

Fourteen new species of *Oecetis* McLachlan, 1877 (Trichoptera: Leptoceridae) from the Neotropical region

Authors: Fabio B. Quinteiro¹ and Ralph W. Holzenthal²

Affiliation:

¹Laboratório de Biologia Comparada e Abelhas, Departamento de Biologia, Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto, Universidade de São Paulo, Av. Bandeirantes, 3900, Monte Alegre, Ribeirão Preto, São Paulo, 14040-900, Brazil

²Department of Entomology, University of Minnesota, 219 Hodson Hall, 1980 Folwell Avenue, St. Paul, Minnesota, 55108, U.S.A.

Corresponding author: Fabio B. Quinteiro (fabioquinteiro@gmail.com)

Abstract

Background. The caddisfly genus *Oecetis* currently contains 534 valid species. Its larval stages are found in freshwaters around the world. The adults can be distinguished from other Leptoceridae by the unbranched forewing M vein and the exceptionally long maxillary palps. In the Neotropical region, 55 species of *Oecetis* have been recorded and most of them can be placed in one of the six species groups known from this biogeographical region: the *avara*-, *falicia*-, *inconspicua*-, *punctata*-, *punctipennis*-, and *reticulata*-groups. More than 50% of the known diversity of Neotropical *Oecetis* has been described in the past 40 years. Here, we describe an additional 14 new species of *Oecetis* to further document the diversity of this genus in the Neotropical region.

Methods. The descriptions and illustrations presented here are based on male specimens. Specimens were collected with Malaise traps or ultraviolet light traps. They were preserved in alcohol or pinned as stated in material examined section. Specimens had their genitalia prepared in 10% lactic acid to better observe internal characters and illustrations were aided by the use of a microscope with drawing tube attached.

Results and Discussion. Eight of the new species presented here could not be reliably placed in one of the known species groups (*O. acuticlasper* n. sp., *O. flinti* n. sp., *O. carinata* n. sp., *O. cassicoleata* n. sp., *O. blahniki* n. sp., *O. gibbosa* n. sp., *O. licina* n. sp., and *O. pertica* n. sp.). The others are placed in the *punctata*-group (*O. bidigitata* n. sp., *O. quasipunctata* n. sp.), *reticulata*-group (*O. plenuspinosa* n. sp.), and *falicia*-group (*O. calori* n. sp., *O. hastapulla* n. sp.,

O. machaera n. sp.). Most of the diagnostic characters rely on structures of the inferior appendages and phallic apparatus, and the shape of tergum X.

Keywords

Caddisflies, Taxonomy, Aquatic insects, Morphology, Biodiversity

Introduction

Oecetis McLachlan, 1877, is a genus within the caddisfly family Leptoceridae (Insecta: Trichoptera) with 534 valid species. The species in the genus are usually collected along rivers and lakes, where they tend to be very abundant (Schmid, 1998). The genitalia are characterized by having segment IX usually short, the preanal appendages somewhat prominent and ovoid, and the inferior appendages single-segmented (Schmid, 1998). The adults can be distinguished from other caddisflies by their unique wing venation, with an unbranched forewing M vein (Quinteiro & Calor, 2015), as well as their exceptionally long maxillary palps (Schmid, 1998). Their color ranges from pale yellow to dark brown and their size is from 6–12 mm (Henriques-Oliveira et al., 2014). The forewing often has characteristic brown spots.

Chen (1993) provided a comprehensive treatment of *Oecetis* in his unpublished PhD dissertation. However, the genus has never undergone a thorough revision, since Chen's work was never published. Nevertheless, many authors produced works on more restricted groups of species from around the world (e.g. Malicky, 2005; Rueda-Martín et al., 2011; Lee et al., 2012; Blahnik & Holzenthal, 2014).

In the Neotropical region, specimens of *Oecetis* can be found in almost every freshwater environment, especially those with sandy substrate and slow running water. Fifty-five species of *Oecetis* have been recorded in the Neotropics (Holzenthal & Calor, 2017) and most of them can be placed in one of six species group (Neboiss, 1989): *avara*-, *punctata*-, *falicia*-, *inconspicua*-, *punctipennis*-, and *reticulata*-group.

The *avara*-group has the shape and structure of the inferior appendages somewhat mitten-like as its most diagnostic aspect (Blahnik & Holzenthal, 2014). Species from the *avara*-group are recorded from Canada to the north of South America (Blahnik & Holzenthal, 2014).

Comment [1]: All of the species groups refer to New World species, except *O. reticulata*. In Morse's checklist, this is considered a member of the *Oecetis* testacea group, which represents a much older name. Probably, *O. inconspicua* is also not the oldest available name for a species group, since similar species are almost worldwide in distribution, but it has been referred to in the literature to refer to a group of New World species.

1 The *punctata*-group species are restricted to the Neotropical region (Blahnik & Holzenthal,
2 2014) and have the inferior appendages somewhat quadrate, often with apical processes bearing
3 strong, thick setae.

4 The *falicia*-group is also endemic to the Neotropics and can be diagnosed by the dorsolateral
5 processes on segment IX and the membranous tergum IX of the male (Chen, 1993).

6 The *inconspicua*-group is diagnosed by its phallic apparatus rounded and wide, with a pinched
7 ventral projection and a helical phallic spine. This group was not properly addressed by Chen
8 (1993); even so it is often referred informally in the literature. Its species were treated as two
9 groups by Chen: *ochracea*- and *furva*-group. However, they both share the very similar phallic
10 apparatus shape and even an inferior appendage with rounded dorsal lobe and acuminate distal
11 lobe apex. Representatives of this group can be found in all biogeographic areas except the
12 Australasian and Oriental (Chen, 1993).

