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The Trichoptera of Panama I. New records for caddisflies
(Insecta: Trichoptera) from the Republic of Panama

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Abstract. The Republic of Panama currently has 245 recorded species of Trichoptera distributed among 13 families. Herein we add 32 new country records for Panama, including one new family (Limnephilidae) and one new genus (*Limnephilus*). We also provide the first collection information for *Oxyethira maya* Denning for Panama. These results are part of an ongoing effort to characterize the caddisfly fauna of Panama, and to evaluate that country's major cuencas (water basins).

Key Words. Philopotamidae, Xiphocentronidae, Hydropsychidae, Glossosomatidae, Hydroptilidae, Hydrobiosidae, Leptoceridae, Limnephilidae, Lepidostomatidae, cuenca.

Introduction

The diversity of plants and animals in the Republic of Panama is among the highest in the World. Whereas adequate diversity estimates for vascular plants, mammals, birds, and other vertebrates are obtainable, many groups of invertebrates are less adequately known (Convention on Biological Diversity, 2011). The insect order Trichoptera (caddisflies), until the last 25 years, was among the latter groups. Aguila (1992) published the first list of caddisflies (Insecta: Trichoptera) for Panama, listing 168 species. Since that time, 77 additional species have been recorded, bringing the current total to 245 species distributed among 13 families. Even so, neighboring Costa Rica boasts over 500 species, suggesting there is much yet to learn about Panama's caddisfly fauna.

Based on specimens collected by personnel of the Instituto Conmemorativo Gorgas de Estudios de la Salud and the first author, as well as material identified and housed in the University of Minnesota Insect Collection, we herein add 32 new Panamanian records. Thus, the new total of known caddisflies from the Republic of Panama is 277 species, a 13.1 % increase. In addition, one family, Limnephilidae, and one genus, *Limnephilus*, are now recorded from Panama for the first time.

As a result of the Central American Hydrometeorological Project (UNESCO 2008), an international effort to characterize major cuencas (water basins) in Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama, and to facilitate processing and exchange of hydrographic and meteorological data, was undertaken. Panama has 52 defined cuencas (Fig. 1). The Gorgas Institute is evaluating

the water quality of these, employing macroinvertebrates. We have included a cuenca descriptor (basin number) for each new recorded species and location.

