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The Trichoptera of Panama VII.
Additional new country records for caddisflies
from the Republic of Panama

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Abstract. The Republic of Panama currently has 358 recorded species of Trichoptera. Herein we add 25 new country records for Panama. The newly recorded taxa increase Panama's total known caddisfly fauna to 383 species, distributed among 15 families and 52 genera. These results are part of an ongoing effort to characterize the caddisfly fauna of Panama, and to evaluate that country's major watersheds (cuencas).

Key words. Philopotamidae, Ecnomidae, Polycentropodidae, Glossosomatidae, Xiphocentronidae, Hydropsychidae, Hydroptilidae, Leptoceridae, new country record, cuenca.

Introduction

Until the last 25 years, the insect order Trichoptera (caddisflies) was poorly known in Panama, both in terms of diversity and distribution. In general, repeated collections were made in a relatively few locations. Aguila (1992) published the first list of caddisflies from Panama, listing 168 species in 39 genera and 13 families. Through 2014, six genera and 78 additional species were recorded by a cadre of researchers, bringing the total to 246 species distributed among 13 families and 45 genera. Beginning in 2015 and continuing through early 2018, Armitage et al. (2015), Harris and Armitage (2015), Muñoz-Quesada and Holzenthal (2015), Bueno-Soria and Barba-Álvarez (2015), Armitage et al. (2016), Armitage and Harris (2018), and Thomson and Armitage (2018) have added two families, seven genera,

and 112 new species and new country records of caddisflies.

Based on specimens collected recently, we herein add 25 new country records for Panama. Thus, the new total of known caddisflies from the Republic of Panama is now 383 species.

Materials and Methods

Single-night collections were made using UV-light and alcohol traps (Calor and Mariano 2012). Multiple-night collections were made employing Malaise traps, as indicated. Specimens listed in this publication will be deposited in the Zoological Collection Dr. Eustorgio Méndez (COZEM), or the first author's reference collection (BJA). The order of families below follows the classification presented by Holzenthal et al. (2015).

Results

Family Philopotamidae

Chimarra (C.) cascada Blahnik, 1998

Material examined—Chiriquí Province: **Cuenca 102**, afluyente Río Colorado, Mount Totumas Cloud Forest and Biological Reserve, 8.88472°N and 82.68408°W, 1920 m, Malaise trap, 5–10.viii.2016, B. and T. Armitage, 1 male.

Distribution: Costa Rica, Panama.

Chimarra (C.) limon Blahnik, 1998

Material examined—Bocas del Toro Province: **Cuenca 093**, Quebrada Rambala, nr Rambala Jungle Lodge, 8.91627°N and 82.15469°W, 120 m, Malaise trap, 15–20.xi.2016, E. Carlson, 1 male.

Distribution: Costa Rica, Panama.

Chimarra (C.) paraortiziana Blahnik and Holzenthal, 1992

Material examined—Veraguas Province: **Cuenca 132**, Río Mulabá-Primer Brazo, PSPSCD-PNSF-C132-2017-009, 8.52560°N and 81.12956°W, 623 m, Malaise trap, 19–23.iv.2017, E. Álvarez, T. Ríos, and E. Pérez, 2 males.

Distribution: Costa Rica, Nicaragua, Panama.

Chimarra (C.) xus Blahnik, 1998

Material examined—Chiriquí Province: **Cuenca 093**, afluyente Río Guarumo, nr Continental Divide, 8.77761°N and 82.20175°W, 1068 m, UV-light trap, 21.i.2017, B. and T. Armitage, 1 male.

Distribution: Columbia, Ecuador, Panama.

Chimarrhodella tapanti Blahnik and Holzenthal, 1992

Material examined—Chiriquí Province: **Cuenca 91**, Río Holcon, PSPSCD-PILA-CO91-2017-024, 8.87616°N and 82.48667°W, 1804 m, UV-light trap, 31.viii.2017, E. Álvarez, T. Ríos, and E. Pérez, 1 male.

