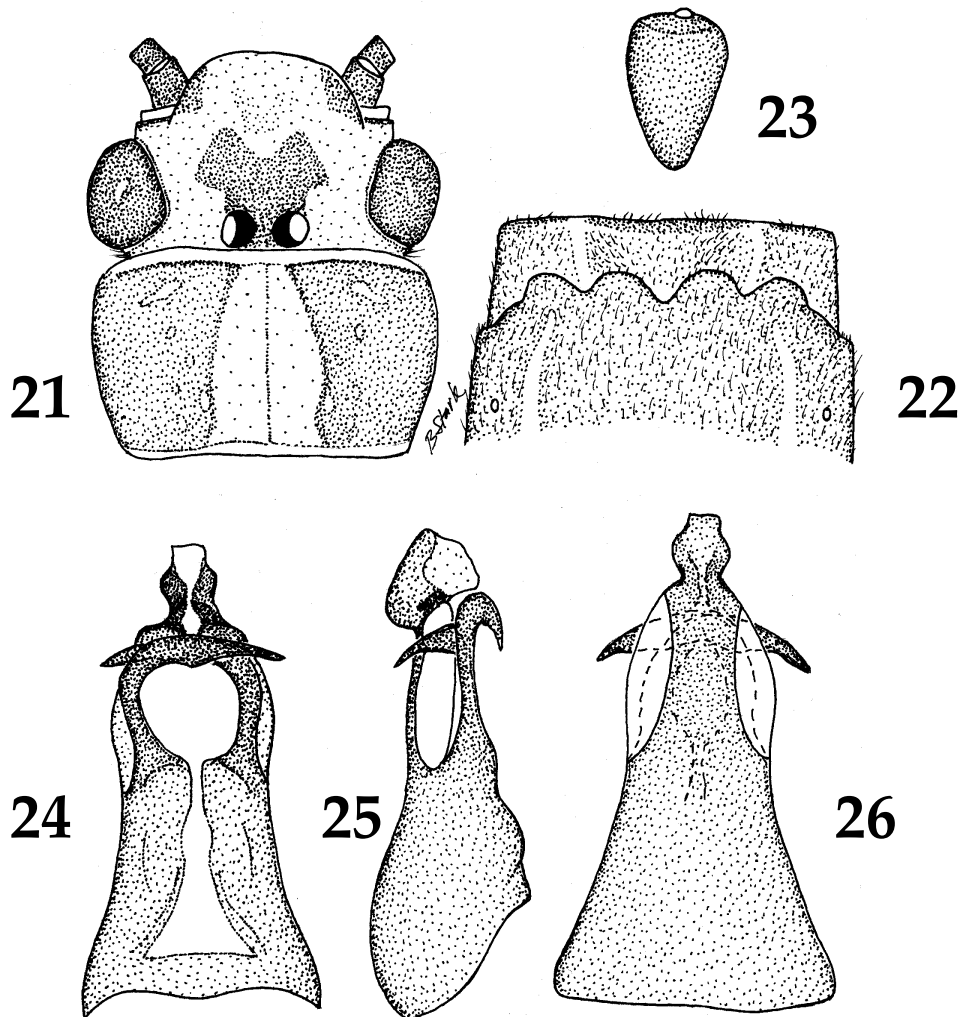
del C. Zúñiga, W. Cardona, G. Zabala, C. Cultid (Holotype and 1 paratype:MEUV, paratype: BPS). Additional paratypes: COLOMBIA: 2♂, Same data except 15-16 April 2006, W. Cardona (MHN-ICN, BYU).

Adult habitus. General color brown, patterned with yellow. Head with dark brown lappets and ocellar patch extending beyond M-line; central frons with a

pale quadrate spot; occiput dusky. Pronotum with wide median pale band; dark lateral bands irregular and bearing scattered pale rugosities (Fig. 16). Wing membrane transparent, veins dark brown. Femora dark along dorsal margin and in narrow apical band; tibiae dark brown but paler on posterior margin.

Male. Forewing length 18 mm. Hammer thimble

shaped, height greater than basal diameter (Fig. 17). Adeagal apex short, triangular in outline with a small membranous nipple; ventrolateral margins very dark, membranous ventral lobes absent (Fig. 18); hooks wide. Dorsal keel well developed, consisting of a pair of closely set ridges (Fig. 20). Lateral aspect wide with blade-like ventroapical margin (Fig. 19).



Figs. 21-26. *Anacroneuria tatama*. 21. Head and pronotum, 22. Female subgenital plate, 23. Egg, 24. Aedeagus, ventral (left hook broken), 25. Aedeagus, lateral, 26. Aedeagus, dorsal.

Female. Unknown.

Larva. Unknown.

Etymology. The species name, used as a noun in apposition, honors the indigenous culture in this region of Colombia.

Diagnosis. This species will key to *Anacroneuria quilla*

Stark & Zúñiga in Stark et al. (1999) but the aedeagal apex is less hatchet-like in lateral aspect and the tip bears a small nipple-like projection rather than a notch. The aedeagus is also similar to that of *A. camelo* Stark but in that species the dorsal keel reaches the apex (Stark 2001).

Ecological notes. The type locality is the same as that of *A. pastora*. This third-order stream is about 15-18 m wide and 0.40-0.70 m deep, with a mixed substrate composed of boulders, stones and patches of gravel and sands, primarily riffle zones and high slope. Natural riparian vegetation is present and the water quality is in optimum environmental condition; water temperature was 13-14°C and the air 16°C at the time of collection; these specimens were collected during the wet season.

Anacroneuria tatama sp. nov., Stark & Cardona
(Figs. 21-26)

Material examined. Holotype ♂ and 2♂, 2♀, paratypes from COLOMBIA, Risaralda, Municipio de Santuario, Parque Municipal Natural Planes de San Rafael, Río San Rafael middle basin, bridge, 2050 m, N 05° 07' 38", W 76° 00' 08", 15-16 July 2007, light trap, M. del C. Zúñiga, W. Cardona, A. Laina, G. Zabala, C. Cultid (Holotype and 1♂, 1♀ paratype: MEUV, 1♂, 1♀ paratype: BPS). Additional paratypes: COLOMBIA: 1♂, 1♀, Risaralda, Municipio de Santuario, Vereda El Tambo, Finca El Triunfo, Río San Rafael low basin, 1450 m, N 05° 05' 33"; W 075° 57' 47", 24 March 2007, light trap, W. Cardona, C. Cultid, G. Zabala, A. Laina, G. Cadena (MHN-ICN) 1♀, Risaralda, Municipio de Pereira, Parque Regional Natural Ucumarí, Estación La Pastora, Río Otún headwater basin, 2400 m, N 04° 42' 32", W 75° 29' 37", on vegetation, 11 March 2007, M. del C. Zúñiga, W. Cardona, G. Zabala, C. Cultid, (MEUV).

Adult habitus. General color dark brown, patterned with yellow. Head with dark brown ocellar spot expanded anterolaterally along M-line; lappets dark brown (Fig. 21). Pronotum dark brown laterally and pale along median suture. Wings with a slight brown tint, veins dark brown with Sc, R and M very dark, C and costal crossveins paler. Legs banded, femora pale basally and dark brown apically, tibiae with yellow mesal and dark brown basal and apical bands.

Male. Forewing length 11.5 mm. Hammer thimble shaped, height greater than basal diameter. Aedeagal apex short, scoop shaped in lateral aspect (Fig. 25) and bearing obscure membranous ventral lobes; slender apical area widest at mid length and offset from shoulders by slight basal constriction accented with dark sclerotization (Fig. 24). Aedeagal hooks

chelate, dorsal keel composed of two close-set, fragmented ridges (Fig. 26).

Female. Forewing length 15 mm. Subgenital plate with four subequal lobes, median notch larger than lateral notches. Setal patch of sternum 9 sparse mesally in stem region and denser posterolaterally (Fig. 22).

Egg. Spindle shaped with small button collar and smooth chorion (Fig. 23).

Larva. Unknown.

