New *Cernotina* caddisflies from the Ecuadorian Amazon (Trichoptera: Polycentropodidae)

Lucas Camargos Corresp., 1, Blanca Ríos-Touma 2, Ralph W. Holzenthal 1

1 Department of Entomology, University of Minnesota - Twin Cities Campus, St. Paul, Minnesota, United States
2 Facultad de Ingenierías y Ciencias Agropecuarias, Ingeniería Ambiental, Universidad de Las Americas, Quito, Ecuador

Corresponding Author: Lucas Camargos
Email address: camar069@umn.edu

Two new species of the caddisfly genus *Cernotina* Ross, 1938 (Polycentropododae) are described from the lowland Amazon basin of Ecuador, *Cernotina tiputini*, new species, and *Cernotina waorani*, new species. These represent the first new species described from this region. We also record from Ecuador for the first time *Cernotina hastilis* Flint, previously known from Tobago, and present new Ecuadorian locality records for *C. cygnea* Flint, and *C. lobisomem* Santos & Nessimian. The homology of the intermediate appendage of the male genitalia of this genus is established. The region surveyed is under severe environmental threat from logging, mining, and crude oil extraction, making the description of the biodiversity of the region imperative.
New *Cernotina* caddisflies from the Ecuadorian Amazon (Trichoptera: Polycentropodidae)

Lucas M. Camargos¹*, Blanca Ríos-Touma², Ralph W. Holzenthal¹

¹ Department of Entomology, University of Minnesota, St. Paul, Minnesota, USA
² Universidad de las Américas, Facultad de Ingenierías y Ciencias Agropecuarias, Ingeniería Ambiental, Campus Queri, Quito, Ecuador

Abstract

Two new species of the caddisfly genus *Cernotina* Ross, 1938 (Polycentropododae) are described from the lowland Amazon basin of Ecuador, *Cernotina tiputini*, new species, and *Cernotina waorani*, new species. These represent the first new species described from this region. We also record from Ecuador for the first time *Cernotina hastilis* Flint, previously known from Tobago, and present new Ecuadorian locality records for *C. cygnea* Flint, and *C. lobisomem* Santos & Nessimian. The homology of the intermediate appendage of the male genitalia of this genus is established. The region surveyed is under severe environmental threat from logging, mining, and crude oil extraction, making the description of the biodiversity of the region imperative.

*Corresponding author = Lucas Camargos (camar069@umn.edu)
Introduction

Trichoptera are an order of insects found in all faunal regions and is comprised of almost 16,000 described species. It is the largest insect order in which all included species live in freshwater during the immature stages (except for a very few semi-terrestrial species and even fewer marine species) (Holzenthal, Thomson & Ríos-Touma., 2015). The Neotropical region (Mexico, Central America, the Caribbean, and South America) is especially diverse in Trichoptera, with more than 3,200 species currently known (Holzenthal & Calor, 2017). Because of their high sensitivity to pollution and environmental changes, caddisflies are considered to be biological indicators of the quality of freshwater (Chang, Lawrence, Ríos-Touma & Resh, 2014). Various biological indices and metrics have been developed incorporating caddisfly diversity and abundance to assess and monitor water quality by many national agencies around the world, including those in South American (Ríos-Touma, Acosta & Prat, 2014).

Among the 39 extant families of Trichoptera, the cosmopolitan family Polycentropodidae contains about 650 species and 15 genera (Chamorro & Holzenthal, 2011). Five genera of polycentropidids occur in the Neotropics: *Cernotina* Ross, 1938, *Cyrnellus* Banks, 1913, *Nyctiophylax* Brauer, 1865, *Polycentropous* Curtis, 1835, and *Polyleptoporus* Ulmer, 1905 (Holzenthal & Calor, 2017).