Distribution: Costa Rica, Panama.

Family Ecnomidae***Austrotinodes doublesi* Muñoz and Holzenthal, 1993**

Material examined—Veraguas Province, Cuenca 097, Río Calovebora, PSPSCD-PNSF-C097-2017-006, 8.55038°N and 81.1648623°W, 461 m, Malaise trap, 27.iv.2017, E. Álvarez, T. Ríos, and C. Nieto, 1 male.

Distribution: Costa Rica, Nicaragua, Panama.

Family Polycentropodidae***Polycentropus fasthi* Holzenthal and Hamilton, 1988**

Material examined—Chiriquí Province: Cuenca 093, afluyente Río Guarumo, nr Continental Divide, 8.77761°N and 82.20175°W, 1068 m, UV-light trap, 21.i.2017, B. and T. Armitage, 1 male; Veraguas Province: Cuenca 097, Río Llanito, PSPSCD-PNSF-097-2017-012, 8.56553°N and 81.18817°W, 340 m, UV-light trap, 20.iv.2017, A. Cornejo, E. Álvarez, T. Ríos, and C. Nieto, 1 male; Cuenca 132, Lago cabaña Alto de Piedra, PSPSCD-PNSF-132-2017-013, 8.51423°N and 81.11679°W, 859 m, UV-light trap, 20.iv.2017, E. Álvarez, T. Ríos, and C. Nieto, 1 male.

Distribution: Costa Rica, Panama.

***Polycentropus nebulosus* Holzenthal and Hamilton, 1988**

Material examined—Chiriquí Province: Cuenca 102, Afluyente Río Colorado, Mount Totumas Cloud Forest and Biological Reserve, 8.88472°N and 82.68408°W, 1920 m, Malaise trap, 31.viii. 2016, J. Dietrich, B. Armitage, and Y. Aguirre, 1 male.

Distribution: Costa Rica, Panama.

Family Xiphocentronidae***Xiphocentron (Antillotrichia) insulare* (Ulmer, 1913)**

Material examined—Veraguas Province, Cuenca 097, Afluyente Río Calovebora, PSPSCD-PNSF-097-2017-005, 8.54318°N and 81.16398°W, 536 m, Malaise trap, 19–23.iv.2017, E. Álvarez, T. Ríos, and C. Nieto, 1 male.

Distribution: Panama, Trinidad.

***Xiphocentron (Spahgnocentron) julus* Schmid, 1982**

Material examined—Chiriquí Province: Cuenca 102, Río Candela, nr Jurutungo-Finca Felix, PSPSCD-PILA-C102-2017-021, 8.90614°N and 82.72882°W, 1799 m, Malaise trap, 1–5.ix.2017, E. Álvarez, T. Ríos, and E. Pérez, 1 male.

Distribution: Mexico, Panama.

Family Hydropsychidae***Centromacronema apicale* (Walker, 1852)**

Material examined—Bocas del Toro Province: Cuenca 093, Quebrada Rambala, nr Rambala Jungle Lodge, 8.91627°N and 82.15469°W, 120 m, Malaise trap, 7–9.x.2016, E. Carlson, 1 male.

Distribution: Colombia, Costa Rica, Panama, Peru, Venezuela.