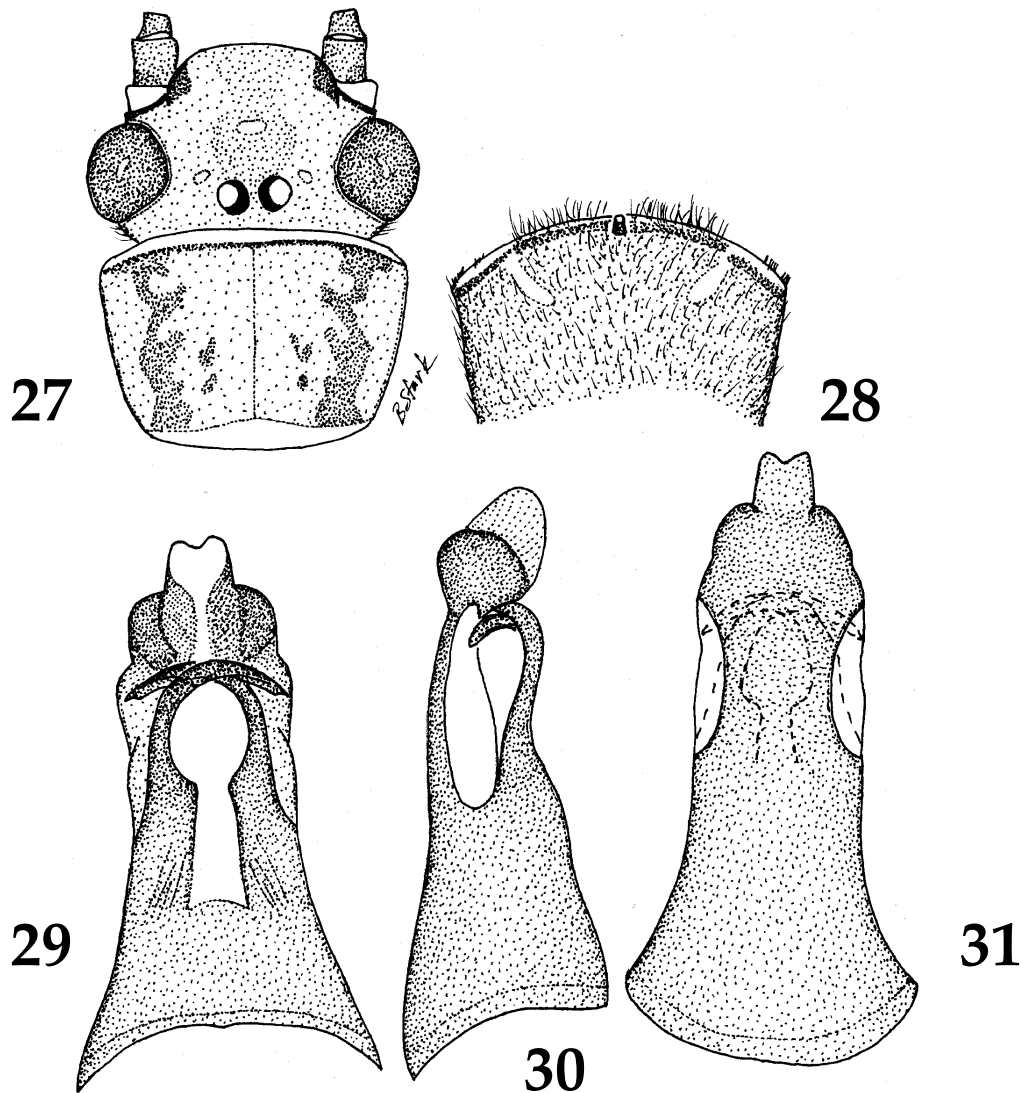
Etymology. The species name, used as a noun in apposition, refers to the mountain range at the area of the type locality.

Diagnosis. This species is a member of the *Anacroneuria aymara* species group (Stark & Sivec 1998; Zúñiga & Stark 2002). The aedeagus is most similar to that of *A. farallonensis* Rojas & Baena but the apex is not expanded as in that species and the fragmented bead-like aspect of the keel lines is distinctive.

Ecological notes. The type locality is in the Cordillera Occidental and is part of Región Natural Andina of Colombia on the low part of "Macizo de Tatamá". This second-order stream is about 5-8 m wide and 0.30-0.60 m deep, with a mixed substrate composed of boulders, stones, patches of gravel and sands, in riffle zones with high slope. Water temperature was 15°C and the air 18°C at the time of collection. Natural riparian vegetation is present and the water quality is in optimum environmental condition. The specimen was collected at the start of dry season.

Anacroneuria tayrona sp. nov., Zúñiga & Tamaris
(Figs. 27-31)

Material examined. Holotype ♂ from COLOMBIA, Magdalena, Municipio de Santa Marta, Parque Nacional Natural Sierra Nevada Santa Marta, Estación San Lorenzo, Río Gaira headwater basin, 1560 m, N 11° 10' 02", W 74° 10' 41", 1 September 2004, light trap, C. Tamaris, R. Turrizo (MEUV). Paratypes: COLOMBIA: 3♂, same data, except 5 June 2004 (MEUV). 4♂, same data, except 8 July 2004 (BPS, BYU, MEUA, MHN-ICN). 1♂, same data, except 12 January 2004 (MEUV). 1♂, same data, except 7 June 2004 (MEUV). 1♂ same data, except 2 July 2004 (MEUV). 1♂, same data, except January 2005, C. Tamaris, D. Serna (BPS).



Figs. 27-31. *Anacroneuria tayrona*. 27. Head and pronotum, 28. Male sternum 9, 29. Aedeagus, ventral, 30. Aedeagus, lateral, 31. Aedeagus, dorsal.

Adult habitus. Teneral color mostly pale yellow brown patterned with brown. Head yellow with pale dusky areas on central frons, and darker lappets (Fig. 27). Pronotum pale with narrow midlateral dark bands. Wing transparent, veins pale brown or amber. Legs pale except femora with narrow dark, apical band, and tibiae dark on outer proximal and distal edge.

Male. Forewing length 16.5–18.0 mm. Hammer thimble shaped, height subequal to basal diameter (Fig. 28). Projecting aedeagal apex about as long as wide, membranous lobes absent; shoulders bulging

in ventral and dorsal aspect (Figs. 29, 31) and projecting slightly as ear-like lobes in lateral aspect (Fig. 30).

Female. Unknown.

Larva. Unknown.

Etymology. The species name, used as a noun in apposition, honors the native people who live in the Sierra Nevada de Santa Marta.

Diagnosis. The aedeagus of this species is generally similar to that of *A. marta* Zúñiga & Stark, a species also known from lower elevations of Sierra Nevada de Santa Marta. In *A. tayrona* the apical lobe is

slightly notched and projects beyond the shoulders somewhat more than in *A. marta*.

Ecological notes. The type locality is in the Región Natural Caribe of Colombia on the northwest side of Nacional Natural Park Sierra Nevada de Santa Marta. The Holdridge life zone system classification is very humid subtropical forest (Espinal & Montenegro 1963), with 2446 mm mean annual rainfall and a monomodal pluviometric regime; the wet period is from April to November and the dry period from December to March. The Gaira River is a third-order stream, about 6 m wide and 0.25-0.50 m depth, with a substrate composed of boulders, stones, patches of gravel and sands, riffle and pool zones. The variation of water volume is from 118 l/s to 482 l/s and current speed is from 0.49-0.77 m/s, in relation to dry or wet season. The water is fresh, oligotrophic, in good ecological condition, without evident pollution (18°C, 6.9 mg/l O₂, 12.5 µS/cm, pH 6.7). The natural riparian vegetation is abundant and consists mainly of *Calatola costarisensis*, *Tovomita weddelliana*, *Rondeleti* sp. *Croton bogotanus*, *Pouteria argaucoencium* and *Clusia multiflora* (Tamariz-Turizo et al. 2007).

Anacroneuria tunasi sp. nov., Stark & Zúñiga
(Figs. 32-36)

Material examined. Holotype ♂ from COLOMBIA, Risaralda, Municipio de Santuario, Parque Nacional Natural Tatamá, 2400 m, November 2004, on vegetation, J. Castellanos (MEUV).

Adult habitus. General color yellow brown patterned with brown, head yellow brown with dusky brown area from ocelli to forward of M-line; M-line represented by oval median spot (Fig. 32). Pronotum with irregular dark lateral bands and wide median pale band. Wing membrane with pale brown tint and brown veins, R vein darkest. Femora dark on dorsum and in narrow apical band; tibia uniformly dark brown.

Male. Forewing length 12 mm. Hammer thimble shaped, height subequal to basal diameter (Fig. 33). Aedeagal apex trilobed with shoulders projecting as ear-like structures (Fig. 34); dorsal keel a minute triangular projection (Fig. 36). Apical area in lateral aspect about as wide as long; ear-like lateral lobes reach beyond midpoint to ventral margin (Fig. 35).

Female. Unknown.

Larva. Unknown.

Etymology. The species name, used as a noun in apposition, honors the indigenous people who inhabited this region in Colombia.

Diagnosis. The aedeagus of this species is similar to that of *A. citara* (described above) and related species. It differs from the related species (*A. albimacula* and *A. rugosa*) on the same basis as *A. citara*, and it differs from that species in having a much smaller apical aedeagal area, in the absence of small basal ear lobes and in the sinuate dorsal connection of the lateral ear lobes to the apex. In *A. citara* this connection is more linear (Fig. 36).