13 The *punctipennis*-group can be diagnosed by the forewing R_{1+2} vein divided very close to the tip
14 of the wing (Chen, 1993). This group has a trans-Antartic distribution (South America, Australia)
15 but the species in the Neotropical region have, as an additional diagnostic character, the phallic
16 apparatus, short, bent ventrally, and with a horseshoe-shaped phallotremal sclerite.

17 The *reticulata*-group is diagnosed as having a shield-like tergum VIII and a honeycomb
18 microstructure covering abdominal terga V–VIII (Neboiss, 1989), as in *O. reticulata* Kimmins.
19 Henriques-Oliveira *et al.* (2014) described *O. iara*, the only known species so far in the
20 Neotropics with the honeycomb texture on abdominal terga, but lacking the shield-like tergum
21 VIII. Since *O. iara* does not have the shield-like tergum VIII, it cannot be assigned properly to
22 the *reticulata*-group. However, it is probably a closely related species and only a phylogenetic
23 analysis could provide evidence for placement.

24 Significant contributions on the taxonomy of *Oecetis* in the Neotropical region were made in the
25 last 40 years by several authors (Flint, 1974; Bueno-Soria, 1981; Rueda-Martín *et al.*, 2011;
26 Blahnik & Holzenthal, 2014; Henriques-Oliveira *et al.*, 2014; Quinteiro & Calor, 2015). The
27 species proposed by those authors account for more than 50% of the currently known species in
28 the Neotropical region, but it is known that there is much more to do in caddisfly taxonomy in
29 the Neotropics (Holzenthal & Calor, 2017). Despite this increasing description of the Neotropical

1 fauna, much of the region's biodiversity likely still remains unknown. Even in museums there are
2 new species already deposited and labeled, waiting for decades to be described.

3 In an attempt to ~~document (or record)~~ the diversity of the Neotropical region, we present fourteen
4 new species of *Oecetis*, ~~based on morphological characters of the adult males~~.

Deleted: discover

Comment [2]: Probably also unnecessary

Deleted: described and illustrated

6 **Material and Methods**

7 The specimens were ~~primarily~~ collected ~~by use of~~ ultraviolet fluorescent light bulbs placed in
8 front of a white sheet, pan light traps (Calor & Mariano, 2012), and Malaise traps. Those
9 specimens collected on the white sheets are preserved dried and pinned. The remaining
10 specimens were preserved in 80% ethyl alcohol.

Deleted: primarily using

11 For a more accurate study of some ~~genitalia~~ characters, the specimens had their genitalia
12 removed and cleared in 85% lactic acid (Blahnik *et al.*, 2007) at 115°C for approximately 1 hour,
13 washed with distilled water, and stored in 0.2 mL vials with approximately 50 µL of glycerin in
14 the vial bottom.

Comment [3]: This is a noun, not an adjective.
Use genital or genitalic.

15 The specimens were examined and illustrated with the aid of a stereomicroscope with drawing
16 tube attached. Pencil sketches were rendered, scanned with a flat-bed scanner, and placed in
17 Adobe Illustrator CS5, where they were digitally inked. Species descriptions were made using
18 the DELTA editor (Dallwitz, *et al.*, 1999)

19 Terminology for wing venation and male morphology follows Quinteiro and Calor (2015). Type
20 specimens are deposited at the University of Minnesota Insect Collection, St. Paul, Minnesota,
21 USA (UMSP), National Museum of Natural History, Smithsonian Institution, Washington, DC,
22 USA (NMNH), Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil (MZSP),
23 Museo de Historia Natural Noel Kempff Mercado, Santa Cruz de la Sierra, Bolivia (UASC),
24 Colección Entomológica de la Universidad de Antioquia, Medellín, Colombia (CEUA), and
25 Museu de Zoologia da Universidade Federal da Bahia, Salvador, Brazil (UFBA), as indicated in
26 the material examined. Distribution for each species is given by country and state, province, or
27 department.

1 The electronic version of this article in Portable Document Format (PDF) will represent a
2 published work according to the International Commission on Zoological Nomenclature (ICZN),
3 and hence the new names contained in the electronic version are effectively published under that
4 Code from the electronic edition alone. This published work and the nomenclatural acts it
5 contains have been registered in ZooBank, the online registration system for the ICZN. The
6 ZooBank LSIDs (Life Science Identifiers) can be resolved and the associated information viewed
7 through any standard web browser by appending the LSID to the prefix <http://zoobank.org/>. The
8 LSID for this publication is: *urn:lsid:zoobank.org:pub:ED02CA58-B074-45A6-AAC7-*
9 *48FB48B97BA8*. The online version of this work is archived and available from the following
10 digital repositories: PeerJ, PubMed Central and CLOCKSS.

11

12 Taxonomy

13

14 *Oecetis acuticlasper* Quinteiro & Holzenthal, n. sp. *urn:lsid:zoobank.org:act:046E520D-07ED-*
15 *4892-BBDE-BE0654C5BE95*

16 Fig. 1

17 **Diagnosis.** This species does not have features to place it in any known species group. However,
18 it can be distinguished from all other *Oecetis* by the slender dorsal lobe of tergum X, which is
19 almost as long as the preanal appendage and **laterally** divided at **its** apex; and by the shape of the
20 inferior appendage, with its enlarged, somewhat triangular ventral lobe, **discrete**, also triangular
21 dorsal lobe, and a distal lobe, **which is distinctly constricted and narrowed in** the apical third of
22 **the appendage**.

23 This species is morphologically similar to *O. maspeluda* Botosaneanu, 1977. Both of
24 them **have** a dorsoventrally divided tergum X, short phallic apparatus, and a somewhat triangular
25 inferior appendage. However, the dorsal lobe of tergum X in this new species is much shorter
26 than in *O. maspeluda* and **laterally** divided at the apex. Also, the new species has the ventral
27 margin of inferior appendage slightly concave **in lateral view**, giving an almost 90° angle
28 between the ventral and distal lobes, while **in** *O. maspeluda* **this margin is** smooth and almost
29 straight. Additionally, the constriction present at the last third of the inferior appendage's length
30 in the new species is unique in *Oecetis*.