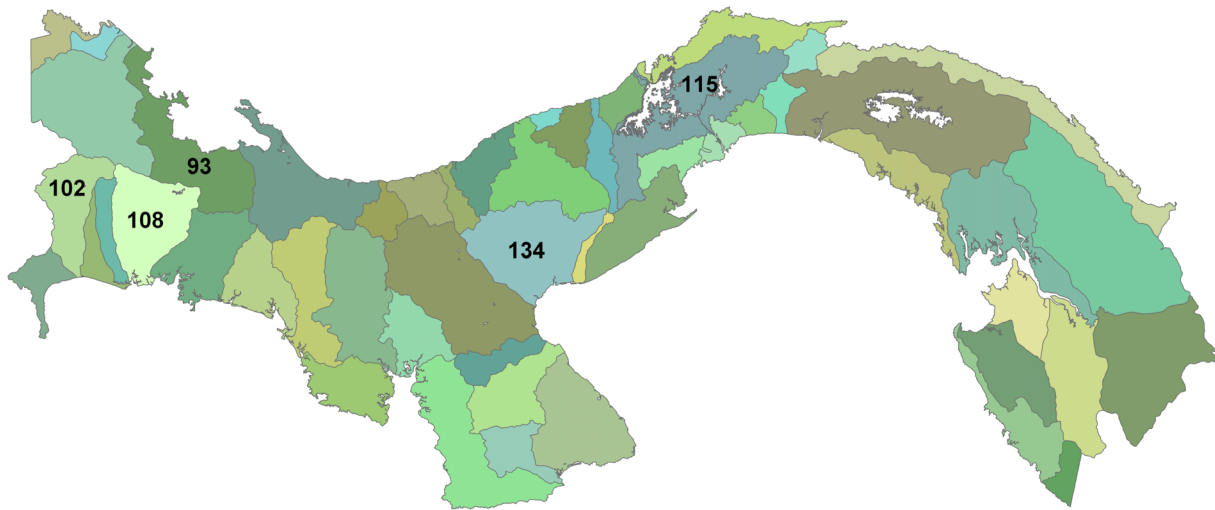


Figure 1. Major cuencas (water basins) of the Republic of Panama. New country records can be found in the cuencas indicated as follows (cuenca no.–major river–cuenca area): 93–Río Guariviara–2,121 km²; 102–Río Chiriquí Viejo–1,376 km²; 108–Río Chiriquí–1,905 km²; 115–Río Chagres–3,338 km²; and, 134–Río Grande–2,493 km²). More comprehensive information about all major cuencas in Panama can be found at the following web site: <http://www.hidroment.com.pa/cuencas.php?idioma=ing>

Materials and Methods

Single-night collections were made, in general, using UV light over alcohol traps (Calor and Mariano 2012). Multiple-night collections were made with this same method, or employing Malaise traps, as indicated. Specimens listed in this publication are deposited in the Universidad de Panamá Museo de Invertebrados (**MIUP**), the Colección Zoológica Dr. Eustorgio Méndez (**CoZEM**) of the Gorgas Institute, the University of Minnesota Insect Collection (**UMSP**), or the first author's reference collection (**BJA**). The order of families below follows the classification presented by Holzenthal et al. (2015).

Family Philopotamidae

Chimarra (Chimarra) colmillo Blahnik and Holzenthal, 1992

Material examined—Chiriquí Province: **Cuenca 108**, Río Chiriquí, Fortuna Dam site near Hornitos, 8.91667°N and 82.26667°W, 1050 m asl, 1.i-8.ii.1977, H. Wolda, 1 male, 1 female (**UMSP**).

Distribution: Costa Rica, Panama

Chimarra (Curgia) costaricensis Flint, 1998

Material examined—Chiriquí Province: **Cuenca 108**, Quebrada Jaramillo, Jaramillo Alta Rd. bridge, 8.76671°N and 82.41341°W, 1305 m asl, 26.vii.2014, A. Cornejo, 1 male (**MIUP**).

Distribution: Costa Rica, Panama

Chimarra (Chimarra) jemima Blahnik and Holzenthal, 1992

Material examined—Chiriquí Province: **Cuenca 108**, Río Chiriquí, Fortuna Dam site near Hornitos, 8.91667°N and 82.26667°W, 1050 m asl, 21.ix-18.xi.1977, H. Wolda, 1 male (UMSP).

Distribution: Costa Rica, Panama

Chimarra (Curgia) purisca Flint, 1998

Material examined—Chiriquí Province: **Cuenca 108**, Río Chiriquí, Fortuna Dam site near Hornitos, 8.91667°N and 82.26667°W, 1050 m asl, 21.ix-18.xi.1977, H. Wolda, 1 male, 1 female (UMSP).

Distribution: Costa Rica, Panama

Family Xiphocentronidae

Xiphocentron evandrus Schmid, 1982

Material examined—Bocas del Toro Province: **Cuenca 93**, Quebrada Rambala, nr Rambala Jungle Lodge, 8.91627°N and 82.15469°W, 120 m asl, 28.iii.2015, E. Carlson, 1 male (CoZEM); *ibid.*, 31.iii-11.iv.2015 (Malaise trap), E. Carlson, 3 males (MIUP). **Chiriquí Province: Cuenca 102**, Quebrada Norte, Mount Totumas Cloud Forest and Biological Reserve, 8.87361°N and 82.69051°W, 1709 m asl, 26-iv-10.v.2015 (Malaise trap), B. Armitage and J. Dietrich, 1 male (BJA).

Distribution: Costa Rica, Panama

Family Hydropsychidae

Calosopsye ardisia Flint and Bueno-Soria, 1987

Material examined—Chiriquí Province: **Cuenca 102**, Quebrada Norte, Mount Totumas Cloud Forest and Biological Reserve, 8.87361°N and 82.69051°W, 1709 m asl, 14.iv.2015, B. Armitage and J. Dietrich, 6 males (MIUP; CoZEM); *ibid.*, 26-iv-10.v.2015 (Malaise trap), B. Armitage and J. Dietrich, 1 male (BJA); *ibid.*, tributary of Río Colorado, Mount Totumas Cloud Forest and Biological Reserve, 8.88472°N and 82.68408°W, 1920 m asl, 14.iv.2015, B. Armitage and J. Dietrich, 1 male (MIUP).