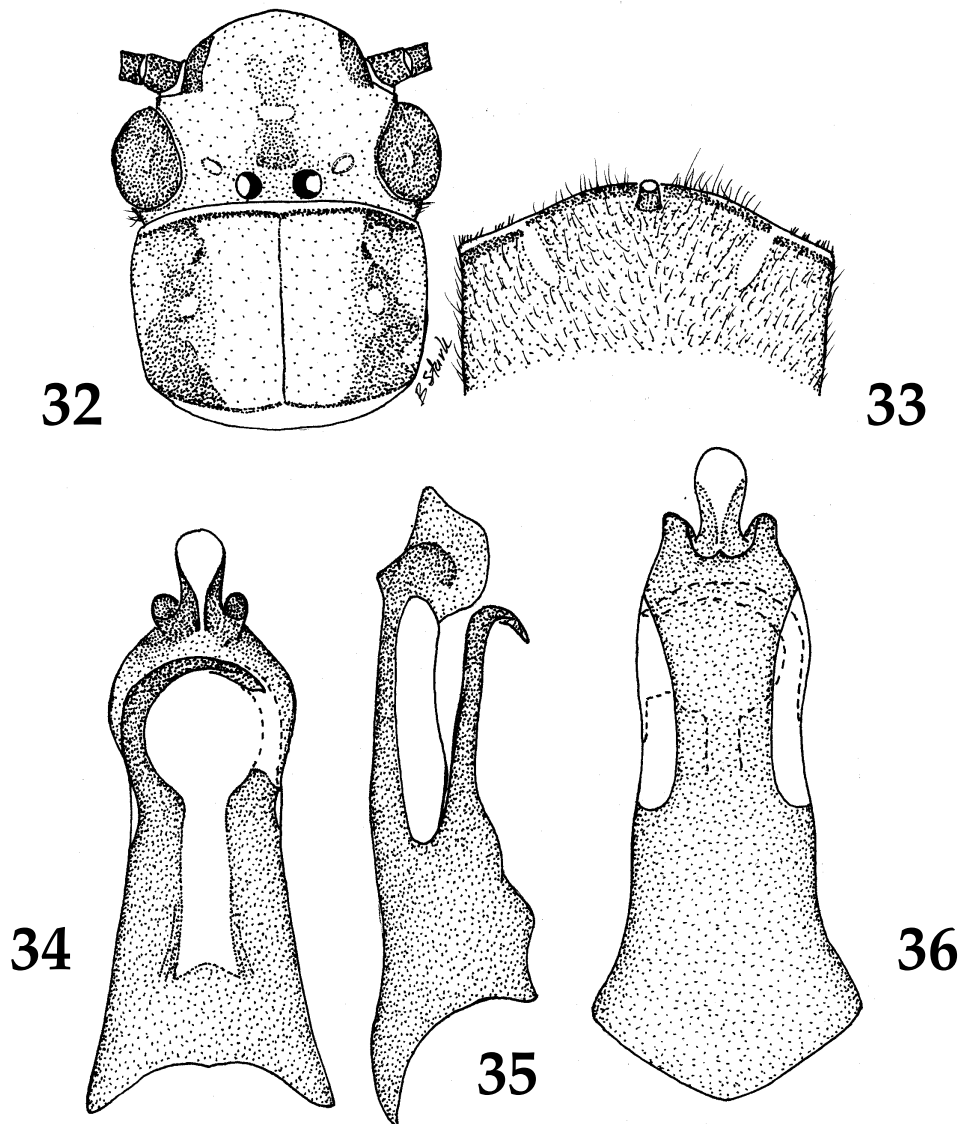
Ecological notes. The specimen was collected near the type locality of *A. tatama*. This National Natural Park is one of the best protected areas in Colombia and is located in the west part of Región Natural Andina in an area with rugged topography.

New Records

Anacroneuria anchicaya Baena & Zúñiga

Anacroneuria anchicaya Baena & Zúñiga in Stark, et al., 1999:22. Holotype ♂, Alto Anchicayá, Valle del Cauca, Colombia (MEUV)

Material examined. COLOMBIA: 4♂, Antioquia, Municipio de Betania, Farallones de Citará, Vereda La Oculta, Quebrada Agualinda, at light, 7 August 1996, O.E.Ortega (MEFLG). 1♂, Same data, except 13 October 1996 (MEFLG). 1♂, Cauca, Municipio de Popayán, Vereda Clarete, 1800 m, December 2000, S. Mosquera (MEUV). 7 ♂, Risaralda, Municipio de Apía, Finca La Playita, polygeneric shaded coffee, 1490 m, N 05° 08', W 75° 56', 21 February 2004, L. Ramírez, M. Astudillo (MEUV, BPS, BYU). 1♂, Risaralda, Municipio de Pereira, Parque Regional Natural Ucumarí, Estación La Pastora, Río Otún headwater basin, 2400 m, N 04° 42' 32", W 75° 29' 37", 26 June 2006, M. del C. Zúñiga, W. Cardona, G. Zabala, R. J. Cardozo-Zúñiga (MEUV). 1♂, Same data, except 10-11 March 2007, M. del C. Zúñiga, W. Cardona, G. Zabala, C. Cultid (BPS). 1♂, Same data, except 3 July 2007, M. del C. Zúñiga, W. Cardona, J. Chará, L. P. Giraldo, A. M. Chará (BYU). 1♂, same data, except emerging (MEUV). 1♂, Risaralda, Municipio de Pereira, Parque Natural Regional



Figs. 32-36. *Anacroneuria tunasi*. 32. Head and pronotum, 33 Male sternum 9, 34. Aedeagus, ventral, 35. Aedeagus, lateral, 36. Aedeagus, dorsal.

Ucumarí, Estación La Pastora, Río Otún metallic bridge, 2350 m, N 04° 42' 35", W 75° 30' 03", 5 July 2007, M. del C. Zúñiga, W. Cardona, J. Chará, L. P. Giraldo, A. M. Chará (MEUV). 5♂, Risaralda, Municipio de Santuario, Vereda el Tambo, Finca El Triunfo, Río San Rafael low basin, bridge, 1450 m, N 05° 05' 33", W 75° 57' 47", 23-24 March 2007, W. Cardona, C. Cultid, G. Zabala, A. Laina, G. Cadena (MEUV, MEUA, BPS). 9♂, Same data, except 14 July 2007, M. del C. Zúñiga, W. Cardona, A. Laina, G. Zabala, C. Cultid (MEUV, MHN-ICN, BPS, BYU). 3♂,

Risaralda, Municipio de Santuario, Vereda El Tambo, Finca El Bosque, Río Apía low basin, 1210 m, N 05° 04' 21", W 75° 57' 06", 26 March 2007, W. Cardona, C. Cultid, J. Pineda, L. Valenzuela (MEUV). 3♂. Risaralda, Municipio de Santuario, Parque Municipal Natural Planes de San Rafael, Río San Rafael headwater basin, bridge, 2050 m, N 05° 07' 38", W 76° 00' 08", 15-16 July 2007, M. del C. Zúñiga, W. Cardona, A. Laina, G. Zabala, C. Cultid (MEUV, MEUA). 1♂, Valle del Cauca, Municipio de Cali, Corregimiento de Pance, Reserva Natural Anahuac,

Río Pance headwater basin, 1600 m, N 03° 19' 51", W 76° 39' 01", 4 May 2007, light trap, M. del C. Zúñiga, W. Cardona, M. Gamboa, C. Cultid (MEUV).

Discussion. Zúñiga & Stark (2002) and Zúñiga et al. (2006) gave additional records of this species. These new records include the first for Cauca and Risaralda Departments and all are from the Región Natural Andina in Colombia. One of the sites, Finca La Payita in Risaralda, Municipio de Apía, is in the Cordillera Occidental. The zone receives 2320 mm mean annual rainfall with a bimodal pluviometric regime; the rain peaks are in May and November. Air temperature is 18-20°C and 80% relative humidity. The life zone according to the Holdridge system is humid premontane forest with rugged topography (Espinal & Montenegro 1963). These specimens were collected in a polygeneric shaded coffee plantation.

Anacroneuria azul Rojas & Baena

Anacroneuria azul Rojas & Baena in Stark et al., 1999:23. Holotype ♂, Río Azul, Río Calima middle basin, Valle del Cauca, Colombia (MEUV)

Material examined. COLOMBIA: 1♂, Antioquia, Municipio de Támesis, La Pintada, Río Arma bank, on ground, 800 m, April 1979, G. Morales (MEFLG).

Discussion. Zúñiga & Stark (2002) and Zúñiga et al. (2006) gave additional records for this species from Antioquia and Valle del Cauca. This specimen represents a range extension for the Cordillera Occidental of Antioquia.

Anacroneuria bari Stark

Anacroneuria bari Stark, 1995:226. Holotype ♂, El Tucuco, Zulía, Venezuela (USNM)

Material examined. COLOMBIA: 2♂ Antioquia, Municipio de Támesis, Quebrada La Guamo, Río Cauca middle basin, N 05° 48' 02"; W 075° 40' 32", 640 m, light trap, 14 October 2002, M. del C. Zúñiga, J. A. Posada, A. J. Cardozo- Zúñiga (MEUV). 1♂, Antioquia, Municipio de Betania, Farallones de Citará, Vereda La Oculta, Quebrada Agualinda, at light, 13 October 1996, O. E. Ortega (MEFLG).

Discussion. This species was previously known from several sites in Venezuela (Stark 1995, 1999). These specimens, the first reported for Colombia, are from

the Cordillera Occidental of the Región Natural Andina in northwestern Colombia. The locality in the Municipio de Támesis is a third order creek about 10 m wide and 0.50 m deep, with a mixed substrate composed of boulders, stones, patches of gravel and sands, and riffle zones. It flows to the Río Cauca middle basin. The water temperature was 24°C and the air 26°C at the time of collection. The sparse riparian vegetation consists primarily of shrubs and grasses. These specimens were collected during the wet season.

Anacroneuria calima Baena & Rojas

Anacroneuria calima Baena & Rojas in Stark et al., 1999:23. Holotype ♂, Río Azul, Río Calima middle basin, Valle del Cauca, Colombia (MEUV)

Material examined. COLOMBIA: 1♂, Valle del Cauca, Municipio de Buenaventura, Río Anchicayá, 555 m, light trap, 6 October 1994, M. Lozano (MEUV). 1♀, Same data, except 800 m, 3 June 1997, J. Ramírez (MEUV). 1♀, Same data, except 26 August 1994, G. Jaramillo (MEUV). 1♀, Same data, except 7 October 1994, A. Gómez (MEUV).