31 **Description. Male:** forewing length 6.5 mm (n = 1).

32 **Head.** Color yellowish brown (specimens in alcohol); maxillary palps pale yellow, 5-
33 segmented, palpomeres subequal, densely covered **with** setae; labial palps yellow, 3-segmented.

Deleted: laterally

Deleted: the

Deleted: a

Deleted: with

Deleted: a

Deleted: constriction

Deleted: at

Deleted: its length

Deleted: share

Deleted: laterally

Deleted: has

Deleted: by

1 **Thorax.** Pterothorax yellowish brown; forewing yellow; dark bands over cord absent,
2 dark spots absent (Fig. 1A); fork I petiolate, fork V **rooted**; sectoral crossvein (s) not aligned with
3 *r-m* (Fig. 1A). Hind wing with forks I and V present (Fig. 1B). Legs yellowish brown, mid leg
4 with longitudinal row of spines on tibia and tarsal segments. Tibial spur formula 0,2,2.

5 **Abdomen.** Segment IX annular, short, bearing pair of lateral processes, slender, straight,
6 tapering posteriorly, shorter than phallic apparatus; acrotergite absent (Fig. 1C–D). Preanal
7 appendage short, digitate, bearing apical setae (Figs. 1C–D). Tergum X, in lateral view, divided
8 into dorsal and ventral lobes (Fig. 1C); dorsal lobe modified into single cylindrical structure,
9 with apex slightly divided, longer than ventral lobe, and with short apical setae (Figs. 1C–D);
10 ventral lobe divided medially, with V-shaped incision, broad basally, digitate apically (Figs. 1C–
11 D). Inferior appendage 1-segmented, setose; dorsal lobe acuminate, discrete (Figs 1C, 1E);
12 ventral lobe protruding, triangular, apex acute; distal lobe narrow, tapering posteriorly, apex
13 acute, with distinct constriction at distal third (Figs 1C, 1E); short, stout, spine-like setae present
14 on inner surface (Fig. 1E). Phallic apparatus bilaterally symmetrical, cylindrical, short, strongly
15 curved ventrally, with globular endotheca (Figs 1F–G). Phallic spine and phallotremal sclerite
16 absent (Figs 1F–G).

17 **Distribution.** Brazil (Minas Gerais, Rio de Janeiro).

18 **Material examined.** Holotype: (male): BRAZIL, Minas Gerais, Presidente Olegário, Faz.
19 Gigante, Armadilha Luminosa, 18°31'S, 46°18'W, 1000 m, 02-05.iv.2007, Amorim, Ribeiro,
20 Capellari, Borkent (MZSP). Paratype: BRAZIL, Rio de Janeiro, Nova Friburgo, mun. water
21 supply, 950 m, 24 April 1977, C.M. & O.S. Flint Jr. – 1 male (NMNH, identified as *Oecetis* n.
22 sp. E in loan to UMSP).

23 **Etymology.** From Latin *acutus* = pointed, in reference to the pointed tip of the inferior
24 appendage, or clasper.

25

26 *Oecetis flinti* Quinteiro & Holzenthal, n. sp. urn:lsid:zoobank.org:act:E760A8EB-7908-427C-
27 AC19-D11291E15FE8

28 Fig. 2

29 **Diagnosis.** This species does not fit within one of the recognized species groups. However, it can
30 be diagnosed from other *Oecetis* by its enlarged tergum IX, ovoid preanal appendage, and by the
31 inferior appendage, which has a basal constriction and lacks dorsal and ventral lobes.

32 Important adjunct characters, such as the presence of dark spots on the forewing and the position
33 of the main forks, are easily observable. This new species is similar to *O. pratti* Denning, 1947,
34 since both have tergum X divided dorsoventrally, with a deflexed dorsal lobe, and an inferior
35 appendage without dorsal and ventral lobes. However, the inferior appendage of this new species
36 has a distinct constriction at its base, while *O. pratti* has the inferior appendage uniformly wide

Comment [4]: ?

Deleted: short

Deleted: acuminate

Deleted: with

Comment [5]: date should follow locality

Deleted: 02-05.iv.2007,

Deleted: 950 m,

Deleted: ;

Deleted: named

Deleted: as

Deleted: the

Deleted: without dorsal and ventral lobes and with

Deleted: However, i

Deleted: the

1 along its entire length. *Oecetis flinti* n. sp. has its preanal appendage short and ovoid, somewhat
2 lobulate in lateral view, while in *O. pratti* they are long and digitate. The most evident
3 characteristics of this new species that differ from *O. pratti* are the presence of a phallic spine in
4 the phallic apparatus and the elongate tergum IX, which is much longer than sternum IX.

Deleted: in

5 **Description. Male:** forewing length 4.5 mm (n= 1).

6 **Head.** Color yellowish brown (specimens in alcohol); maxillary palps pale yellow; labial
7 palps pale yellow, 3-segmented.

8 **Thorax.** Pterothorax yellowish brown; forewing yellow; dark bands over cord present
9 (Fig. 2A); dark spots on M-Cu fork, on basis of Rs, on basis of Cu₁ and Cu₂, on junction of anal
10 veins (Fig. 2A); forks I and V rooted; sectoral crossvein (s) not aligned with *r-m* (Fig. 2A). Hind
11 wing with forks I and V present (Fig. 2B). Legs pale yellow, mid leg with longitudinal row of
12 spines on tibia and tarsal segments. Tibial spur formula 1,2,2; apical spur of fore tibia very small.