Distribution: Costa Rica, Panama

Calosopsye bicuspis Flint and Bueno-Soria, 1987

Material examined—Chiriquí Province: **Cuenca 102**, tributary of Río Candelas, PILA nr Jurutungo, Sr. Felix property, 8.89056°N and 82.61201°W, 1996 m asl, 25-26.i.2015, A. Cornejo, 1 male (CoZEM); *ibid.*, tributary of Río Colorado, Mount Totumas Cloud Forest and Biological Reserve, 8.88472°N and 82.68408°W, 1920 m asl, 14.iv.2015; B. Armitage and J. Dietrich; 5 males (MIUP; BJA).

Distribution: Costa Rica, Panama

Leptonema rafita Munoz-Quesada, 1997

Material examined—Chiriquí Province: **Cuenca 102**, tributary of Río Candelas, PILA nr Jurutungo, Sr. Felix property, 8.89056°N and 82.61201°W, 1996 m asl, 25-26.i.2015, A. Cornejo, 1 male (**CoZEM**); *ibid.*, tributary of Río Colorado, Mount Totumas Cloud Forest and Biological Reserve, 8.88472°N and 82.68408°W, 1920 m asl, 14.iv.2015, B. Armitage and J. Dietrich, 1 male (**BJA**).

Distribution: Costa Rica, Panama

Family Glossosomatidae

Mortoniella redunca Blahnik and Holzenthal, 2008

Material examined—Chiriquí Province: **Cuenca 102**, Quebrada Norte, Mount Totumas Cloud Forest and Biological Reserve, 8.87361°N and 82.69051°W, 1920 m asl, 26-iv-10.v.2015 (Malaise trap), B. Armitage and J. Dietrich, 1 male (**BJA**).

Distribution: Costa Rica, Panama

Protophila altura Holzenthal and Blahnik, 2006

Material examined—Chiriquí Province: **Cuenca 102**, Quebrada Norte, Mount Totumas Cloud Forest and Biological Reserve, 8.87361°N and 82.69051°W, 1920 m asl, 14.iv.2015, B. Armitage and J. Dietrich, 1 male (**BJA**); *ibid.*, 26-iv-10.v.2015 (Malaise trap), 1 male (**BJA**). **Cuenca 108**, Quebrada Grande, Boquete, Valle Escondido, below Sabor Restaurant, 8.77970°N and 82.44016°W, 1122 m asl, 25.ii.2013, A. Cornejo, 1 male (**BJA**); *ibid.*, 19.iii.2013, 1 male (**MIUP**); *ibid.*, 26.ix.2013, 1 male (**CoZEM**); *ibid.*, tributary of Quebrada Grande, at waterfall, 8.78291°N and 82.44579°W, 1253 m asl, 17.ix.2013, A. Cornejo, 1 male (**BJA**); *ibid.*, Quebrada Jaramillo, Jaramillo Alto Rd. bridge, 8.77427°N and 82.40699°W, 1470 m asl, 20.iii.2015, B. Armitage and T. Arefina-Armitage, 3 males (**BJA**); *ibid.*, off Jaramillo Alto Rd., Collier property, 8.76520°N and 82.41383°W, 1257 m asl, 22.iv.2015, B. Armitage, 1 male (**BJA**); *ibid.* Río Caldera, opposite Hotel Ladera, Boquete, 8.78361°N and 82.43014°W, 1109 m asl, 21.xi.2013, A. Cornejo, 1 male (**BJA**).

Distribution: Costa Rica, Panama

Protophila chitaria Holzenthal and Blahnik, 2006

Material examined—Bocas del Toro Province: **Cuenca 93**, Quebrada Rambala, nr Rambala Jungle Lodge, 8.91627°N and 82.15469°W, 120 m asl, 9.viii.2014, E. Carlson, 1 male (**CoZEM**); *ibid.*, tributary of Quebrada Rambala, 8.91543°N and 82.15527°W, 122 m asl, 28.iii.2015, B. Armitage, 1 male (**MIUP**).