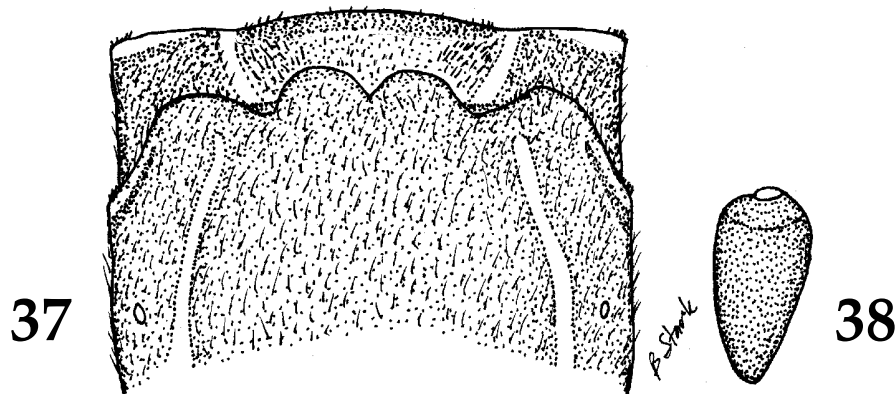
Discussion. The original description of this species was based on a small series of males (Stark et al. 1999) and the female has not previously been described. Our samples include three females from near the type locality, which are similar in size and color pattern to the holotype. We add the description of these as the probable female of *A. calima*.

Female. Forewing length 12 mm. Subgenital plate 4-lobed; mesal lobes close set, divided by narrow, shallow notch, and projecting beyond the slightly broader lateral lobes (Fig. 37). Sternum 9 with a narrow transverse sclerite on posterior margin; mesal setal patch composed of fine, sparse median patch and slightly longer setae in lateral patches; entire mesal patch relatively inconspicuous.

Egg. Spindle shaped, elongate and typical of genus (Fig. 38).

Anacroneuria caraca Stark

Anacroneuria caraca Stark, 1995:228. Holotype ♂, Río Limón, Parque Nacional Henri Pittier, Aragua, Venezuela (USNM)



Figs. 37-38. *Anacroneuria calima*. 37. Female subgenital plate, 38. Egg.

Material examined. COLOMBIA: 1♂, Risaralda, Municipio de Pereira, Vereda La Suiza, Santuario de Fauna y Flora Otún-Quimbaya, Río Otún middle basin, bridge Finca Buenos Aires, 1800 m, N 04° 44' 00", W 75° 34' 49", light trap, 12 April 2006, M. del C. Zúñiga, W. Cardona, G. Zabala (MEUV). 3♂, Risaralda, Municipio de Santuario, Vereda El Tambo, Finca El Triunfo, Río San Rafael low basin, 1450 m, N 05° 05' 33", W 75° 57' 47", light trap, 14 July 2007, M. del C. Zúñiga, W. Cardona, A. Laina, G. Zabala, C. Cultid (MEUV, BPS). 1♂, Valle del Cauca, El Tamboral, 1100 m, light trap, November 1994, A. Osorio (MEUV). 1♂, Valle del Cauca, Municipio de La Cumbre, Corregimiento Puente Palo, Finca El Jazmín, N 03° 38' 43"; W 076° 37' 15", 1530 m, light, R. J. Cardozo-Zúñiga (MEUV). 1♂, Valle del Cauca, Municipio de La Cumbre, Corregimiento de Arboledas, 1500 m, M. Astudillo (MEUV). 1♂, Valle del Cauca, Municipio de Cali, Km 11, road to the Pacific coast, 24 September 2006, L. Vázques-Vélez (MEUV).

Discussion. This species was described from specimens collected in Venezuela and subsequently reported from Colombia and Ecuador (Stark 1995, 2001; Zúñiga & Stark 2002; Zúñiga et al. 2006). Previous Colombian records are from Magdalena, Valle del Cauca and Antioquia. The new records are from the Región Natural Andina. One of the sites, the Santuario de Flora y Fauna Otún-Quimbaya in the Cordillera Central, is part of a protected zone of the Río Otún middle basin. It has a bimodal pluviometric

regime, with peaks in April and October and receives 2500 mm mean annual rainfall. The area is covered by a mosaic of mature natural forest, secondary forest with natural regeneration and a monospecific plantation of "urapán" (*Fraxinus chinensis*) and "roble" (*Quercus humboldtii*).

Anacroneuria cordillera Rojas & Zúñiga

Anacroneuria cordillera Rojas & Zúñiga in Stark et al., 1999:26. Holotype ♂, Río Meléndez high basin, Villa Carmelo, Valle del Cauca, Colombia (MEUV)

Material examined. COLOMBIA: 1♂, Cauca, Municipio de Popayán, Río Palacé, Panamerican way bridge, light trap, 30 April 2000, M. del C. Zúñiga, R. J. Cardozo-Zúñiga (MEUV).

Discussion. This species was previously known for a few localities in Valle del Cauca (Zúñiga & Stark 2002). The new record is the first for Cauca Department, in the Región Natural Andina of Colombia and the Cordillera Central.

Anacroneuria curiosa Stark

Anacroneuria curiosa Stark, 1998:563. Holotype ♂, Río Tempisquito, Maritza, Parque Nacional Guanacaste, Guanacaste, Costa Rica (USNM)

Material examined. COLOMBIA: 1♂, Valle del Cauca, Municipio de Buenaventura, Río Calima low basin, 90 m, 20 June 1996, V. H. Serrano (MEUV).

Discussion. This species was previously known from Costa Rica, Nicaragua and Panama. This is the first Colombian record of the species and the second Mesoamerican species to be authenticated in South America (Stark 1998; Zúñiga & Stark 2002). The collection locality is in the Región Natural del Pacífico in the lowland, and the life zone according to the Holdridge system is very humid tropical forest (Espinal & Montenegro 1963).

Anacroneuria farallonensis Rojas & Baena

Anacroneuria farallonensis Rojas & Baena, 1993:23
Holotype ♂, Río Cali, Peñas Blancas, Valle del Cauca, Colombia (MEUV)

Material examined. COLOMBIA: 3♂. Risaralda, Municipio de Pereira, Parque Regional Ucumarí, Estación La Pastora, Quebrada La Pastora, Río Otún headwater basin, 2440 m, N 04° 42' 54", W 75° 29' 26", 12 March 2007, M. del C. Zúñiga, W. Cardona, G. Zabala, C. Cultid (MEUV, BPS).

Discussion. Previously reported specimens of this species were all collected at the type locality in the Cordillera Occidental (Rojas & Baena 1993; Zúñiga & Stark 2002). These specimens, from the Cordillera Central in Risaralda Department, represent a significant range extension. The collection locality is in a protected area with abundant natural riparian vegetation and clear and unpolluted water. The specimens were collected at the start of the rainy season, after a climatic "Niño" phenomenon; water temperature was 14°C and the air, 18°C at the time of collection.

Anacroneuria fenestrata (Pictet)

Perla fenestrata Pictet, 1841:281. Holotype ♂, Colombia (MNHU)

Anacroneuria fenestrata: Zwick 1972:1157. Redescription

Material examined. COLOMBIA: 1♂, Boyacá, Municipio de Arcabuco, Río Cane, Villa de Leyva-Arcabuco road, light trap, 2500 m, 12 December 2002, M. del C. Zúñiga, N. Aranguren, A. J. Cardozo-Zúñiga and colleagues (MEUV).

Discussion. The species was known from Boyacá in Colombia (Zúñiga et al. 2006) and from Venezuela (Stark 1995). This specimen expands the known

distribution within Boyaca in the Región Natural Andina, to the Cordillera Oriental.

Anacroneuria guambiana Zúñiga & Stark

Anacroneuria guambiana Zúñiga & Stark in Stark et al., 1999:27. Holotype ♂, Río Piendamó, Piendamó, Cauca, Colombia (MEUV)

Anacroneuria guambiana Stark & Zúñiga, 2003:234.
Female description

Material examined. COLOMBIA: 2♂, Risaralda, Municipio de Pereira, Parque Regional Natural Ucumarí, Estación La Pastora, Río Otún headwater basin, 2400 m, N 04° 42' 32", W 75° 29' 37", 15-16 June 2006, light trap, W. Cardona (MEUV). 2♂, Same data, except 10-11 March 2007, M. del C. Zúñiga, W. Cardona, G. Zabala, C. Cultid (MEUV). 2♂, Same data, except Quebrada La Pastora, 2440 m, N 04° 42' 54", W 75° 29' 26", 12 March 2007 (MHN-ICN). 4♂, Same data, except 3 July 2007, M. del C. Zúñiga, W. Cardona, J. Chará, L. P. Giraldo, A. M. Chará (MEUA, BPS, BYU). 2♂, Same data, except Río Otún metallic bridge, 2350 m, N 04° 42' 35", W 75° 30' 03", 5 July 2007 (BPS, BYU). 1♀, Risaralda, Municipio de Santuario, Parque Municipal Natural Planes de San Rafael, Río San Rafael middle basin, 2050 m, N 05° 07' 38", W 76° 00' 08", light trap, 15-16 July 2007, M. del C. Zúñiga, W. Cardona, G. Zabala, C. Cultid, A. Laina (MEUV).

Discussion. This series of twelve specimens is similar to those reported earlier from this site by Stark & Zúñiga (2003), however in this same collection from "La Pastora" are eight males whose head pattern matches that of *A. socapa* Stark & Zúñiga, but whose aedeagal features are like those of the males listed above. Four additional "intermediate" males were collected at another site, Natural National Park Los Nevados, El Jordán at 3100 meters, in Risaralda, and three males with the opposite condition (*A. socapa* aedeagus but without head markings) were collected at two additional sites in Risaralda (reported under *A. socapa*). The "La Pastora" site specimens also include several typical males of *A. socapa*. This suggests the possibility of hybridization at sites in Risaralda, or, perhaps the head pattern character is less reliable than previously thought.

Anacroneuria harperi Stark

Anacroneuria harperi Stark, 1998:568. Holotype ♂, Alajuela, Panamá (USNM)

Material examined. COLOMBIA: 2♂, Chocó, Municipio de Riosucio, Belén de Bajirá, 18 m, January 1995, in forest, F. Serna, J. Hurtado (MEFLG). 1♂, Chocó. Municipio de Nuquí, way to Cerro Aguila, on vegetation, 6 May 1995, P. Duque (CECIB).