As an exclusively New World genus, *Cernotina* has most of its 70 extant species in the Neotropical region (Holzenthal & Calor 2017), where most occur in the lowlands of the vast Amazon basin (Flint, 1971). One species, *Cernotina pulchra* Wichard, 2007, is known from Dominican amber. No species occur in temperate southern South America (Chile and adjacent patagonian Argentina). In the central and northern Andean countries, *Cernotina* is found exclusively in the Amazonian lowlands (Holzenthal & Calor, 2017). In spite of its diversity and apparently wide distribution, published descriptions and records from South America are few and include those from Argentina (Flint 1983), Brazil (Flint 1971, 1991, Holzenthal & Almeida 2003, Santos & Nessimian 2008, Dumas & Nessimian 2011, Barcelos-Silva, Camargos, Pes & Salles, 2013), Peru (Sykora, 1998), and Uruguay (Angrisano, 1994). The first records of the genus from Ecuador were recently published for *Cernotina cygnea* Flint, 1971 and *C. lobisomem* Santos and Nessimian, 2008 (Ríos-Touma, Holzenthal, Huisman, Thomson & Rázuri-Gonzales, 2017). In North America, *Cernotina* inhabits lotic and lentic freshwaters habitats and the larvae
are considered predators (Morse & Holzenthal, 2008). However, there is no ecological information for the Neotropical species.

Polycentropodidae can be distinguished from other Neotropical caddisflies by a combination of characters (Chamorro & Holzenthal, 2011; Pes, Santos, Barcelos-Silva & Camargos, 2014): absence of ocelli; elongate, flexible segment 5 of the maxillary palp; segment 3 of the maxillary palp inserted subapically on segment 2; pair of distinct, oval, setal warts on the mesoscutum. Adult *Cernotina* can be separated from other Neotropical polycentropodids by the absence of a preapical tibial spur on the foreleg.

The eastern part of the Ecuadorian Amazon includes the vast Yasuní National Park (ca. 10,000 km²) and the adjacent, much smaller and private Tiputini Biodiversity Station (6.5 km²). These conservation areas harbor a great diversity of amphibians, mammals, birds, and plants (Bass et al., 2010). In contrast, most insects, including Trichoptera have not been intensively studied in this area. However, while existing records are scarce, they suggest a diverse fauna (Ríos-Touma, Holzenthal, Huisman, Thomson & Rázuri-Gonzales, 2017). Oil concessions and logging have been threatening the biological diversity of this region for more than five decades (Bass et al. 2010, Sierra, 2000; Viña, Echavarria & Rundquis, 2004, O’Rourke & Connolly, 2003). Further, since freshwater biodiversity is among the world's least known (Dudgeon et al., 2006; Esteban & Finlay, 2010), and the Amazon is among the greatest global freshwater ecosystems, it is imperative to study well preserved areas like Yasuní and Tiputini. In our recent effort to record species of Trichoptera from Tiputini, we found new species and records of *Cernotina* (Ríos-Touma, Holzenthal, Huisman, Thomson & Rázuri-Gonzales, 2017) among other caddisflies. In this paper, we describe two new species of *Cernotina* from Tiputini and record a previously described species for the first time in Ecuador.

**Materials and Methods**

Collecting was accomplished at three sites in the Tiputini Biodiversity Station in October, 2011. The station is located on the northern bank of the Río Tiputini, an easterly flowing southern tributary of the much larger Río Napo (supplementary file 1). We sampled two small waterways and the Tiputini river using ultraviolet lights for approximately 2.5 hours (17:30-20:00 h). (Fig 1). To collect dry specimens for subsequent pinning, ultraviolet and white fluorescent lights were
hung in front of a white bed sheet placed by the margin of the streams (Fig. 1D). Adult
Trichoptera attracted to the lights were captured in jars containing ammonium carbonate as the
killing agent. In addition, a small UV light was placed over a white tray containing 80% ethanol
and left for about 2.5 hours at streamside. Caddisflies collected in the tray were sorted later in the
laboratory from other insects and were stored in 80% ethanol.