***Smicridea (Rhyacophylax) nemorosa* Holzenthal and Blahnik, 1995**

Material examined—Chiriquí Province: **Cuenca 108**, Quebrada Cascante, PSPSCD-PNVB-108-2017-018, 8.84939°N and 82.49349°W, 1947 m, Malaise trap, 5–8.vi.2017, E. Álvarez, E. Pérez, and T. Ríos, 2 males. **Veraguas Province: Cuenca 097**, Afluente Río Calovebora, PSPSCD-PNSF-097-2017-005, 8.54318°N and 81.16398°W, 536 m, Malaise trap, 19–23.iv.2017, E. Álvarez, T. Ríos, and C. Nieto, 1 male; *ibid.*, Río Calovebora, PSPSCD-PNSF-C097-2017-006, 8.55038°N and 81.1648623°W, Malaise trap, 19–23.iv.2017, E. Álvarez, T. Ríos, and C. Nieto, 1 male; **Cuenca 132**, Lago cabaña Alto de Piedra, PSPSCD-PNSF-132-2017-013, 8.51423°N and 81.11679°W, 859 m, UV-light trap, 20.iv.2017, E. Álvarez, T. Ríos, and E. Pérez, 1 male.

Distribution: Costa Rica, Panama.

***Smicridea (Rhyacophylax) tapanti* Holzenthal and Blahnik, 1995**

Material examined—Chiriquí Province: **Cuenca 91**, Río Holcon, PSPSCD-PILA-CO91-2017-024, 8.87616°N and 82.48667°W, 1804 m, UV-light trap, 31.viii.2017, E. Álvarez, T. Ríos, and E. Pérez, 2 males.

Distribution: Costa Rica, Panama.

***Smicridea (S.) polyfasciata* Martynov, 1912**

Material examined—Veraguas Province: **Cuenca 097**, Río Calovebora, PSPSCD-PNSF-C097-2017-006, 8.55038°N and 81.1648623°W, Malaise trap, 19–23.iv.2017, E. Álvarez, T. Ríos, and C. Nieto, 1 male.

Distribution: Bolivia, Colombia, Ecuador, Peru, Panama.

Family Glossosomatidae***Mortoniella akantha* Blahnik and Holzenthal, 2008**

Material examined—Chiriquí Province: **Cuenca 102**, Río Candela, nr Jurutungo-Finca Felix, PSPSCD-PILA-C102-2017-021, 8.90614°N and 82.72882°W, 1799 m, UV-light trap, 4.ix.2017, E. Álvarez, T. Ríos, and E. Pérez, 1 male.

Distribution: Costa Rica, Panama.

***Mortoniella falcicula* Blahnik and Holzenthal, 2008**

Material examined—Chiriquí Province: **Cuenca 91**, Río Holcon, PSPSCD-PILA-CO91-2017-024, 8.87616°N and 82.48667°W, 1804 m, UV-light trap, 31.viii.2017, E. Álvarez, T. Ríos, and E. Pérez, 1 male.

Distribution: Mexico, Panama.

***Protoptila boruca* Flint, 1974**

Material examined—Veraguas Province: **Cuenca 132**, Río Mulabá-Primer Brazo, Isleta, PSPSCD-PNSF-C132-2017-015, 8.52560°N and 81.12956°W, 623 m, Malaise trap, 24–28.iv.2017, C. Rodríguez, 1 male.

Distribution: Costa Rica, Panama.

Family Hydroptilidae***Bredinia sucrensis* Harris, Holzenthal, and Flint, 2003**

Material examined—Cocle Province, Cuenca 134, Quebrada La Yaya, La Pintada, El Harino, PSPSCD-PNOTHC134-2017-004, 8.66168°N and 80.59522°W, 586 m, Malaise trap, 22–26.iii.2017, E. Álvarez, T. Ríos, and E. Pérez, 2 males.

Distribution: Panama, Venezuela.

***Leucotrichia extraordinaria* Bueno-Soria, Santiago-Fragoso, and Barba-Álvarez, 2001**

Material examined—Bocas del Toro Province, Cuenca 093, Quebrada Rambala, nr Rambala Jungle Lodge, 8.91627°N and 82.15469°W, 120 m, Malaise trap, 31.iii–11.iv.2015, E. Carlson, 3 males; *ibid.*, 7–9.x.2016, 59 males; *ibid.*, 15–20.xi.2016, 18 males; *ibid.*, 21–31.xii.2016, 13 males, *ibid.*, 6–12.ii.2017, 6 males.