13 **Abdomen.** Segment IX uneven, tergum IX longer than sternum IX; acrotergite absent
14 (Fig. 2C). Preanal appendage slightly wider than long (ovoid), bearing apical setae (Figs. 2C–D).
15 Tergum X, in lateral view, not divided into dorsal and ventral lobes, undivided medially,
16 composed of single elongated lobe, broad basally, tapering apically, apex acuminate (Figs. 2C–
17 D). Inferior appendage 1-segmented, setose, broad basally; ventral and dorsal lobes absent (Figs.
18 2C–E); distal lobe narrow, tapering posteriorly, apex acute, discrete constriction close to base,
19 slightly bent inward (Figs. 2C–E); short stout spine-like setae absent (Figs. 2C–E). Phallic
20 apparatus slightly bilaterally asymmetrical, curved downward, cylindrical, elongate, rounded on
21 base, tapering apically, apex acute (Figs. 2F–G). Phallotremal sclerite absent (Figs. 2F–G).

Deleted: dorsoventrally

Deleted: larger

Deleted: ,

Deleted: bilaterally

Deleted: d

Comment [6]: My idea of the word acuminate is something that is elongate, tapered, and drawn out, rather than just acute (coming to a angle less than 90°). Check definition and use of the word in other descriptions.

Deleted: acuminate

22 **Distribution.** Brazil (Tocantins).

23 **Material examined. Holotype (male):** BRAZIL, Tocantins, Mateiros, P.E. Jalapão, Cachoeira
24 da Formiga, 10°20'58"S, 46°28'23.1"W, 461m, 17.x.2008, luz, Calor, Mariano, Mateus
25 (MZSP). **Paratypes:** same data as holotype – 2 males (UFBA).

26 **Taxonomic comment:** The available specimens had damaged wings so it was not possible to
27 illustrate an entire wing.

28 **Etymology.** The specific epithet honors our colleague Dr. Oliver S. Flint for his contributions to
29 caddisfly taxonomy and his extensive studies in the Neotropical region.

30

31 *Oecetis carinata* Quinteiro & Holzenthal, n. sp. urn:lsid:zoobank.org:act:404BC99D-A18C-
32 4322-892F-E824DA3B66CF

33 Fig. 3

34 **Diagnosis.** This new species does not have characteristics that allow placement in a known
35 species group. However, it can be differentiated from other *Oecetis* by its laterally deeply

1 divided tergum X, forming two slender terete lobes, and its inferior appendage with the ventral
2 lobe quadrate and greatly enlarged, and its distal lobe rounded and very short.

3 This new species is very similar to *O. inflata* Flint, 1974, since they both share a deeply
4 divided tergum X, forming two slender and terete processes. ~~Additionally, they resemble each~~
5 ~~other in that~~ the preanal appendages are short and digitate, the phallic apparatus is short and
6 strongly curved ventrally, and the forewing venation is almost identical. However, the new
7 species has the ventral lobe of the inferior appendage quadrate and greatly enlarged in relation to
8 the distal lobe. *Oecetis inflata* has the ventral lobe of the inferior appendage ~~somewhat~~ quadrate,
9 but the ventral margin is very smooth ~~and~~ not as angled, as is the new species. Additionally, the
10 distal lobe of the inferior appendage in *Oecetis carinata* is reduced compared ~~to~~ *O. inflata*.

11 **Description. Male:** forewing length 6.5 mm (n= 1).

12 **Head.** Color yellowish brown (specimens in alcohol); maxillary palps yellowish brown,
13 5-segmented, palpomeres subequal; labial palps pale yellow, 3-segmented.

14 **Thorax.** Pterothorax yellow; forewing yellowish brown; dark bands over cord absent
15 (Fig. 3A); dark spots absent; forks I and V rooted (Fig. 3A); sectoral crossvein (s) aligned with *r*-
16 *m* (Fig. 3A). Hind wing with forks I and V present (Fig. 3B). Legs yellowish brown, mid leg
17 with longitudinal row of spines over distal half of femur, all along tibia and first tarsal segment.
18 Tibial spur formula 0,2,2.

19 **Abdomen.** Segment IX annular, short; acrotergite absent (Fig. 3C). Preanal appendage
20 short, digitate, bearing apical setae (Figs. 3C–D). Tergum X, in lateral view, divided into dorsal
21 and ventral lobes; dorsal lobe divided medially, forming two ~~slender~~ terete lobes, ~~apices~~
22 acuminate; ~~ventral lobe divided near posterior region by broad incision, apex rounded (Figs. 3C–~~
23 ~~D).~~ Inferior appendage 1-segmented, setose; dorsal lobe absent (Figs. 3C, 3E); ventral lobe
24 quadrate, keeled, enlarged, margin angular (Figs. 3C, 3E); distal lobe a ~~broad~~, smoothly rounded
25 projection; short and stout, spine-like setae absent (Figs. 3C, 3E). Phallic apparatus bilaterally
26 symmetrical, cylindrical, short, strongly curved ventrally (Figs. 3F–G). Phallic spine and
27 phallotremal sclerite absent (Figs. 3F–G).

28 **Distribution.** Brazil (Bahia, São Paulo).

29 **Material examined. Holotype (male):** BRAZIL, São Paulo, São Carlos, Córrego Fazzari,
30 20.xii.2007, malaise trap (MZSP). **Paratypes:** BRAZIL, Bahia, Mucugê, Sempre Viva, Córrego
31 do Boiadeiro, 10.v.2015, malaise, Dias & Campos – 2 males, 2 females (UFBA).

32 **Etymology.** From Latin *carina* = keel, referring to the keel-like ventral lobe of the inferior
33 appendage in ~~lateral view~~.

34

35 *Oecetis cassicoleata* Quinteiro & Holzenthal, n. sp. urn:lsid:zoobank.org:act:140E12D6-B022-
36 4128-9AB9-BF148264378F

Deleted: Likewise

Deleted: in both species.