For examination and description, the male genitalia were prepared using warm 85% lactic
acid to macerate soft tissue following the procedures of Blahnik, Holzenthal & Prather . (2007).
Pencil sketches were rendered with the aid of a drawing tube attached to an Olympus BX 41
compound microscope. Pencil sketches were imported into Adobe Illustrator CC to produce final
digital illustrations. Terminology for male genitalic structures follows that of Chamorro &
Holzenthal (2011) for Polycentropodidae.
The specimens examined in this work are deposited in the University of Minnesota Insect
Collection, St. Paul, Minnesota, USA (UMSP), the Museo Ecuadoriano de Ciencias Naturales,
Quito, Ecuador (MECN), and the Museo de Ecología Acuática de la Universidad San Francisco
de Quito, Ecuador (USFQ) as indicated below. All collections were performed under the
Environmental Ministry of Ecuador study permit No 0032 MAE-DPO-PNY -2011.

The electronic version of this article in Portable Document Format (PDF) will represent a
published work according to the International Commission on Zoological Nomenclature (ICZN),
and hence the new names contained in the electronic version are effectively published under that
Code from the electronic edition alone. This published work and the nomenclatural acts it
contains have been registered in ZooBank, the online registration system for the ICZN. The
ZooBank LSIDs (Life Science Identifiers) can be resolved and the associated information viewed
through any standard web browser by appending the LSID to the prefix http://zoobank.org/. The
LSID for this publication is: urn:lsid:zoobank.org:pub:5CE7AFE5-5077-4930-96BA-
5B746FF12250. The online version of this work is archived and available from the following
digital repositories: PeerJ, PubMed Central and CLOCKSS.

Results

Species descriptions
**Cernotina tiputini**, new species

urn:lsid:zoobank.org:act:E254D21B-7FA0-47CA-AF34-BE437CEE71CE

Figure 2

This species is very similar to *C. chelifera* Flint, 1972 from Argentina in the 2 apical spines of the dorsolateral process of the preanal appendage and the general shape of the appendage. It differs from the Argentinian species by the overall shape of tergum X and the intermediate appendage, its relative size shorter than the inferior appendage, a broader dorsolateral process in dorsal aspect, a narrower inferior appendage, and by having 2 internal spines instead of only 1 long spine in the phallus.

Forewing length 3.5 mm male (n=2). Forewing very light brown, apex with small patch of dark setae, white hairs along anal margin; head and thorax with white hair dorsally; antennae stramineous. Forewing with fork V petiolate; hind wing with cross vein Cu2–1A absent, vein 3A absent.

*Male genitalia*: Sternum IX with height 3/4ths of entire male genital complex, quadrate, anteroventral margin with deep, broad concavity. Tergum X semi-membranous, divided mid-dorsally; intermediate appendages slightly curved ventrad, thumb-like, about as long as inferior appendage, setose, with 2 thick apical setae, surface with microsetae. Preanal appendages each composed of 2 lobes; dorsolateral process oblong, shorter than inferior appendage, with 2 apical spines; mesoventral process produced dorsolaterally, fused on midline, shorter than inferior appendage, bearing a row of stout setae on posterior margin. Inferior appendages in lateral view slightly fusiform, straight, apex rounded; sclerotized apicomesally, pointed in ventral view; dorsal branch elongate, about as long as body of appendage, oriented posteriad, bearing a row of setae. Phallus slightly bent at mid-length, narrow, with 2 spines; phallotremal sclerite large, ovate, with 2 apparent lateral processes.
**Holotype male:** ECUADOR: Orellana, Reserva de Biodiversidad Tiputini, river slough, Numa trail, 00.63954°S, 76.14836°W, el. 260 m, 23.x.2011, Holzenthal and Ríos [pinned] (UMSP000098447) (UMSP).

**Paratype:** same as holotype, except: 1 male [alcohol] (MECN).

**Etymology:** The species is named for the Tiputini River and the adjacent biodiversity research station.

*Cernotina waorani,* new species

urn:lsid:zoobank.org:act:15FD59A3-69F2-4152-B7B8-EE5E34051603

Figure 3

This species has similarities with *C. fallaciosa* Flint, 1983 from Argentina in the bulbous apex of the inferior appendage in lateral aspect and the presence of multiple internal spines in the phallus. However, the absence of apical spines on the dorsolateral process of the preanal appendage, its shape, and the presence of a flap-like median, sub-basal lobe renders this species distinct.

