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New records of *Anacroneuria* Klapálek, 1909 (Plecoptera: Perlidae) for Central America

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Abstract

The perlid genus *Anacroneuria* is the most widely distributed stonefly occurring in the Neotropics. Regional studies of this genus were made early in the last century, whereas local taxonomic and distributional studies have recently increased. In this study, we provide new Central American records for four species of *Anacroneuria*. *Anacroneuria choco* Stark & Bersosa 2006, *A. costana* (Navás 1924), *A. hacha* Stark 1998, and *A. laru* Gutiérrez-Fonseca 2015 are newly reported including new range extensions.

Key words: Costa Rica, Guatemala, Nicaragua, Panamá, stonefly, taxonomy

Resumen

Anacroneuria es el género de la familia Perlidae más ampliamente distribuido en el Neotrópico. Estudios regionales sobre este género fueron realizados a inicios del siglo pasado, mientras que recientemente han incrementado los estudios locales sobre su taxonomía y distribución. En este estudio proporcionamos nuevos registros geográficos para cuatro especies de *Anacroneuria* dentro de Centroamérica. *Anacroneuria choco* Stark & Bersosa 2006, *A. costana* (Navás 1924), *A. hacha* Stark 1998, y *A. laru* Gutiérrez-Fonseca 2015 se reportan con una nueva distribución geográfica para la región.

Palabras claves: Costa Rica, Guatemala, Nicaragua, Panamá, plecópteros, taxonomía

Introduction

In Central America, studies on the taxonomy and distribution of the perlid genus *Anacroneuria* were conducted extensively early in the last century by Klapálek (1922, 1923), Needham and Broughton (1927) and Jewett (1958). However, descriptions of many of those species were based only on external morphology and color patterns, which required subsequent revisions. Much of the older material was redescribed, certain taxa were proposed as synonyms and new distributions were reported for many species (Zwick 1972). Recently, Stark and Kondratieff (2004) and Stark (2014) described new species and indicated new geographical ranges for Central American and México.

Local taxonomic studies are providing valuable regional information on the taxonomy and distribution of the genus in Central America. For example, Harper (1992) and Gutiérrez-Fonseca (2015) for Panamá, and Stark (1998, 2014) for Costa Rica and Panamá reported 29 and 19 species of *Anacroneuria*, respectively. Fenoglio (2007) reported eight species for Nicaragua. Although there are no extensive studies on stoneflies from Guatemala, available information for Mesoamerica (e.g., Stark and Kondratieff 2004, Stark 2014) report at least 13 species for this country. A complete list of species for the region and their occurrence by country can be found in Stark (2014). In this study, we provide new geographical records that expand considerably the distribution of four species of *Anacroneuria* within Central America.

Materials and methods

Specimen collection and preparation. Adult specimens examined were mostly collected with light traps. The collection hours vary according to the site; in Panamá from 16:00 to 21:00h, Costa Rica from 19:00 to 5:00h, Nicaragua from 18:00 to 23:00h and Guatemala from 18:00 to 5:00h. Collected specimens were preserved in 80% EtOH.

For identification, terminal abdominal segments were cut and placed in 10% KOH for 24 hours. Then, the aedeagus was removed from the genital capsule for subsequent study. The material examined is deposited in the Pablo E. Gutiérrez-Fonseca Collection (PEGFC) at the University of Puerto Rico and in the aquatic entomology collection of the Zoological Museum at the University of Costa Rica (MZUCR).

Results

New and previous localities of the four species of *Anacroneuria* within Central America are presented in Figure 1. This distribution corresponds to sites with sampling effort; there were no available stoneflies to examine from Honduras and El Salvador.