Deleted: slightly

Deleted: ,

Deleted: ,

Deleted: with

Deleted: , slender,

Deleted: ex

Comment [7]: It isn't clear to me, from the illustration, what this refers to

Deleted: , broad

Comment [8]: ? A keel is a narrow ridge. It is possible that this may be evident in ventral view, but not really in lateral view.

1 Fig. 4

2 **Diagnosis.** This is another new species that cannot be placed in a named species group.

3 However, it can be diagnosed from the other species in *Oecetis* by its inferior appendage, **which**
4 **has** the distal lobe curved, forming an obtuse angle along its length, and **by** the **enlarged**
5 phallobase, **with** a lamellate process distally over the endotheca.

6 This new species has no similar species **in** the Neotropical region. Some species, such as
7 *O. testacea* (Curtis, 1834) or *O. cinerascens* (Hagen, 1861), share **an** enlarged phallic apparatus,
8 but both of them have phallic spines, not present in this **species**. Also, the inferior appendage **of**
9 **the new species** is very distinct, having a **broad, rounded dorsal lobe**, which becomes forward-
10 pointing due to the concavity of the distal lobe, **which** forms an obtuse angle. Additionally, the
11 presence of a flap-like projection on the dorsodistal margin of the phallobase is very
12 conspicuous.

13 **Description. Male:** forewing length 5.5 mm (n= 1).

14 **Head.** Color yellowish brown (specimens in alcohol). Scape stout; pedicel short;
15 maxillary palps pale yellow, 5-segmented; labial palps pale yellow, 3-segmented.

16 **Thorax.** Pterothorax yellowish brown; forewing yellow; dark bands over cord absent
17 (Fig. 4A); dark spots on forks, junctions and end of veins; fork I rooted, fork V sessile; sectoral
18 crossvein (s) not aligned with *r-m* (Fig. 4A). Hind wing with forks I and V present (Fig. 4B).
19 Legs yellowish brown. Tibial spur formula 0,2,2.

20 **Abdomen.** Segment IX annular, short; acrotergite absent (Figs. 4C–D). Preanal
21 appendage short, rounded, bearing apical setae (Figs. 4C–D). Tergum X, in lateral view, **not**
22 **divided into** dorsal and ventral lobes, composed of single elongate **lobe**, undivided medially,
23 broad basally, tapering apically, apex acuminate (Figs. 4C–D). Inferior appendage 1-segmented,
24 setose; **dorsal lobe broad, rounded** (Figs. 4C–D); ventral lobe absent (Figs. 4C–D); distal lobe
25 narrow, cylindrical, bent posteriorly forming obtuse angle with dorsal lobe, apex rounded; short,
26 stout spine-like setae absent (Figs. 4C–D). Phallic apparatus slightly **bilaterally** asymmetrical,
27 curved downward, cylindrical, elongate, broad basally, tapering distally, apex truncate, bearing
28 flap-like projection distally on dorsal surface (Figs. 4E–F). Phallic spine and phallotremal
29 sclerite absent (Figs. 4E–F).

30 **Distribution.** Brazil (Bahia).

31 **Material examined. Holotype (male):** BRAZIL, Bahia, Barreiras, Rio de Janeiro, cach. Acaba
32 Vidas, 11°53'67"S, 45°36'09"W, alt. 722m, 14.x.2008, light trap, Calor, Mariano, Mateus
33 (MZSP).

34 **Etymology.** From Latin *cassis* = cap and *coleatus* = pertaining to the penis, referring to the
35 hood-like projection on the dorsal surface of phallic apparatus covering the endotheca.

36

Deleted: with

Deleted: enlarged

Deleted: on

Deleted: the

Comment [9]: And both also have a modified, reticulate tergum VIII.

Comment [10]: ?

Deleted: that

Deleted: d

Comment [11]: The terms dorsal, ventral, and apical lobes are confusing at best and in this case I really don't know what they refer to.

Deleted: bilaterally

Deleted: d

1 *Oecetis bidigitata* Quinteiro & Holzenthal, n. sp. urn:lsid:zoobank.org:act:7A089FD8-F3F1-
2 4339-898F-98DE402E3C81

3 Fig. 5

4 **Diagnosis.** This new species can be distinguished from the others in the *punctata* group by its
5 stirrup-like phallotremal sclerite and by its inferior appendage, with a very short ventral lobe and
6 two digitate projections bearing strong and thick setae on the distal lobe.

Deleted: the

7 This species is very similar to *O. knutsoni* Flint, 1981 and *O. quasipunctata* n. sp. The
8 three all belong to the *punctata* group. However, this species, different from *O. knutsoni* and *O.*
9 *quasipunctata* n. sp., has a distinct stirrup-like phallotremal sclerite, not present in the other two
10 species. Additionally, *O. bidigitata* n. sp. has only two digitate projections bearing strong and
11 thick setae on the apex of the distal lobe of inferior appendage, while *O. knutsoni* and *O.*
12 *quasipunctata* n. sp. have four projections.

Deleted: of them

Deleted: ly

Deleted: than

13 **Description. Male:** forewing length 7.5–8.5 mm (n= 7).

14 **Head.** Color pale yellow (pinned specimens). Antennae 3 times length of forewing; scape
15 stout, elongate; pedicel enlarged in width, subequal to other flagellomeres in length, shorter than
16 scape. Maxillary palps yellowish brown, 5-segmented, palpomeres subequal in length and width,
17 setose. Labial palps pale yellow, 3-segmented.

18 **Thorax.** Pterothorax yellowish brown; forewing yellow; dark bands over cord absent
19 (Fig. 5A); dark spots on forks, junctions and end of veins; fork I rooted, fork V sessile (Fig. 5A);
20 sectoral crossvein (s) aligned with *r-m* (Fig. 5A). Hind wing with forks I and V present (Fig. 5B).
21 Legs yellow, mid leg with longitudinal row of spines on tibia and tarsal segments. Tibial spur
22 formula 1,2,2.