Distribution: Costa Rica, Panama

Protophila trichoglossa Holzenthal and Blahnik, 2006

Material examined—Chiriquí Province: **Cuenca 102**, tributary of Río Candela, PILA nr Jurutungo, Sr. Felix property, 8.89056°N and 82.61201°W, 1996 m asl, 25-26.i.2015, A. Cornejo, 1 male (**CoZEM**).

Distribution: Costa Rica, Panama

Family Hydroptilidae

Hydroptila flinti Bueno-Soria, 1984

Material examined—Chiriquí Province: Cuenca 108, Quebrada Grande, Boquete, Valle Escondido, below Sabor Restaurant, 8.77970°N and 82.44016°W, 1122 m asl, 2.v.2013, A. Cornejo, 1 male (**BJA**); *ibid.*, 19.iii.2013, 1 male (**MIUP**).

Distribution: Costa Rica, Panama

Hydroptila veracruzensis Flint, 1967

Material examined—Chiriquí Province: Cuenca 108, Quebrada Grande, Boquete, Valle Escondido, below Sabor Restaurant, 8.77970°N and 82.44016°W, 1122 m asl, 2.v.2013, A. Cornejo, 1 male (**BJA**); *ibid.*, 19.iii.2013, 1 male (**MIUP**).

Distribution: Costa Rica, México, Nicaragua, Panama, Trinidad, Venezuela

Neotrichia canixa (Mosely, 1937)

Material examined—Chiriquí Province: Cuenca 108, Quebrada Grande, Boquete, Valle Escondido, below Sabor Restaurant, 8.77970°N and 82.44016°W, 1122 m asl, 2.v.2013, A. Cornejo, 1 male (**BJA**); *ibid.*, tributary of Quebrada Grande, at waterfall, 8.78291°N and 82.44579°W, 1253 m asl, 17.ix.2013, 1 male (**BJA**).

Distribution: México, Panama, USA.

Oxyethira arizona Ross, 1948

Material examined—Canal Zone: Cuenca 115, Río Chagres, Barro Colorado Island, 9.16361°N and 79.83778°W, 66 m asl, 22.vi.-6.ix.1988 (UV light), H. Wolda, 1 male, 1 female (**UMSP**). **Chiriquí Province: Cuenca 108**, Quebrada Grande, Boquete, Valle Escondido, below Sabor Restaurant, 8.77970°N and 82.44016°W, 1122 m asl, 24.iii.2013, A. Cornejo, 1 male (**MIUP**); *ibid.*, 25.iii.2013, 1 male (**CoZEM**); *ibid.*, 2.vi.2013, 1 male (**BJA**); *ibid.*, 26.ix.2013, 1 male (**BJA**).

Distribution: Costa Rica, Cuba, Dominica, Jamaica, Martinique, Nicaragua, Panama, Puerto Rico, USA

Oxyethira glasa (Ross, 1941)

Material examined—Canal Zone: Cuenca 115, Río Chagres, Barro Colorado Island, 9.16361°N and 79.83778°W, 66 m asl, 31.v.-27.vi.1989 (UV light), H. Wolda, 1 male, 1 female (**UMSP**).

Distribution: Costa Rica, Cuba, Panama, USA

Oxyethira maya Denning, 1947

Material examined—**Canal Zone: Cuenca 115**, Río Chagres, Barro Colorado Island, 9.16361°N and 79.83778°W, 66 m asl, 1.v.-26.vii.1989 (UV light), H. Wolda, 1 male, 1 female (**UMSP**).

Distribution: Mexico, Panama, USA

Note: This species was previously mentioned by Flint and Englund (2003), in a paper dealing with Hawaiian caddisflies, as occurring in Panama (Barro Colorado Island; unpubl. obs.). However, complete collection information was not associated with this remark. We have not included this species as a new country record for Panama, but do provide requisite collection information at this time.

Oxyethira sierruca Holzenthal and Harris, 1992

Material examined—**Chiriquí Province: Cuenca 108**, Quebrada Grande, Boquete, Valle Escondido, below Sabor Restaurant, 8.77970°N and 82.44016°W, 1122 m asl, 2.v.2013, A. Cornejo, 1 male (**MIUP**).