Discussion. This species was previously reported from two sites in Panamá (Stark 1998). These specimens collected on the Región Natural del Pacífico lowland, are the first records in Colombia and the third species from Mesoamerica to be documented in South America.

Anacroneuria jewetti Stark

Anacroneuria jewetti Stark 2001:19. Holotype ♂, San Francisco de Borja, Napo, Ecuador (USNM)

Material examined. COLOMBIA: 1♂, Antioquia, Municipio de Amagá, 1332 m, at light, September 1980, A. M. del Corral (MEFLG).

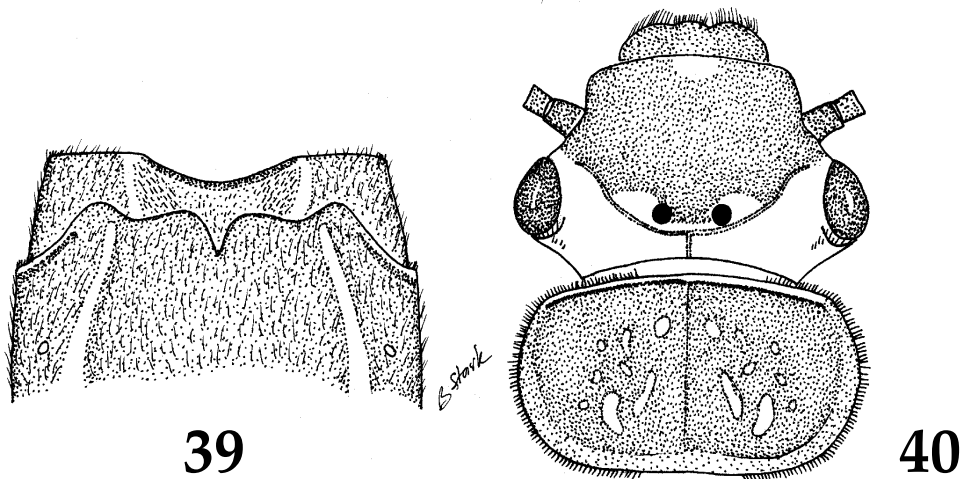
Discussion. This species was known from several places in Ecuador (Stark 2001; Zúñiga et al. 2006) and

the Cordillera Occidental in Valle del Cauca (Zúñiga & Stark 2002). This specimen extends the known distribution to northwest Colombia, and it is the first record from Antioquia in the Cordillera Central.

Anacroneuria marta Zúñiga & Stark

Anacroneuria marta Zúñiga & Stark, 2002:210. Holotype ♂, Don Diego, Magdalena, Colombia (CMNH)

Material examined. COLOMBIA: 2♂, Magdalena, Municipio de Santa Marta, Corregimiento de Minca, Quebrada Agua dulce, Río Gaira middle basin, 710 m, light trap, N 11° 07' 57", W 74° 07' 14", 1 October 2000, M. del C. Zúñiga, L. C. Gutiérrez, L. Pérez, N. Martínez (MEUV). 1♂, Magdalena, Municipio de Santa Marta, Corregimiento de Minca, Río Gaira middle basin, Pozo Azul, 750 m, N 11° 08' 11", W 74° 06' 12", on vegetation, 11 June 2003, L. Florez (BPS). 1♀, Magdalena, Municipio de Santa Marta, Corregimiento de Minca, Hacienda La Victoria, Río Gaira middle basin, 900 m, light trap, N 11° 07' 44", W 74° 05' 36", 27 June 2005, T. Sierra-Labastidas, A. Reyes-Picón (MEUV).



Figs. 39-40. *Anacroneuria marta*. 39. Female subgenital plate, 40. Larval head and pronotum.

Discussion. This species was described from a single male collected at the base of Sierra Nevada de Santa Marta (Zúñiga & Stark 2002) and the female and larva have not been subsequently described. Our sample from the Región Natural del Caribe in

Colombia, includes a single female, with associated larval skin, which matches the holotype and two recently collected males in color pattern and size. We add the description of this female and larva as the probable unknown life stages of this species.

Female. Forewing length 12mm. Subgenital plate weakly 4-lobed; mesal lobes narrowly separated by mesal notch, lateral lobes separated by broad emarginations (Fig. 39); lobes about equal in length. Sternum 9 with a narrow transverse curved sclerite on posterior margin; mesal setal patch composed of relatively short, fine setae; median stalk very sparse and lateral patches with larger and more numerous setae.

Egg. Unknown.

Larva. (from exuvia). General color dark brown with pale areas on head and thorax; abdomen uniformly brown. Head mostly brown forward of ocelli, but small pale areas on anteromedian area and laterad to ocelli; occiput entirely pale (Fig. 40). Legs brown; fringe hairs of legs and cerci not visible due to specimen condition.

Anacroneuria munchique Zúñiga & Stark

Anacroneuria munchique Zúñiga & Stark, 2002:211. Holotype ♂, Parque Nacional Natural Munchique, La Romelia, headwater basin Río San Joaquín, Cauca, Colombia (MEUV)

Material examined. COLOMBIA: ♂, Caldas, Municipio de Aranzazu, Vereda Chambery, Río Chambery, Finca Chambery, 1830 m, 31 March 2004, N 05° 17' 27", W 75° 28' 43", light trap, M. del C. Zúñiga, R. J. Cardozo-Zúñiga (MEUV). 1♂, Risaralda, Municipio de Pereira, Vereda La Suiza, Santuario de Fauna y Flora Otún-Quimbaya, Río Otún middle basin, Finca Buenos Aires bridge, 1800 m, N 04° 44' 00", W 75° 34' 49", 12 April 2006, emerging, M. del C. Zúñiga, W. Cardona, G. Zabala (MEUV). 1♂, Same data, except 27 April 2006, W. Cardona (BPS). 1♂, Risaralda, Municipio de Pereira, Parque Regional Natural Ucumarí, Estación La Pastora, Río Otún headwater basin, 2400 m, N 04° 42' 32", W 75° 29' 37", 16 April 2006, light trap, W. Cardona, (BPS). 1♂, Same data, except 29 June 2006, light trap, M. del C. Zúñiga, W. Cardona, G. Zabala, R. J. Cardozo-Zúñiga (BYU). 1♂, Same data, except Río Otún metallic bridge, N 04° 42' 35", W 75° 30' 03", 5 July 2007, light trap, M. del C. Zúñiga, W. Cardona, J. Chará, L. P. Giraldo, A. M. Chara, (MEUA). 2♂, Risaralda, Municipio de Pereira, Parque Regional Natural Ucumarí, El Cedral, Río Otún middle basin, 2060 m, N 04° 42' 32", W 75° 29' 37", 30 June 2006, M. del C.

Zúñiga, W. Cardona, G. Zabala, R. J. Cardozo-Zúñiga (MEUV, MHN-ICN).

Discussion. This species was reported by Zúñiga & Stark (2002) from several localities in the Andinum region in Cauca, Valle del Cauca and Risaralda in the Cordillera Occidental and Cordillera Central. This series expands the records to Risaralda, mainly to protected areas in the headwater and middle Río Otún basin. The specimen from Caldas is the first record for this Department. This third order stream, is a part of the Cauca River middle basin. It is about 12-15 m wide and 0.5-0.8 m deep with substrate composed of boulders, patches of gravel and sands, riffle zones and high slope. The discharge was 727 l/s, the water is oligotrophic in good ecological condition with incipient organic pollution (7.9 mg/l O₂, 12°C). The sparse riparian vegetation consists primarily of shrubs and grasses. The zone receives 2115 mm mean annual rainfall and the air temperature was 18°C at the time of collection. The specimen was collected during the wet season.

Anacroneuria oreja Zúñiga & Stark

Anacroneuria oreja Zúñiga & Stark in Stark et al., 1999:31. Holotype ♂, Río Azul, Río Calima middle basin, Valle del Cauca, Colombia (MEUV)

Material examined. COLOMBIA: 1♂, Antioquia, Municipio de Santo Domingo, Porce, 1950 m, December 1995, light, R. Vélez (MEFLG).

Discussion. This species was previously known from a single male in Valle del Cauca in southwest Colombia. This specimen, collected on the east slope of the Cordillera Central, is the first record from Antioquia and the second known report of the species.

Anacroneuria pacifica Rojas & Baena

Anacroneuria pacifica Rojas & Baena in Stark et al., 1999:32. Holotype ♂, Alto Anchicayá, Valle del Cauca, Colombia (MEUV)

Material examined. COLOMBIA: 1♂, Antioquia, Municipio de San Luis, 1050 m, light trap, July 1983, G. Morales (MEFLG). 1♂, Valle del Cauca, Municipio de Buenaventura, Río Anchicayá, 555 m, light trap, 10 July 1994, A. Arcila (MEUV).

Discussion. This species was originally described based on a small series of males from two places in western Valle del Cauca. The new specimens include the third report from the type locality and the first for Antioquia on the east slope of the Cordillera Central.

Anacroneuria paisa Zúñiga & Stark

Anacroneuria paisa Zúñiga & Stark in Zúñiga et al., 2006:52. Holotype ♂, Parque Ecológico Piedras Blancas, Quebrada Matasano, Antioquia, Colombia (MEUV)

Material examined. COLOMBIA: 1♂, Antioquia, Municipio de Frontino, 1317 m, light trap, July 1989, G. Morales, C. Mantilla (MEFLG).