23 **Abdomen.** Segment IX annular, short; two acrotergites present dorsolaterally (Figs. 5C–
24 D). Preanal appendage very short, digitate, bearing apical setae (Figs. 5C–D). Tergum X, in
25 lateral view, not divided into dorsal and ventral lobes, divided medially by V-shape incision, in
26 dorsal view broad basally, acute apically (Figs. 5C–D). Inferior appendage 1-segmented, broad
27 basally, setose; dorsal lobe absent (Figs. 5C, 5E); ventral lobe quadrate, short (Figs. 5C, 5E);
28 distal lobe narrow, short, two digitate projections on top, inner process curved inward (Figs. 5C,
29 5E); two short, stout spine-like apical setae present (Figs. 5C, 5E). Phallic apparatus bilaterally
30 symmetrical, cylindrical, elongate, membranous apically, curved ventrally (Figs. 5F–H); in
31 caudal view, apex short, cylindrical, phallobase narrowing distally (Fig. 5G). Phallic spine absent
32 (Figs. 5F–H). Phallotremal sclerite U-shaped, with V-shaped incision distally (Fig. 5H).

Deleted: d

Comment [12]: ?

33 **Distribution.** Bolivia (La Paz).

34 **Material examined. Holotype (male):** BOLÍVIA, Dept. La Paz, San Buenaventura-Ixiamas
35 rd., Arroyo Maije at Puente Maije, 14°20.908'S, 67°40.530'W, 278 m, 14.vii.2003, Robertson
36 and Blahnik (UASC, on loan to UMSP). **Paratypes:** same data as holotype – 1 female (UMSP);
37 **BOLÍVIA, Dept. La Paz,** ANMI Madidi, Chalalan Ecological, Rio Tuichi at entrance to lodge &

1 trib., 14°25.017'S, 67°54.378'W, 300 m, 27.vii.2003, Robertson and Blahnik – 3 males (UMSP);
2 same data except Raya Mayo river at Anta trail, 14°28.134'S, 67°55.761'W, 264 m, 26.vii.2003,
3 Robertson and Blahnik – 3 males (NMNH).

4 **Etymology.** From Latin prefix *bi* = two and *digitus* = finger, referring to the two digitate
5 projections on apex of the inferior appendages.

6

7 *Oecetis quasipunctata* Quinteiro & Holzenthal, n. sp. urn:lsid:zoobank.org:act:B7E84B92-
8 234B-46F1-BDF0-9D74D1CA9AB9

9 Fig. 6

10 **Diagnosis.** This new species can be diagnosed from the others in the *punctata* group by its
11 inferior appendage, with the ventral lobe very reduced and forming an acute angle with the distal
12 lobe, and also by the nearly straight distal lobe.

13 This new species is very similar to *O. knutsoni*, *O. bidigitata* n. sp., and *O. punctata*
14 (Navás, 1924). *Oecetis bidigitata* has only two digitate projections apically on the distal lobe of
15 the inferior appendage, while *O. knutsoni*, *O. punctata*, and *O. quasipunctata* n. sp. have four
16 projections. *Oecetis punctata* has a concave inner surface of the inferior appendage (best seen in
17 ventral view), while *O. knutsoni*, *O. bidigitata* n. sp., and *O. quasipunctata* n. sp. have the inner
18 surface straight (Fig. ?). The main differences between *O. knutsoni* and this new species are in
19 the inferior appendage. *Oecetis knutsoni* has an inferior appendage with a long ventral lobe,
20 forming a straight angle with the distal lobe, while this new species has a very reduced ventral
21 lobe, forming an acute angle with the distal lobe. Additionally, *O. knutsoni* has the apex of the
22 distal lobe slightly bent distally, while the new species has it nearly straight.

23 **Description. Male:** forewing length 9.1–10.3 mm (n= 21).

24 **Head.** Color yellowish brown (pinned specimens). Antennae 3 times length of forewing;
25 scape stout, elongate; pedicel enlarged in width, subequal to other flagellomeres in length,
26 shorter than scape. Maxillary palps yellow, 5-segmented, palpomeres subequal in length and
27 width. Labial palps yellow, 3-segmented.

28 **Thorax.** Pterothorax yellow; forewing yellow; dark bands over cord absent (Fig. 6A);
29 dark spots on forks, junctions and end of veins; forks I and V rooted (Fig. 6A); sectoral crossvein
30 (*s*) aligned with *r-m* (Fig. 6A). Hind wing with forks I and V present (Fig. 6B). Legs pale yellow,
31 mid leg with longitudinal row of spines on tibia and tarsal segments. Tibial spur formula 1,2,2.

32 **Abdomen.** Segment IX annular, very short; two acrotergites present dorsolaterally (Fig.
33 6C). Preanal appendage short, digitate, bearing apical setae (Figs. 6C–D). Tergum X, in lateral
34 view, not divided into dorsal and ventral lobes, composed of single elongate lobe, broad basally,
35 divided mesally by shallow depression (Figs. 6C–D). Inferior appendage 1-segmented, broad
36 basally, setose (Figs. 6C, 6E); dorsal lobe absent; ventral lobe quadrate, very short (Figs. 6C,
37 6E); distal lobe narrow, straight, short, with 4 digitate projections on top, inner process curved

Deleted: as well as

Deleted: the

Deleted: nearly straight

Deleted: better

Deleted: it

Comment [13]: posteriorly? Distal is a location and not a direction

Deleted: d

1 inward; short and stout spine-like apical setae present (Figs. 6C, 6E). Phallic apparatus bilaterally
2 symmetrical, curved downward, cylindrical, short (Figs. 6F–H); in caudal view, apex short,
3 cylindrical, phallobase tapering distally, with slightly "pinched" tip (Fig. 6G). Phallic spine and
4 phallotremal sclerite absent (Figs. 6F–H).