Distribution: Costa Rica, Panama

Oxyethira simulatrix Flint, 1968

Material examined—**Canal Zone: Cuenca 115**, Río Chagres, Barro Colorado Island, 9.16361°N and 79.83778°W, 66 m asl, 13.vii.-20.ix.1988 (UV light), H. Wolda, 1 male, 1 female (**UMSP**).

Distribution: Costa Rica, Jamaica, Panama, USA

Zumatruchia attenuata Flint, 1970

Material examined—**Chiriquí Province: Cuenca 108**, Río Caldera, Wilson Bridge, nr Alto Boquete, 8.74228°N and 82.42160°W, 1000 m asl, 18.xi.2013, A. Cornejo, 1 male (**MIUP**).

Distribution: Costa Rica, Panama

Zumatruchia galtena Mosely, 1937

Material examined—**Chiriquí Province: Cuenca 108**, Quebrada Grande, Boquete, Valle Escondido, below Sabor Restaurant, 8.77970°N and 82.44016°W, 1122 m asl, 2.v.2013, A. Cornejo, 1 male (**MIUP**).

Distribution: Costa Rica, Honduras, Mexico, Panama

Family Hydrobiosidae

Atopsyche chimpucillo Schmid, 1989

Material examined—**Chiriquí Province: Cuenca 108**, Río Chiriquí, Fortuna Dam site near Hornitos, 8.91667°N and 82.26667°W, 1050 m asl, 17.xi-28.xii.1976, H. Wolda, 1 male (**UMSP**).

Distribution: Costa Rica, Panama

Atopsyche cira (Mosely, 1949)

Material examined—Chiriquí Province: **Cuenca 102**, tributary of Río Candela, PILA nr Jurutungo, Sr. Felix property, 8.89056°N and 82.61201°W, 1996 m asl, 25-26.i.2015, A. Cornejo, 1 male (**CoZEM**); *ibid.*, tributary of Río Colorado, Mount Totumas Cloud Forest and Biological Reserve, 8.88472°N and 82.68408°W, 1915 m asl, 14.iv.2015, B. Armitage and J. Dietrich, 1 male (**BJA**); *ibid.*, Río Chiriquí Viejo, Guadeloupe Arriba, NNE Cerro Punta, 8.87289°N and 82.55361°W, 2097 m asl, 10.vii-16.vii.1985, H. Wolda, 1 male (**UMSP**).

Distribution: Costa Rica, Panama

Atopsyche huainacpac Schmid, 1989

Material examined—Chiriquí Province: **Cuenca 108**, Río Chiriquí, Fortuna Dam site near Hornitos, 8.91667°N and 82.26667°W, 1050 m asl, 17.xi-28.xii.1976, H. Wolda, 1 male (**UMSP**).

Distribution: Costa Rica, Panama

Atopsyche jaba Blahnik and Gottschalk, 1997

Material examined—Chiriquí Province: **Cuenca 102**, Quebrada Norte, Mount Totumas Cloud Forest and Biological Reserve, 8.87361°N and 82.69051°W, 1920 m asl, 14.iv.2015, B. Armitage and J. Dietrich, 1 male (**MIUP**).

Distribution: Costa Rica, Panama

Family Leptoceridae

Oecetis knutsoni Flint, 1981

Material examined—Bocas del Toro Province: **Cuenca 93**, Quebrada Rambala, nr Rambala Jungle Lodge, 8.91627°N and 82.15469°W, 120 m asl, 9.viii.2014, E. Carlson, 1 male (**MIUP**); *ibid.*, 31.iii-11.iv.2015 (Malaise trap), E. Carlson, 2 males (**MIUP**). Chiriquí Province: **Cuenca 102**, Quebrada Norte, Mount Totumas Cloud Forest and Biological Reserve, 8.87361°N and 82.69051°W, 1920 m asl, 14.iv.2015, B. Armitage and J. Dietrich, 1 male (**CoZEM**); *ibid.*, Río Colorado, 8.87356°N and 82.68999°W, 1700 m asl, 15.iv.2015, B. Armitage and J. Dietrich, 1 male (**BJA**); **Cuenca 108**, Quebrada Grande, Boquete, Valle Escondido, below Sabor Restaurant, 8.77970°N and 82.44016°W, 1122 m asl, 25.ii.2013, A. Cornejo, 1 male (**MIUP**); *ibid.*, 26.ix.2013, 1 male (**BJA**); *ibid.*, Quebrada Jaramillo, off Jaramillo Alto Rd., Collier property, 8.76520°N and 82.41383°W, 1257 m asl, 13.xi.2014, A. Cornejo, 1 male (**BJA**).