Discussion. This species was previously described from a single male from Antioquia in the Cordillera Central (Zúñiga et al. 2006). The new specimen represents the second collection record, and it extends the distribution to the Cordillera Occidental in Antioquia.

Anacroneuria puna Stark

Anacroneuria puna Stark 2001:29. Holotype ♂, Cotopaxi, San Francisco de Las Pampas, Otonga, Ecuador (CMNH)

Material examined. COLOMBIA: 1♂, Antioquia, Municipio de Caldas, on vegetation, March 1974. R. Vélez (MEFLG).

Discussion. This species was previously known from Ecuador (Stark 2001) and a single locality in Colombia from the Región Natural del Pacífico (Zúñiga & Stark 2002). This specimen is a new record for Antioquia in the Cordillera Central.

Anacroneuria quilla Stark & Zúñiga

Anacroneuria quilla Stark & Zúñiga in Stark et al., 1999:35. Holotype ♂, Termales de Santa Rosa de Cabal, Risaralda, Colombia (USNM)

Material examined. COLOMBIA: 3♂, Risaralda, Municipio Santa Rosa de Cabal, Vereda San José de la Paloma, Parque Municipal Natural Campoalegre, Río San Eugenio headwater basin, 2100 m, N 04° 49' 49", W 75° 34' 12", 17-19 May 2006, W. Cardona (MEUV, BPS). 3♂, Risaralda, Municipio de Pereira, Parque Nacional Natural Los Nevados, El Jordán, Río

Otún headwater basin, 3100 m N 04° 42' 32", W 75° 29' 37", 27-28 June 2006, M. del C. Zúñiga, W. Cardona, G. Zabala, R. J. Cardozo-Zúñiga (MEUV, BPS). 2♂, Risaralda, Municipio de Pereira, Parque Regional Natural Ucumarí, El Cedral, Río Otún middle basin, 2060 m, N 04° 42' 17", W 75° 32' 21", 30 June 2006, M. del C. Zúñiga, W. Cardona, G. Zabala, R. J. Cardozo-Zúñiga (MEUV). 4♂, Risaralda, Municipio de Pereira, Parque Natural Regional Ucumarí, Estación La Pastora, Río Otún metallic bridge, 2350 m, N 04° 42' 35", W 75° 30' 03", 5 July 2007, M. del C. Zúñiga, W. Cardona, J. Chará, L. P. Giraldo, A. M. Chará (MEUV, UM-ICN, MEUA). 1♂, Risaralda, Municipio de Santuario, Parque Municipal Natural Planes de San Rafael, Río San Rafael headwater basin, bridge, 2050 m, N 05° 07' 38", W 76° 00' 08", 15-16 July 2007, M. del C. Zúñiga, W. Cardona, A. Laina, G. Zabala, C. Cultid (MEUV). 1♂, Risaralda, Municipio de Pereira, Vereda La Suiza, Santuario de Fauna y Flora Otún-Quimbaya, Río Otún middle basin, Finca Buenos Aires bridge, 1800 m, N 04° 44' 00", W 75° 34' 49", 12 April 2006, M. del C. Zúñiga, W. Cardona, G. Zabala (MEUV). 1♂, same data, except 1830 m, N 04° 43' 42", W 75° 34' 25", emerging, 22 April 2006, W. Cardona, C. Cultid (BYU).

Discussion. This species was previously reported from Caldas, Cauca, Risaralda and Valle del Cauca in Colombia and from Ecuador (Stark et al. 1999; Stark 2001; Zúñiga & Stark 2002; Zúñiga et al. 2006). The species appears to be relatively common over a broad range of the Cordillera Occidental and Cordillera Central, but these specimens represent the third report from Risaralda, mainly in protected areas and at the highest altitudes known in the mountains of the Los Nevados National Park.

Anacroneuria socapa Stark & Zúñiga

Anacroneuria socapa Stark & Zúñiga in Stark et al., 1999:38. Holotype ♂, Termales de Santa Rosa de Cabal, Risaralda, Colombia (USNM)

Anacroneuria socapa Stark & Zúñiga, 2003:235. Female description

Material examined. COLOMBIA: 4♂, Risaralda, Municipio de Pereira, Vereda La Suiza, Santuario de Fauna y Flora Otún-Quimbaya, Río Otún middle basin, 1830 m, N 04° 43' 42", W 75° 34' 25", 23 February 2006, W. Cardona, C. Cultid (MEUV). 2♂,

same data, except 25 February 2006, M. del C. Zúñiga, W. Cardona, L. Ramirez (MEUV, BYU). 3♂, same, data except Finca Buenos Aires bridge, 1800 m, N 04° 44' 00", W 75° 34' 49", 12 April 2006, M. del C. Zúñiga, W. Cardona, G. Zabala (MEUV, BPS). 2♂, Risaralda, Municipio de Pereira, Parque Regional Natural Ucumari, Estación La Pastora, headwater Río Otún basin, 2400 m, N 04° 42' 32", W 75° 29' 37", 15-16 April 2006, W. Cardona (MEUV). 2♂, same data, except 29 April 2006 (BYU). 2♂, same data, except 10-11 March 2007, M. del C. Zúñiga, W. Cardona, G. Zabala, C. Cultid (MEUA, MHN-ICN). 6♂, same data except Río Otún metallic bridge, 2350 m, N 04° 42' 35", W 75° 30' 03", 5 July 2007, M. del C. Zúñiga, W. Cardona, J. Chará, L. P. Giraldo, A. M. Chará (MEUV, UM-ICN, MEUA, BPS). 1♂, Risaralda, Municipio de Pereira, Parque Regional Natural Ucumari, El Cedral, Río Otún middle basin, 2060 m, N 04° 42' 17", W 75° 32' 21", 30 June 2006, M. del C. Zúñiga, W. Cardona, G. Zabala, R. J. Cardozo-Zúñiga (MEUV). 2♂, Risaralda, Municipio de Pereira, Parque Nacional Natural Los Nevados, El Jordán, Río Otún headwater basin, 3100 m N 04° 42' 32", W 75° 29' 37", 27-28 June 2006, M. del C. Zúñiga, W. Cardona, G. Zabala, R. J. Cardozo-Zúñiga (MEUV, BPS). INTERMEDIATES: 2♂, Risaralda, Municipio de Pereira, Vereda La Suiza, Santuario de Fauna y Flora

Rafael headwater basin, bridge, N 05° 07' 38", W 76° 00' 08", 15-16 July 2007, M. del C. Zúñiga, W. Cardona, A. Laina, G. Zabala, C. Cultid (MEUV).

Discussion. Twenty four typical *A. socapa* males with notched aedeagus and dark pre-ocellar marking (Fig. 41), and three males with similar aedeagus but lacking the head markings are listed above. The twenty seven specimens come from five different sites in Risaralda. Possibly the head markings had not yet developed in the three "intermediate" individuals.

Anacroneuria ucumari Stark & Zúñiga

Anacroneuria ucumari Stark & Zúñiga, 2003:232. Holotype ♂, Río Pichindé, Peñas Blancas, Parque Nacional Natural Farallones de Cali, Valle del Cauca (MEUV)

Material examined. COLOMBIA: 1♂, Risaralda, Municipio de Pereira, Parque Regional Natural Ucumari, Estación La Pastora, Río Otún headwater basin, 2400 m, N 04° 42' 32", W 75° 29' 37", 29 June 2006, M. del C. Zúñiga, W. Cardona, G. Zabala, R. J. Cardozo-Zúñiga (MEUV). 1♂, same data except, 3 July 2007, M. del C. Zúñiga, W. Cardona, J. Chará, L. P. Giraldo, A. M. Chará (MEUV).

Discussion. The site where these specimens were collected is near the locality where the paratype male was taken. Four females were also collected which may represent this species, however because males identified as *A. guambiana*, *A. socapa* and as an intermediate of these two species were also in this sample, no definite association is possible.

Anacroneuria valle Zúñiga & Baena

Anacroneuria valle Zúñiga & Baena in Stark et al., 1999:41. Holotype ♂, Río Azul, Río Calima middle basin, Valle del Cauca, Colombia (MEUV)

Material examined. COLOMBIA: 1♂, Valle del Cauca, Municipio de Buenaventura, Río Anchicayá, 555 m, light trap, 7 October 1994, A. Montoya (MEUV).

Discussion. This species was known from a single male collected in the Choco biogeographic area. This specimen is the second record in the Región Natural del Pacífico of Colombia, near the type locality.

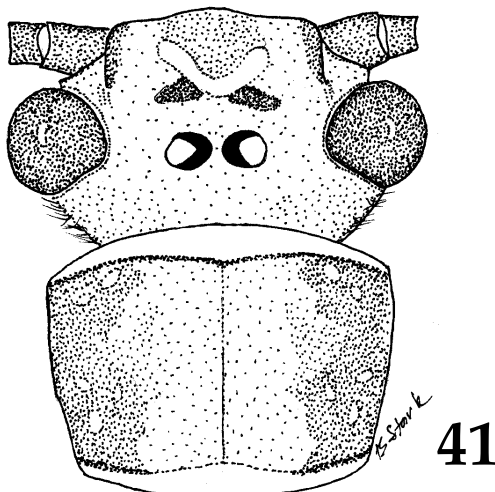


Fig. 41. *Anacroneuria socapa* head and pronotum.