Forewing length 3.5-4 mm (n=6). Forewing stramineous, with slightly darker hairs at apex; head and thorax with lighter hair dorsally; antennae stramineous. Forewing with fork V sessile; hind wing with crossvein Cu2–1A present, vein 3A absent.

*Male genitalia:* Sternum IX with height about half of entire male genital complex, trapezoidal; anteroventral margin with deep, narrow concavity. Tergum X semi-membranous, divided mid-dorsally; intermediate appendages entire, digitate, about as long as inferior appendage, setose, without spines, surface with microsetae. Preanal appendages each composed of 2 lobes: dorsolateral process elongate, longer than inferior appendage, with flap-like mesal lobe; mesoventral process oblong, not fused on midline, shorter than inferior appendage, bearing a row of stout setae on posterior margin. Inferior appendage subtriangular in lateral view, lateral apex narrow; apex complex, directed mesad, with apicomesal lobe-like processes, mesal process with...
sclerotized apex; dorsal branch absent. Phallus straight, narrow, with 2 spines and membranous pouch of 8 small spines; phallostremal sclerite anterodorsal, large, hourglass-shaped.

**Holotype male:** ECUADOR: Orellana, Reserva de Biodiversidad Tiputini, small stream, Harpia trail, 00.63496°S, 76.14602°W, el. 240 m, 22.x.2011, Holzenthal & Ríos [pinned] (UMSP000098911) (UMSP).

**Paratypes:** same as holotype, except – 4 males [alcohol] (USFQ, MECN); same except: Reserva de Biodiversidade Tiputini, river slough, Numa trail, 00.63954°S, 76.14836°W, el. 260 m, 23.x.2011, Holzenthal & Ríos – 1 male [pinned] (UMSP).

**Etymology:** This new species is named for the Waorani people, in whose territory, now under severe environmental threat, this species occurs.

**Additional species records**

**Cernotina hastilis** Flint, 1996, NEW RECORD

Flint, 1996a:75 [original designation]. —Botosaneanu, 2002:95 [checklist]. —Holzenthal & Calor, 2017:415 [catalog].

This species was previously recorded from the island of Tobago.

**Material examined:** ECUADOR: Orellana, Reserva de Biodiversidad Tiputini, small stream, Harpia trail, 00.63496°S, 76.14602°W, el. 240 m, 22.x.2011, Holzenthal and Ríos – 2 males [pinned] (UMSP); same except: 27 males [alcohol] (UMSP, MECN, USFQ).

**Cernotina cygnea** Flint, 1971

Cernotina cygnea Flint, 1971:37 [original description]. —Sykora, 1998:120 [distribution]. — Paprocki, Holzenthal & Blahnik, 2004:15 [checklist]. —Ríos-Touma, Holzenthal, Huisman,
This species was previously reported from Brazil, Ecuador, and Peru.

**Material examined:** **ECUADOR:** Orellana, Reserva de Biodiversidad Tiputini, river slough, Numa trail, 00.63954°S, 76.14836°W, el. 260 m, 23.x.2011, Holzenthal and Ríos - 1 male [pinned] (UMSP).

**Cernotina lobisomem** Santos & Nessimian, 2008

**Material examined:** **ECUADOR:** Orellana, Reserva de Biodiversidade Tiputini, river slough, Numa trail, 00.63954°S, 76.14836°W, el. 260 m, 23.x.2011, Holzenthal and Ríos - 1 male [alcohol] (UMSP).

This species was previously reported from Brazil.

**Discussion**

As discussed by Chamorro & Holzenthal (2010), the intermediate appendage in Polycentropodidae is difficult to distinguish in taxa where this structure is fused with tergum X along its mesal margin, a characteristic commonly found in *Cernotina*. This confusion has led to difficulty in determining the homology of the intermediate appendage versus the dorsolateral appendage in previous species descriptions (e.g., Holzenthal & Almeida, 2003). Some species such as *C. perpendicularis* Flint, 1971 has an appendage very distinct from the membranous tergum X, similar to that of some *Polyplectropus*. In those cases, the intermediate appendages
are lateral to tergum X, mesal to the dorsolateral process of the preanal appendages, and always setose.