Distribution: Bolivia, Colombia, Guadeloupe, Panama, Peru, Venezuela

Trienodes anomalous Flint, 1967

Material examined—Chiriquí Province: **Cuenca 102**, Quebrada Norte, Mount Totumas Cloud Forest and Biological Reserve, 8.87361°N and 82.69051°W, 1709 m asl, 14.iv.2015, B. Armitage and J. Dietrich, 1 male (**BJA**); **Cuenca 108**, Río Chiriquí, Fortuna Dam site near Hornitos, 8.91667°N and 82.26667°W, 1050 m asl, 17.xi-28.xii.1976, H. Wolda, 1 male (**UMSP**).

Distribution: Mexico, Nicaragua, Panama

Trienodes talamanca Holzenthal and Andersen, 2004

Material examined—**Coclé Province: Cuenca 134**, tributary of Las Yayas, Toma de agua Barringón, 8.66307°N and 80.58908°W, 709.4 m asl, 26.ii.2015, A. Cornejo, 1 male (**CoZEM**).

Distribution: Costa Rica, Panama

Family Limnephilidae

Limnephilus hamifer Flint, 1963

Material examined—**Chiriquí Province: Cuenca 102**, Río Chiriquí Viejo, Guadeloupe Arriba, NNE Cerro Punta, 8.87289°N and 82.55361°W, 2097 m asl, 2.v-8.v.1984, H. Wolda, 1 male (**UMSP**).

Distribution: Costa Rica, Panama

Note: This represents the first record for the family Limnephilidae and the genus *Limnephilus* in Panama.

Family Lepidostomatidae

Lepidostoma griseum (Banks, 1911)

Material examined—**Chiriquí Province: Cuenca 102**, Río Chiriquí Viejo, Guadeloupe Arriba, NNE Cerro Punta, 8.87289°N and 82.55361°W, 2097 m asl, 14.iii-20.iii.1984 (UV light), H. Wolda, 1 male (**UMSP**).

Distribution: Canada, Panama, USA

Lepidostoma polylepidum Holzenthal and Strand, 1992

Material examined—**Chiriquí Province: Cuenca 102**, tributary of Río Candela, PILA nr Jurutungo, Sr. Felix property, 8.89056°N and 82.61201°W, 1996 m asl, 25-26.i.2015., A. Cornejo, 1 male (**CoZEM**); *ibid.*, tributary of Río Colorado, Mount Totumas Cloud Forest and Biological Reserve, 8.88472°N and 82.68408°W, 1920 m asl, 14.iv.2015, B. Armitage and J. Dietrich, 1 male (**MIUP**); *ibid.*, Río Colorado, 8.87356°N and 82.68999°W, 1700 m asl, 15.iv.2015, B. Armitage and J. Dietrich, 1 male (**BJA**); *ibid.*, Quebrada Norte, Mount Totumas Cloud Forest and Biological Reserve, 8.87361°N and 82.69051°W, 1920 m asl, 14.iv.2015, B. Armitage and J. Dietrich, 1 male (**BJA**); *ibid.*, 26.iv-10.v.2015 (Malaise trap), 3 males (**BJA**).

Distribution: Costa Rica, Panama

Lepidostoma reimoseri Flint and Bueno-Soria, 1977

Material examined—**Chiriquí Province: Cuenca 102**, tributary of Río Colorado, Mount Totumas Cloud Forest and Biological Reserve, 8.88472°N and 82.68408°W, 1920 m asl, 14.iv.2015, B. Armitage and J. Dietrich, 1 male (**MIUP**).

Distribution: Costa Rica, Panama

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