Otún-Quimbaya, Río Otún middle basin, 1830 m, N 04° 43' 42", W 75° 34' 25", 22 April 2006, W. Cardona, (MEUV, BPS). 1♂, Risaralda, Municipio de Santuario, Parque Municipal Planes de San Rafael, Río San

Anacroneuria yameo Stark & Sivec

Anacroneuria yameo Stark & Sivec, 1998:60. Holotype ♂, Río Nanay, Callicebus Research Station, Mishana, Loreto, Peru (USNM)

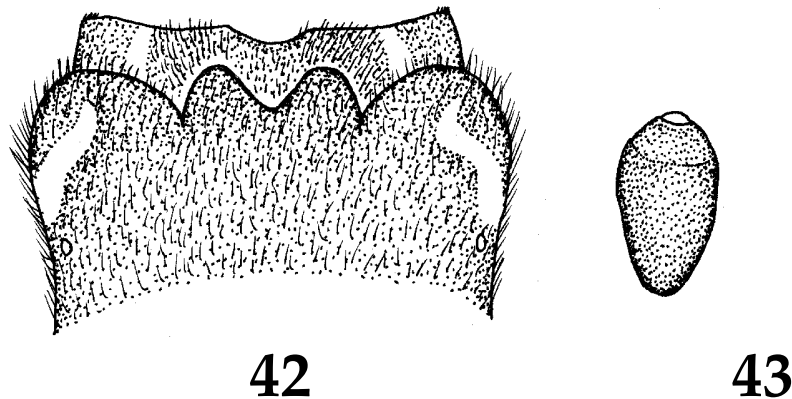
Material. COLOMBIA: 1♀, Amazonas, Municipio de Leticia, Quebrada La Arenosa, Km 11 road to Tarapacá, Río Amazonas middle basin, light trap, S 04° 07' 30", W 69° 57' 25", 26 May 2002, D. Emmerich (MEUV).

Discussion. This species was previously reported from this same locality by Zúñiga et al. (2006) but the female specimen, collected at the same time, had not previously been studied. This specimen matches the color pattern of the holotype closely and is an almost

certain match. The locality is in the lowlands of Río Amazonas central basin in the small Colombian "trapezium" between Peru and Brasil. The water of the creek is slightly colored, the water temperature at the time of collection was 24°C and natural riparian vegetation is present.

Female. Forewing length 11.5 mm. Subgenital plate 4-lobed, mesal lobes narrower and slightly longer than lateral lobes and divided by a shallow, wide triangular notch (Fig. 42); lateral lobes divided by narrow notches. Transverse sclerite of sternum 9 weak, obscure; mesal setal patch with conspicuous long red brown setae in lateral patches; median stalk with thin short setae.

Egg. Spindle shaped with broadly rounded apex; typical of genus (Fig. 43).



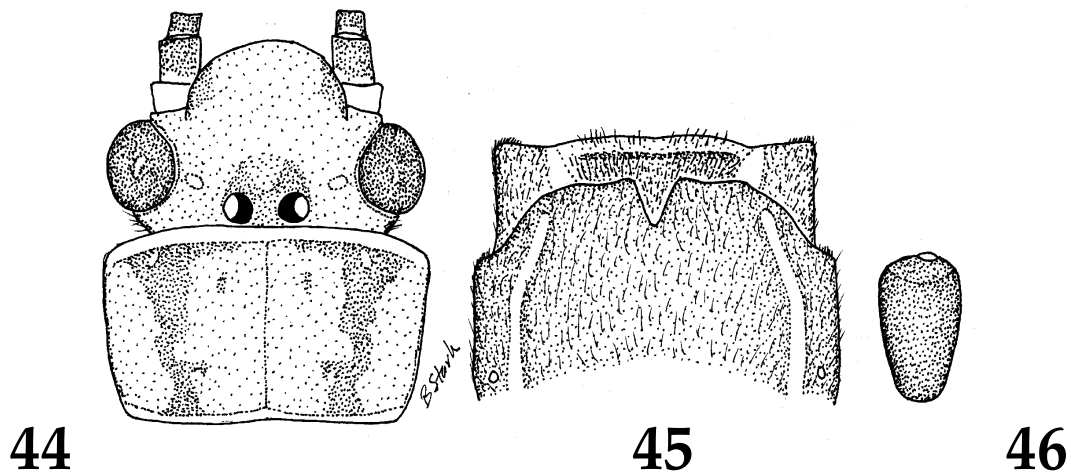
Figs. 42-43. *Anacroneuria yameo*. 42. Female subgenital plate, 43. Egg.

Unassociated Females

Anacroneuria CO-8

Material examined. COLOMBIA: 48♀, Risaralda, Municipio de Santuario, Vereda El Tambo, Finca El Triunfo, Río San Rafael low basin, 1450 m, N 05° 05' 33", W 75° 57' 47", light trap, 23-24 March 2007, W. Cardona, G. Zabala, C. Cultid, A. Laina, G. Cadena (MEUV, BPS). 7♀, Same data, except 14 July 2007, M. del C. Zúñiga, W. Cardona, G. Zabala, C. Cultid, A. Laina (MEUV, BPS, BYU). 3♀, Risaralda, Municipio de Santuario, Vereda El Tambo, Finca El Bosque, Río Apía low basin, 1210 m, N 05° 04' 21", W 75° 57' 06", light trap, 26 March 2007, W. Cardona, C. Cultid, G. Cadena, J. Pineda (MEUV). 2♀, Risaralda, Municipio de Pereira, Parque Regional Natural Ucumarí,

Estación La Pastora, Río Otún headwater basin, 2400 m, N 04° 42' 32", W 75° 29' 37", light trap, 26 June 2006, M. del C. Zúñiga, W. Cardona, G. Zabala, R. J. Cardozo Zúñiga (BPS). 4♀, Same data, except 29 June 2006 (MEUV). 4♀, Same data, except 15-16 April 2006, W. Cardona (BPS). 9♀, Same data, except 10-11 March 2007, M. del C. Zúñiga, W. Cardona, G. Zabala, C. Cultid (MEUV). 10♀, Same data, except 3-5 July 2007, M. del C. Zúñiga, W. Cardona, J. Chará, L. P. Giraldo, A. M. Chara (BYU, BSC). 2♀, Same data, except metallic bridge, 2350m, N 04° 42' 35", W 75° 30' 03" (MEUV). 23♀, Risaralda, Municipio de Santuario, Parque Municipal Natural Planes de San Rafael, Río San Rafael middle basin, 2050 m, N 05° 07' 38", W 76° 00' 08", light trap, 15-16 July 2007, M. del C. Zúñiga, W. Cardona, G. Zabala, C. Cultid, A. Laina (MEUV, BPS).



Figs. 44-46. *Anacroneuria* CO-8. 44. Head and pronotum, 45. Female subgenital plate, 46. Egg.

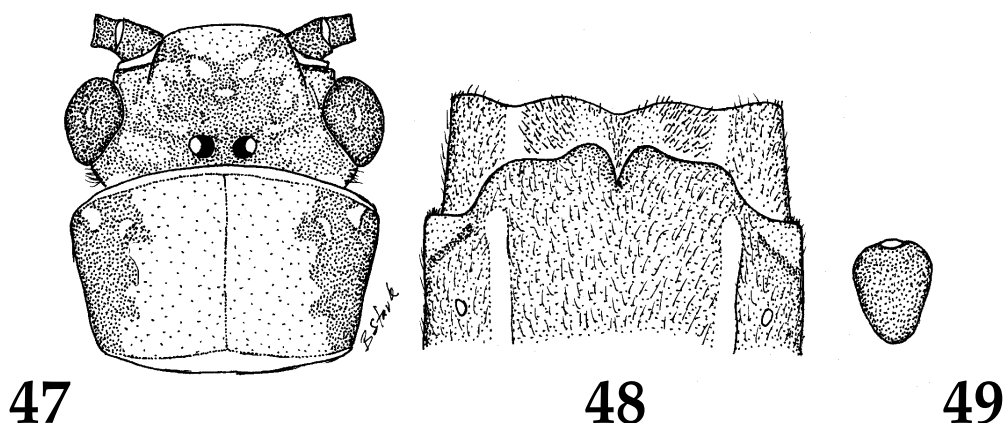
Adult habitus. General color yellow brown with brown markings. Head yellow with small, dusky ocellar spot and darker lappets. Pronotum with wide pale median band and dark midlateral bands (Fig. 44). Wings transparent, veins C, Sc, and R pale, M and other veins darker. Legs pale except narrow, dark apical band on femora and brown blotch on outer proximal tibial surface; tibiae slightly darker than femora.

Female. Forewing length 16.5–18.0 mm. Subgenital plate bilobed with wide triangular notch; lobes slightly emarginate to truncate (Fig. 45). Transverse

sclerite of sternum 9 narrow and straight; mesal setal patch without clear distinction of lateral patches and median stalk.

Egg. Spindle shaped, typical of genus (Fig. 46).

Discussion. This series of specimens, collected by light traps at several localities, and on separate dates, from Risaralda in the Región Natural Andina, includes a large number of females (112), but no male was associated with them. This situation suggests that the male of this species may not be strongly attracted to the black or white light.



Figs. 47-49. *Anacroneuria* CO-9. 47. Head and pronotum, 48. Female subgenital plate, 49. Egg.

Anacroneuria CO-9

Material examined. COLOMBIA: 1♀, Chocó, Parque Nacional Natural Ensenada de Utría, 100 m, Malaise trap, 2000 (MHN-ICN).

Adult habitus. General color dark brown. Head dark except for pale M-line, anteromedian area, and smaller midlateral dusky areas (Fig. 47). Pronotum dark brown laterally and pale mesally. Wings dark brown with darker veins. Fore and mid legs uniformly dark brown; hind femora banded with apical and basal dark areas and median pale band.