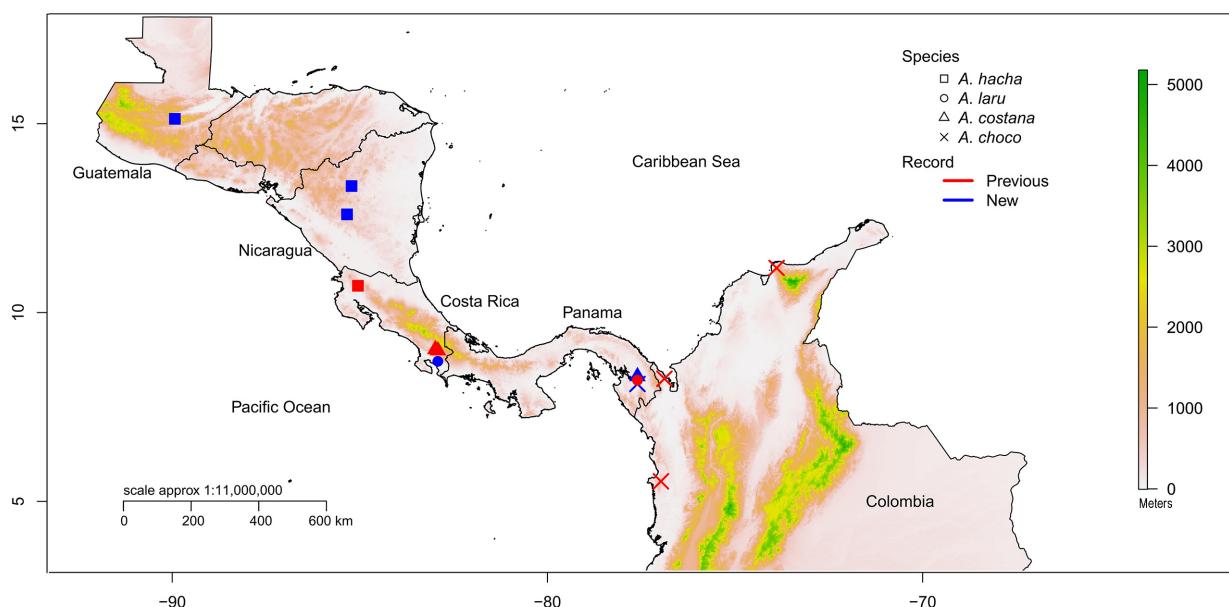


FIGURE 1. New and previous geographical records for four species of *Anacroneuria* within Central America.

Anacroneuria choco Stark & Bersosa 2006

Anacroneuria Co-7. Zúñiga & Stark, 2002.

Anacroneuria choco Stark & Bersosa 2006 in Zúñiga *et al.*, (2006). Holotype ♂ (MEUV). Colombia.

Material examined. Panamá, Darién, Darién National Park, field station near to the Perresenico stream, 8° 01' 10.41" N, 77° 44' 17.44" W, 94m, 17–22 November 2014, R. Salas, P.E. Gutiérrez-Fonseca, light trap, 1♂ (PEGFC).

Comments: This species was known for Colombia and Ecuador (Zúñiga *et al.*, 2006).

Anacroneuria costana (Navás 1924)

Neoperla costana Navás 1924. Holotype ♂ (MNHN). Costa Rica.

Anacroneuria costana Stark 1998. Redescription.

Material examined. Panamá, Darién, Darién National Park, field station near to the Perresenico stream, 8° 01' 10.41" N, 77° 44' 17.44" W, 94m, 17–22 November 2014, R. Salas, PE Gutiérrez-Fonseca, light trap, 1♂ (PEGFC).

Comments. This species was known for Costa Rica and México (Stark 1998, Stark and Kondratieff 2004). Stark and Kondratieff (2004) mention that Mexican specimens are larger than those reported for Costa Rica. The specimen examined here has a forewing length of 9mm, similar to specimens from Costa Rica, which has a forewing length of 8.5mm (Stark 1998).

Anacroneuria hacha Stark 1998

Anacroneuria hacha Stark 1998. Holotype ♂ (USNM). Costa Rica.

Material examined. Guatemala, Baja Verapaz, Ranchitos del Quetzal, 15° 12' 55.74" N, 90° 13' 09.26" W, 1680m, 2 August 2011, J. Monzón, 1♂ (PEGFC). Nicaragua, Jinotega, Reserva Natural Bosawas, Cerro Kilambé, 13° 34' 30.93" N, 85° 42' 18.73" W, 1520m, 20–25 April 2010, J.M. Maes, 3♂ (PEGFC). Same location, 2♂ (MZUCR). Matagalpa, Selva Negra, 12° 59' 56.54" N, 85° 54' 35.35" W, 1275m, 11–13 November 2009, J.M. Maes, 1♂ (PEGFC).

Comments. This species was only known for Costa Rica (Stark 1998). Specimens examined from Nicaragua and Guatemala are larger than specimens collected in Costa Rica. The specimens examined here have a forewing length ranging from 17–18.5mm, while specimens from Costa Rica have a forewing length ranging from 10–11mm (Stark 1998).

Anacroneuria laru Gutiérrez-Fonseca 2015

Anacroneuria laru Gutiérrez-Fonseca 2015. Holotype ♂ (USNM). Panamá.

Material examined. Costa Rica, Puntarenas, Golfito, La Gamba, La Gamba Tropical Station, 8–9 March 2013, 8° 42' 00.39" N, 83° 12' 09.98" W, 86m, A.M. Alonso-Rodríguez, automatic funnel light trap, 3♂ (PEGFC). Same location, 2♂ (MZUCR).

Comments. This species was only known for Panamá (Gutiérrez-Fonseca 2015).

Discussion

The new geographical records reported in this study increase the list of formally recognized *Anacroneuria* species for four countries in Central America: 21 species for Panamá, 30 species for Costa Rica, nine species for Nicaragua, and 14 species for Guatemala. *Anacroneuria* is expected to have strong patterns of endemism and isolation, as suggested by Zwick (1972) and Stark (1998). However, the new records reported here show overlap in the distribution of some species and less endemism among populations within Central American countries. Although 30.6% of the known *Anacroneuria* species from Central America (i.e., Guatemala to Panamá) are limited to a single country (mostly reported to Costa Rica or Panamá), the fact that over 69.4% occur in two or more countries suggest that high endemism might be a sampling artifact.

Despite significant sampling efforts conducted in the Central American region, it is still possible to discover new geographical records and taxa (e.g., Gutiérrez-Fonseca and Springer 2011). This is especially true for species that were

described from a few specimens from limited localities (Stark 2007). In addition, the older species descriptions are sometimes incomplete and type material has been lost (Froehlich 2010). Further collecting effort in the region will increase our knowledge of Central American stoneflies.

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