In this paper, we used the term "intermediate appendage" to refer to the lateral, setose, lightly sclerotized lobes of tergum X, following the morphological discussions of Chamorro & Holzenthal (2010) for *Polyplectropus* and the character coding from Chamorro & Holzenthal (2011).

Conclusions

The species of *Cernotina* described and recorded here were collected only adjacent to two small waterways, one a permanent small stream, the other an inundated, separated channel of the Tiputini River. We did not collect any specimen from lights set adjacent to the Tiputuni River. Even though the study consisted of only 3 nights of sampling (one on the Tiputini, two on the small water bodies), we collected 5 species, 3 recorded here and 2 species previously reported from Ecuador by Ríos-Touma, Holzenthal, Huisman, Thomson & Rázuri-Gonzales (2017).

Considering the amount of similar freshwater habitats, the potential diversity of this genus in northern Amazonia is enormous. However, several species could become locally extinct due to the effects of environmental degradation from crude oil extraction, mining, and deforestation if current conservation efforts are not maintained. Loss of species diversity could be even greater, especially if regional endemism is also high as might occur with some *Cernotina* (Flint, 1971). The importance of areas such as Tiputini and Yasuní cannot be overstated for the conservation of the largely unknown freshwater insect fauna of the Amazon.

Acknowledgements

Dr. David Romo and Dr. Andrea Encalada, Universidad San Francisco de Quito, provided transportation, lodging, and access to services at the Tiputini station. We thank Dr. Lourdes Chamorro and an anonymous reviewer for their constructive comments on the manuscript.
Angrisano EB. 1994. Contribución al conocimiento de los Trichoptera de Uruguay. I: familias Ecnomidae y Polycentropodidae. Revista de la Sociedad Entomológica Argentina 53:129-139.

Banks N. 1913. Neuropteroid insects from Brazil (The Stanford Expedition to Brazil). Psyche 20:83-89.

Barcelos-Silva P, Camargos LM, Pes AM, Salles FF. 2013. Six new species of Cernotina Ross, 1938 (Trichoptera: Polycentropodidae) from Brazil. Zootaxa 3669:115-128.

Bass MS, Finer M, Jenkins CN, Kreft H, Cisneros-Heredia DF, McCracken SF, Pitman NCA, English PH, Swing K, Villa G, Di Fiore A, Voigt CC, Kunz TH. 2010. Global conservation significance of Ecuador's Yasuni National Park. PLOS ONE 5:e8767. 10.1371/journal.pone.0008767

Blahnik RJ, Holzenthal RW, Prather AL. 2007. The lactic acid method for clearing Trichoptera genitalia. In: Bueno-Soria J, Barba-Álvarez R, and Armitage BJ, eds. Proceedings of the 12th International Symposium on Trichoptera. Columbus, Ohio: The Caddis Press, 9-14.

Botosaneanu L. 2002. An annotated checklist of caddisflies from the Caribbean islands, with distribution and bibliography (Insecta, Trichoptera). Bulletin de la Société Entomologique de France 107:79-108.

Brauer F. 1865. Zweiter bericht uber die auf der Weltfahrt der kais. Fregatte Novara gesammelten Neuroptera. Verhandlungen der Kaiserlich-Königlichen Zoologischen-Botanischen Gesellschaft in Wien 15:415-422.

Chamorro ML, Holzenthal RW. 2010. Taxonomy and phylogeny of New World Polyplectropus Ulmer, 1905 (Trichoptera: Psychomyioidea: Polycentropodidae) with the description of 39 new species. Zootaxa 2582:1-252.