5 **Distribution.** Colombia (Cauca, Valle, Quindío).

6 **Material examined. Holotype (male): COLOMBIA, Cauca,** Municipio de Inzá, Quebrada San
7 Andrés, 1km S del centro de San Andrés de Pisimbalá, 02°34'36"N, 76°02'11"W, 1730 m,
8 20.xii.1997, Fdo. Muñoz-Q. et al. (CEUA, on loan to UMSP); **Paratypes:** same data as holotype
9 – 14 males (UMSP); **COLOMBIA, Cauca,** Municipio de Inzá, 500 m W Restaurante "La
10 Portada", San Andrés de Pisimbalá, 02°34'56"N, 76°02'36"W, 1750 m, 21.xii.1997, Fdo.
11 Muñoz-Q. et al. – 16 males (UMSP); Municipio de Belalcazar, Quebrada Tálaga, ~14km N Páez
12 (Belalcazar), 02°42'24"N, 76°01'05"W, 1680 m, 22.xii.1997, Fdo. Muñoz-Q. et al. – 12 males
13 (UMSP); Río Cabuyal Pescador, ~20km N Piendamó (Carretera Panamericana), 02°48'82"N,
14 76°32'58"W, 1400 m, 28.xii.1997, Fdo. Muñoz-Q. et al. – 4 males (CEUA, on loan to UMSP);
15 **Valle,** Municipio El Cerrito, Río Cerrito, 7.1km E Hacienda "El Paraíso", 03°38'59"N,
16 76°09'10"W, 1950 m, 03.xii.1997, Fdo. Muñoz-Q. et al. – 4 males, 2 females (UFBA);
17 Municipio de Cali, Río Pichindé, Peñas Blancas, ~24km SW Cali, 03°25'06"N, 76°39'04"W,
18 2000 m, 18.xii.1997, Fdo. Muñoz-Q. et al. – 12 males, 2 females (UMSP); **Quindío,** Río
19 Quindío, Retén "La Playa", ~2km NE Salento, 04°38'25"N, 75°33'24"W, 1890 m, 02.i.1998,
20 Fdo. Muñoz-Q. et al. – 2 males, 2 females (NMNH).

21 **Etymology.** From Latin *quasi* = appearing as if, similar. This is a reference to the resemblance
22 of this new species with *Oecetis punctata* (Navás, 1924).

23

24 *Oecetis calori* Quinteiro & Holzenthal, n. sp. urn:lsid:zoobank.org:act:58B08D3F-32E2-4408-
25 9D62-24A46FAB2B5F

26 Fig. 7

27 **Diagnosis.** This new species can be diagnosed from the others in the *falicia* group by its three
28 phallic spines and by the inferior appendage with a small, discrete, quadrate dorsal lobe with a
29 truncate apex, and a triangular, protruding, and very angular ventral lobe.

30 This new species is similar to *O. fibra* Chen & Morse in Quinteiro & Calor, 2012 and to
31 *O. acarati* Angrisano & Sganga, 2009; all of them share a segment IX with slender, ventrally
32 directed dorsolateral processes with no ramifications, and a terete, apically rounded distal lobe
33 on the inferior appendage. However, none of the described species possess three spines in the
34 phallic apparatus as in the new species. Additionally, the inferior appendage of *O. fibra* has a
35 quadrate ventral lobe with smooth margins, while in *O. acarati* and the new species this lobe is
36 triangular. *Oecetis acarati* has the ventral lobe of the inferior appendage with a smooth margin

Comment [14]: I know of no comparative illustration for this species. It would probably be good to illustrate *O. punctata* for comparative purposes, since the verbal comparison is hardly sufficient.

Comment [15]: It would not be clear to everyone (including me) that the small basal projection constitutes a dorsal lobe. It would be helpful to label it.

Deleted: because

Deleted: of

Deleted: ventral lobe

1 and no dorsal lobe, while *O. calori*, n. sp. has a discrete quadrate dorsal lobe and a triangular
2 flattened ventral lobe.

3 **Description. Male:** forewing length 7.3–7.6 mm (n= 3).

4 **Head.** Color yellowish brown (pinned specimens). Antennae 3 times length of forewing;
5 scape stout, elongate; pedicel enlarged in width, subequal to other flagellomeres in length,
6 shorter than scape. Maxillary palps yellow, 5-segmented. Labial palps yellow, 3-segmented.

7 **Thorax.** Pterothorax yellow; forewing yellowish brown; dark bands over cord absent
8 (Fig. 7A); dark spots absent; forks I and V rooted (Fig. 7A); sectoral crossvein (*s*) not aligned
9 with *r-m* (Fig. 7A). Hind wing with forks I and V present (Fig. 7B). Legs pale yellow, mid leg
10 with longitudinal row of spines on tibia and tarsal segments. Tibial spur formula 1,2,2.

11 **Abdomen.** Segment IX annular, short, bearing pair of dorsolateral processes; ~~processes~~
12 slender, bent ventrad, cylindrical, tapering posteriorly, same length as phallic apparatus;
13 acrotergite absent (Figs. 7C–D). Preanal appendage long, digitate, bearing apical setae (Figs.
14 7C–D). Tergum X, in lateral view, divided into dorsal and ventral lobes; dorsal lobe modified
15 into single cylindrical structure, apex digitate, same length as ventral lobe, with short apical setae
16 (Figs. 7C–D); ventral lobe deeply divided laterally, forming two cylindrical lobules, apices
17 rounded (Figs. 7C–D). Inferior appendage 1-segmented, broad at base, setose; dorsal lobe in
18 lateral view quadrate, discrete (Figs. 7C, 7E); ventral lobe, in lateral view, quadrate (Figs. 7C,
19 7E); distal lobe narrow, tapering posteriorly, apex rounded (Figs. 7C, 7E); short, stout spine-like
20 setae present on inner surface (Fig. 7E). Phallic apparatus bilaterally symmetrical, curved
21 downward, cylindrical, elongate, membranous apically (Figs. 7F–H); apex elongate, in caudal
22 view, (Fig. 7G). Three phallic spines present, curved downward (Fig. 7F–G). One phallotremal
23 sclerite present, sickle-shaped (Figs. 7G–H).