Female. Forewing length 10.5 mm. Subgenital plate broadly bilobed, but lobes slightly emarginate (Fig. 48). Lobes separated by triangular notch, inner shoulders of lobes project beyond outer shoulders. Transverse sclerite of sternum 9 obsolete; mesal setal patch with well defined lateral patches and a long, narrow median stalk; setae of median stalk fine and short.

Egg. Spindle shaped but much shorter and wider than typical *Anacroneuria* eggs (Fig. 49).

Discussion. The specimen was collected in a very humid locality of Región Natural del Pacífico, with abundant tropical forest and about 7000-8000 mm of rainfall per year.

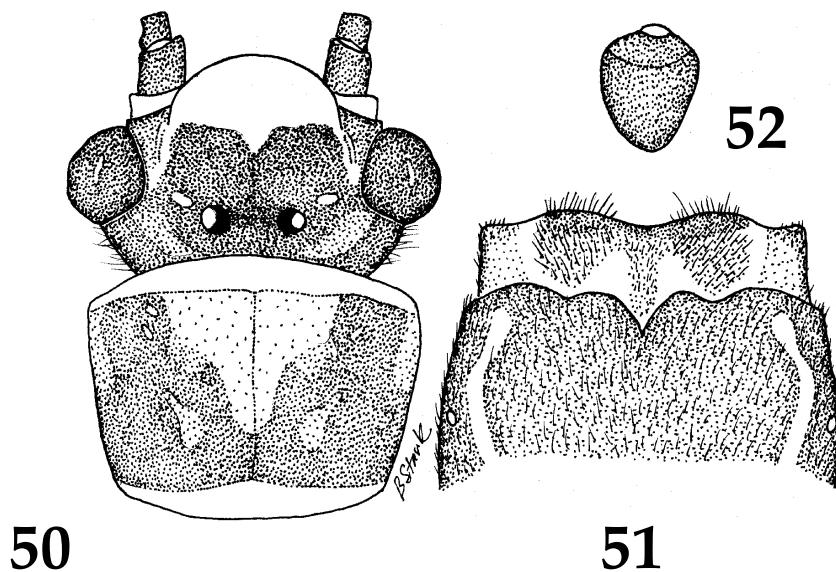
Material examined. COLOMBIA: 2♀, Amazonas, Municipio de Leticia, Quebrada La Arenosa, Km 11 road to Tarapacá, Río Amazonas middle basin, light trap, S 04° 07' 30"; W 69° 57' 25 ", 26 May 2002, M. del C. Zúñiga, A. J. Cardozo-Zúñiga, R. J. Cardozo-Zúñiga (MEUV). BRASIL: 1♀, Amazonas, Reserva Natural Palmari, Quebrada Natividad, Río Yavari basin, 2 Km Centro Administrativo, S 04° 17' 28", W 70° 17' 42 ", 150 m, 28 May 2002, light trap, M. del C. Zúñiga, D. Emmerich, A. J. Cardozo-Zúñiga, R. J. Cardozo-Zúñiga (MEUV).

Adult habitus. General color dark brown patterned with yellow. Anterior third of head yellow, posterior region dark brown; dark area with a small median emargination on anterior margin (Fig. 50). Pronotum mostly dark but with a median, yellow V-shaped area. Wings brown, veins darker. Femora banded, pale at base and dark apically; foreleg yellow band reduced, hind leg yellow band subequal to dark.

Female. Forewing length 9.5 mm. Subgenital plate weakly 4-lobed; inner lobes separated by V-shaped notch, lateral lobes separated by shallow emarginations (Fig. 51). Transverse sclerite of sternum 9 weak, but armed on posterolateral margins with small patch of strong setae; mesal setal patch with well defined lateral patches consisting of mixed setae and median stalk of short, fine setae.

Egg. Spindle shaped but much shorter and wider than typical *Anacroneuria* eggs (Fig. 52).

Anacroneuria CO-10



Figs. 50-52. *Anacroneuria* CO-10. 50. Head and pronotum, 51. Female subgenital plate, 52. Egg.

Discussion. The Brazilian specimen shares the leg and pronotal patterns but has a slightly different head pattern. The subgenital plates also differ slightly but the setal patterns of sternum 9 are very similar. The collection locality belongs to the Región Natural Amazónica in lowlands of Río Amazonas central basin. The water of the small streams is slightly colored by soluble organic compounds such as tannins and lignins from the flooded forest in this area. Water temperature at the time of collection was 23°C and the air 26°C.

ACKNOWLEDGMENTS

The field trips in the Central Andes of Risaralda had the partial economic support of John D. and Catherine T. MacArthur Foundation; Colombian Program of Wildlife Conservation Society-WCS and Fundación EcoAndina-Cali, Colombia, gave logistic support; we specially thank G. Kattan. We also thank Parques Nacionales Naturales de Colombia - Santuario de Flora y Fauna Otún-Quimbaya and Corporación Autónoma Regional del Risaralda-CARDER for facilities to collect in protected areas. We thank the following individuals and national institutions for the loan of specimens: G. Morales, Museo de Entomología "Francisco Luis Gallego", Universidad Nacional, Medellín; G. Amat, Colección Entomológica del Instituto de Ciencias Naturales, Universidad Nacional, Santafé de Bogotá; J. S. Zuluaga, Colección Entomológica de la Corporación de Investigaciones Biológicas, Medellín. We thank J. Castellanos, R. González, J. A. Posada, L. Ramírez, M. Astudillo, R. Cardozo-Zúñiga, C. Cultid, R. Turizo-Correa, T. Sierra-Labastidas, A. Reyes-Picón and S. Mosquera who generously provided specimens for our study from Antioquia, Cauca, Magdalena, Risaralda and Valle del Cauca. We are grateful to Mississippi College for its hospitality and facilities in the stonefly research laboratory and the Stark family for housing the first author during her time in Clinton, Mississippi; R. González for facilities in the Laboratorio de Investigaciones Entomológicas de la Universidad del Valle and N. Aranguren in Universidad Pedagógica y Tecnológica de Tunja. To all our colleagues for their assistance in the field and laboratory work, specially C. Cultid, C. E. Posso, G. Zabala, V. Rojas, J. A. Posada, N. Aranguren, Y. Toro, A. Laina, and the Agudelo-Montoya family for their hospitality in the Finca Atenas-Santuario, Risaralda.

REFERENCES

- Espinal, L.S. & E. Montenegro. 1963. Formaciones vegetales de Colombia. Memoria explicativa del mapa ecológico. Instituto Geográfico Agustín Codazzi. 201 pp.
- Rojas, M. & M. Baena. 1993. *Anacroneuria farallonensis* (Plecoptera: Perlidae) una nueva especie para Colombia. Boletín del Museo de Entomología de la Universidad del Valle, 1:23-28.
- Pictet, F.J. 1841. Histoire naturelle générale et particulière des insectes Névroptères. Fam. des Perlides. pp 227-240.
- Stark, B.P. 1995. New species and records of *Anacroneuria* (Klapálek) from Venezuela. Spixiana, 18(3):211-249.
- Stark, B.P. 1998. The *Anacroneuria* of Costa Rica and Panama (Insecta: Plecoptera: Perlidae). Proceedings of the Biological Society of Washington, 111(3):551-603.
- Stark, B.P. 1999. *Anacroneuria* from northeastern South America (Insecta: Plecoptera: Perlidae). Proceedings of the Biological Society of Washington, 112(1):70-93.
- Stark, B.P. 2001. Records and descriptions of *Anacroneuria* from Ecuador (Plecoptera: Perlidae). Scopolia, 46:1-46.
- Stark, B.P. & I. Sivec. 1998. *Anacroneuria* of Peru and Bolivia (Plecoptera: Perlidae). Scopolia, 40:1-64.
- Stark, B.P. & M. del C. Zúñiga. 2003. The *Anacroneuria guambiana* complex of South America (Plecoptera: Perlidae). pp 229-237. In: E. Gaino (Ed.). Research update on Ephemeroptera and Plecoptera. University of Perugia, Italy.
- Stark, B.P., M. del C. Zúñiga, A.M. Rojas. & M. L. Baena. 1999. Colombian *Anacroneuria*: Descriptions of new and old species. Spixiana, 22(1):13-46.
- Tamariz-Turizo, C., R. Turizo-Correa. & M. del C. Zúñiga. 2007. Distribución espacio-temporal y hábitos alimenticios de ninfas de *Anacroneuria* (Insecta: Perlidae) en el Río Gaira (Sierra Nevada de Santa Marta, Colombia). Caldasia (in press).
- Zúñiga, M. del C. & B.P. Stark. 2002. New species and records of Colombian *Anacroneuria* (Insecta, Plecoptera, Perlidae). Spixiana, 25(3):209-224.
- Zúñiga, M. del C., B.P. Stark., J.J. Vásconez., F. Bersosa. & D. Vimos. 2006. Colombian and Ecuadorian *Anacroneuria* (Plecoptera: Perlidae): New species, records and life stages. Studies on

Zúñiga, M. del C., B.P. Stark, W. Cardona, C. Tamaris-Turizo, & O.E. Ortega 2007. Additions to the Colombian *Anacroneuria* fauna (Plecoptera: Perlidae) with descriptions of seven new species.
Illiesia, 3(13):127-149. Available online: <http://www2.pms-lj.si/illiesia/Illiesia03-13.pdf>

Neotropical Fauna and Environment, 41(1):45-57.
Zwick, P. 1972. Die Plecopteren Pictets und
Burmeisters, mit Angaben über weitere Arten
(Insecta). *Revue Suisse de Zoologie*, 78:1123-1194.

Received 14 August 2007, Accepted 9 September 2007, Published
13 September 2007