Chamorro ML, Holzenthal RW. 2011. Phylogeny of Polycentropodidae Ulmer, 1903 (Trichoptera: Annulipalpia : Psychomyioidea) inferred from larval, pupal and adult characters. Invertebrate Systematics 25:219-253. http://dx.doi.org/10.1071/IS10024

Chang F-H, Lawrence JE, Rios-Touma B, Resh VH. 2014. Tolerance values of benthic macroinvertebrates for stream biomonitoring; assessment of assumptions underlying scoring systems worldwide. Environmental Monitoring and Assessment 186:2135-2149. 10.1007/s10661-013-3523-6

Curtis J. 1835. Hymenoptera, Part II, Neuroptera, Trichoptera. Vol IV, p. 65, 66, pl. 544, 601, in the 8 vol systematic binding. In, British Entomology; being illustrations and descriptions of the
genera of insects found in Great Britain and Ireland: containing coloured figures from nature of
the most rare and beautiful species, and in many instances of the plants upon which they are
found. London: E. Ellis and Co.

Dudgeon D, Arthington AH, Gessner MO, Kawabata Z-I, Knowler DJ, Lévêque C, Naiman RJ, Prieur-
Richard A-H, Soto D, Stiassny MLJ, Sullivan CA. 2006. Freshwater biodiversity: importance,
threats, status and conservation challenges. Biological Reviews 81:163-182.
10.1017/S1464793105006950

Dumas LL, Nessimian JL. 2011. A new species of Cernotina (Trichoptera, Polycentropodidae) from the
Atlantic Forest, Rio de Janeiro State, southeastern Brazil. Revista Brasileira de Entomologia
55:31-34.

Esteban GF, Finlay BJ. 2010. Conservation work is incomplete without cryptic biodiversity. Nature
463:293-293.

Flint OS Jr. 1971. Studies of Neotropical caddisflies, XII: Rhyacophilidae, Glossosomatidae,
Philopotamidae, and Psychomyiidae from the Amazon Basin (Trichoptera). Amazoniana 3:1-67.

Flint OS Jr. 1972. Studies of Neotropical caddisflies, XIV: on a collection from northern Argentina.
Proceedings of the Biological Society of Washington 85:223-248.

Flint OS Jr. 1983. Studies of Neotropical caddisflies, XXXIII: new species from austral South America
(Trichoptera). Smithsonian Contributions to Zoology 377:1-100.

Flint OS Jr. 1991. Studies of Neotropical caddisflies, XLIV: on a collection from Ilha de Maraca,
Brazil. Acta Amazonica 21:63-83.

Flint OS Jr. 1996. Studies of Neotropical caddisflies LV: Trichoptera of Trinidad and Tobago.
Transactions of the American Entomological Society 122:67-113.

Holzenthal RW, Calor AR. 2017. Catalog of the Neotropical Trichoptera (Caddisflies). ZooKeys 654:1-
566. 10.3897/zookeys.654.654916

Holzenthal RW, Almeida GL. 2003. New species of Polycentropodidae (Trichoptera) from southeastern
and southern Brazil. Proceedings of the Entomological Society of Washington 105:22-29.

Holzenthal RW, Thomson RE, Rios-Touma B. 2015. Order Trichoptera. In: Thorp JH, and Rogers DC,
eds. Ecology and General Biology, Vol I: Thorp and Covich's Freshwater Invertebrates, 4th
Edition: Academic Press, 965-1002.

Morse JC, Holzenthal RW. 2008. Chapter 18, Caddisfly genera. In: Merritt RW, Cummins KW, and
Berg MA, eds. An Introduction to the Aquatic Insects of North America, 4th edition. Dubuque:
O'Rourke D, Connolly S. 2003. Just oil? The distribution of environmental and social impacts of oil production and consumption. *Annual Review of Environment and Resources* 28:587-617. 10.1146/annurev.energy.28.050302.105617

Paprocki H, França D. 2014. Brazilian Trichoptera Checklist II. *Biodiversity Data Journal* 2: e1557:1-109. 10.3897/BDJ.2.e1557

Paprocki H, Holzenthal RW, Blahnik RJ. 2004. Checklist of the Trichoptera (Insecta) of Brazil I. *Biota Neotropica* 4:1-22.

Pes AM, Santos APM, Barcelos-Silva P, Camargos LM. 2014. Ordem Trichoptera. In: Hamada N, Nessimian JL, and Querino RB, eds. *Insetos Aquáticos na Amazônia Brasileira: Taxonomia, Biologia e Ecologia*. Manaus: Editora do INPA, 391-433.