Distribution: Mexico, Panama.

***Leucotrichia mutica* Flint, 1991**

Material examined—Bocas del Toro Province, Cuenca 093, Quebrada Rambala, nr Rambala Jungle Lodge, 8.91627°N and 82.15469°W, 120 m, Malaise trap, 31.iii–11.iv.2015, E. Carlson, 2 males; *ibid.*, 7–9.x.2016, 17 males; *ibid.*, 15–20.xi.2016, 10 males; *ibid.*, 21–31.xii.2016, 6 males, *ibid.*, 6–12.ii.2017, 6 males.

Distribution: Colombia, Panama.

***Rhyacopsyche ramphisa* Wasmund and Holzenthal, 2007**

Material examined—Cocle Prov, Cuenca 134, Quebrada La Yaya, La Pintada, El Harino, PSPSCD-PNOTH-C134-2017-004, 8.66168°N and 80.59522°W, 586 m, Malaise trap, 22–26.iii.2017, E. Álvarez, T. Ríos, and E. Pérez, 7 males.

Distribution: Colombia, Costa Rica, Peru, Panama.

***Rhyacopsyche torulosa* Flint, 1971**

Material examined—Bocas del Toro Province, Cuenca 093, Río Changuinola, WNW of Ceiba, 9.01537°N and 82.50616°W, 438 m, UV-light trap, 7.ii.2017, I. Kingsley, 20 males.

Distribution: Costa Rica, Guatemala, Panama.

***Rhyacopsyche turrialbae* Flint, 1971**

Material examined—Bocas del Toro Province, Cuenca 093, Río Changuinola, WNW of Ceiba, 9.01537°N and 82.50616°W, 438 m, UV-light trap, 7.ii.2017, I. Kingsley, 3 males.

Distribution: Costa Rica, Panama.

Family Leptoceridae***Atanatolica moselyi* Denning and Holzenthal, 1988 [in Holzenthal 1988]**

Material examined—Chiriquí Province, Cuenca 102, Río Candela, PSPSCD-PILA-C102-2017-020, 8.89968°N and 82.73786°W, 1728 m, UV-light trap, 18.vi.2017, E. Álvarez, E. Pérez, and T. Ríos, 1 male; *ibid.* Quebrada Cascada, PSPSCD-PILA-C102-2017-022, 8.90124°N and 82.61817°W, 2354 m, Malaise trap, 17–21.vi.2017, E. Álvarez, E. Pérez, and T. Ríos, 1 male.

Distribution: Costa Rica, Panama.

***Nectopsyche tuanis* Holzenthal, 1995**

Material examined—Chiriquí Province: Cuenca 108, Río Chirigagua, SSE Guayabal, 8.64102°N and 82.55780°W, 737 m, UV-light trap, 19.vi.2015, C. Nieto, M. Molinar, and A. Tuñon, 1 male.

Distribution: Costa Rica, Nicaragua, Panama.

Discussion

The number of new country records, in this third paper of that topic, is lower than the first two papers (Armitage et al. 2015, 2016; $n = 32$ and $n = 42$, respectively). However, we feel that this is the result of a reduction in our time for identifications during 2017, and not the beginning of a downtrend. For example, Panama's microcaddisfly fauna at the species level compared to that of Costa Rica and Mexico indicates that the percent similarity is less than 10% and 7%, respectively (Armitage and Harris, in press). Thus, there is still great potential for finding in Panama species that are currently known from these and other countries in the northern Neotropical Region. It should be noted that six of the 25 species recorded here are also known from northern South America. This area and the Caribbean are two more rich sources for caddisflies that might occur in Panama.

By the end of 2018, we anticipate an increase in Panama's recorded caddisfly fauna to well over 400 species. Based on the number of new country records and new species to science that we are finding in most of the samples we have on hand, we project a total recorded fauna in excess of 500 species within three years.

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