Ríos-Touma B, Acosta R, Prat N. 2014. The Andean Biotic Index (ABI): revised tolerance to pollution values for macroinvertebrate families and index performance evaluation. *Revista Biología Tropivsl* 62 (suppl 2):249-273.

Ríos-Touma B, Holzenthal RW, Huisman J, Thomson R, Rázuri-Gonzales E. 2017. Diversity and distribution of the caddisflies (Insecta: Trichoptera) of Ecuador. *PeerJ* 5:e2851. 10.7717/peerj.2851

Ross HH. 1938. Descriptions of Nearctic caddis flies (Trichoptera) with special reference to the Illinois species. *Bulletin of the Illinois Natural History Survey* 21:101-183.

Santos APM, Nessimian JL. 2008. Five new species of *Cernotina* Ross (Trichoptera: Polycentropodidae) from Central Amazonia, Brazil. *Zootaxa* 1899:25-33.

Sierra R. 2000. Dynamics and patterns of deforestation in the western Amazon: the Napo deforestation front, 1986–1996. *Applied Geography* 20:1-16. http://dx.doi.org/10.1016/S0143-6228(99)00014-4

Sykora JL. 1998. New species of *Cernotina* Ross (Insecta: Trichoptera: Polycentropodidae) from the Amazon Basin in northeastern Peru and northern Brazil. *Annals of Carnegie Museum* 67:95-104.

Ulmer G. 1905. Zur Kenntniss aussereuropäischer Trichopteren. (Neue Trichoptern des Hamburger und Stettiner Museums und des Zoologischen Instituts in Halle, nebst Beschreibungen einiger Typen Kolenati's und Burmeister's.). *Stettiner Entomologische Zeitung* 66:1-119.

Viña A, Echavarria FR, Rundquist DC. 2004. Satellite change detection analysis of deforestation rates and patterns along the Colombia – Ecuador border. *AMBIO: A Journal of the Human*
Wichard W. 2007. Overview and descriptions of caddisflies (Insecta, Trichoptera) in Dominican amber (Miocene). *Stuttgarter Beiträge zur Naturkunde Serie B (Geologie und Paläontologie)* 366:1-51.
Figure Legends

Figure 1. Collecting localities, Tiputini Biodiversity Station, Ecuador. (A) small stream, Harpia trail, type locality for Cernotina waorani, new species. (B) Río Tiputini. (C) river slough, Numa trail, type locality for Cernotina tiputini, new species. (D) same, showing UV light collecting method.

Figure 2. Male genitalia of Cernotina tiputini, new species. (A) segment IX and X, lateral. (B) segment X and preanal appendages, dorsal. (C) segment IX and inferior appendages, ventral. (D) phallus, lateral. (E) phallus, dorsal. (F) mesoventral processes of preanal appendages, ventral.

Figure 3. Male genitalia of Cernotina waorani, new species. (A) segment IX and X, lateral. (B) segment X and preanal appendages, dorsal. (C) segment IX and inferior appendages, ventral. (D) phallus, lateral. (E) phallus, dorsal.
Figure 1

Figure 1. Collecting localities, Tiputini Biodiversity Station, Ecuador.

(A) small stream, Harpia trail, type locality for *Cernotina waorani*, new species. (B) Río Tiputini. (C) river slough, Numa trail, type locality for *Cernotina tiputini*, new species. (D) same, showing UV light collecting method.
Figure 2. Male genitalia of *Cernotina tiputini*, new species.

(A) segment IX and X, lateral. (B) segment X and preanal appendages, dorsal. (C) segment IX and inferior appendages, ventral. (D) phallus, lateral. (E) phallus, dorsal. (F) mesoventral processes of preanal appendages, ventral.
A: Dorsolateral process preanal appendage
B: Preanal appendage
C: Intermediate appendage
D: Inferior appendage
E: Phallothremal sclerite
Figure 3. Male genitalia of *Cernotina waorani*, new species.

(A) segment IX and X, lateral. (B) segment X and preanal appendages, dorsal. (C) segment IX and inferior appendages, ventral. (D) phallus, lateral. (E) phallus, dorsal.