24 **Distribution.** Brazil (Minas Gerais).

25 **Material examined. Holotype (male):** BRAZIL, Minas Gerais, Aldeia da Cachoeira das
26 Pedras, 20°06.824'S, 44°01.412'W, 925 m, 28-29.ix.2000, Paprocki and Braga (MZSP).

27 **Paratypes:** same data as holotype – 1 female (UMSP); **Brazil, Minas Gerais,** Estação
28 Ecológica de Peti, Córrego Brucutu, 19°52.995'S, 43°22.452'W, 29.ix.1998, Paprocki – 2 males,
29 1 female (UMSP).

30 **Etymology.** The specific epithet honors our colleague Adolfo R. Calor for his contributions to
31 caddisfly taxonomy and systematics, especially of the Brazilian fauna.

32

33 *Oecetis hastapulla* Quinteiro & Holzenthal, n. sp. urn:lsid:zoobank.org:act:B43E4DCE-3579-
34 4BDD-B803-B32151AB0327

35 Fig. 8

Deleted: ,

Comment [16]: This is not apparent to me from the illustration

Deleted: d

Deleted: caudal view

Deleted: d

Comment [17]: I am not sure that this very accurately describes the shape.

1 **Diagnosis.** This new species can be discriminated from the others in the *falcia* group by the very
2 elongate dorsal lobe of tergum X, with its slightly clavate apex, the divided apex of the inferior
3 appendage, and by the elongate, asymmetrical, dorsolateral processes on segment IX.

4 This new species is very similar to *O. prolongata* Flint, 1981, since both of them have an
5 elongate and terete dorsal lobe of tergum X, an inferior appendage with the apex divided, and the
6 dorsolateral processes of segment IX asymmetrical. However, this new species has the dorsal
7 lobe of tergum X slightly clavate, while *O. prolongata* has it uniformly wide along its entire
8 length. Also, *Oecetis hastapulla* n. sp. has the dorsolateral processes of segment IX longer than
9 those of *O. prolongata* and the process on the right side of the body is bent posteriorly, while
10 those of *O. prolongata* are bent ventrally.

11 **Description. Male:** forewing length 6.5 mm (n= 2).

12 **Head.** Color yellowish brown (pinned specimens). Antennae 2.5 times length of
13 forewing; scape stout, elongate; pedicel enlarged in width, subequal to other flagellomeres in
14 length, shorter than scape. Maxillary palps yellow, 5-segmented, setose. Labial palps pale
15 yellow, 3-segmented.

16 **Thorax.** Pterothorax yellowish brown; forewing yellow; dark bands over cord absent
17 (Fig. 8A); dark spots absent (Fig. 8A); forks I and V rooted; sectoral crossvein (s) not aligned
18 with *r-m* (Fig. 8A). Hind wing with forks I and V present (Fig. 8B). Legs yellow, mid leg with
19 longitudinal row of spines on tibia and tarsal segments. Tibial spur formula 0,2,2.

20 **Abdomen.** Segment IX annular, short, bearing pair of dorsolateral processes, slender,
21 bent ventrad, cylindrical, tapering posteriorly, not bilaterally symmetrical, with dark tips, tip of
22 right process bent 90 degrees distally, same length as phallic apparatus; acrotergite absent (Figs.
23 8C–D). Preanal appendage long, digitate, bearing apical setae (Figs. 8C–D). Tergum X, in lateral
24 view, divided into dorsal and ventral lobes; dorsal lobe modified into single cylindrical structure,
25 apex clavate, longer than ventral lobe, with short apical setae (Figs. 8C–D); ventral lobe deeply
26 divided laterally, forming two cylindrical lobules, apex acuminate, tips dark (Figs. 8C–D).
27 Inferior appendage 1-segmented, broad basally, setose (Fig. 8C, 8E); dorsal and ventral lobes
28 absent (Fig. 8C); distal lobe narrow, tapering posteriorly, with V-shaped incision on apex (Fig.
29 8C, 8E); short, stout spine-like setae absent (Fig. 8C, 8E). Phallic apparatus bilaterally
30 symmetrical, curved downward, cylindrical, elongate, membranous apically (Figs. 8F–H); apex
31 elongate in caudal view, phallobase quadrate, endotheca cylindrical (Fig. 8G). Phallic spine and
32 phallotremal sclerite absent (Figs. 8F–H).

33 **Distribution.** Costa Rica (Guanacaste, Limón).

34 **Material examined. Holotype (male):** COSTA RICA, Guanacaste, Parque Nacional
35 Guanacaste, ca. 0.7km N Est. Maritza, 10.96°N, 85.50°W, 550 m, 31.viii.1990, Huisman and
36 Quesada (UMSP); **Paratype: COSTA RICA, Limón,** Parque Nacional Braulio Carrillo,
37 Quebrada González, 10.160°N, 83.939°W, 480 m, 12-14.v.1990, Holzenthal and Blahnik – 1
38 male (UMSP).

Comment [18]: Again, I am not sure what this refers to. The definition of a dorsal lobe seems obscure to me.

Deleted: with the apex divided

Comment [19]: ?

Deleted: side

Deleted: tip

Deleted: acuminate

Deleted: dark

Comment [20]: I agree; does not correspond to terminology in diagnosis

Deleted: d

Deleted: in caudal view,

Comment [21]: ? cylindrical or tubular?

Deleted: d

Comment [22]: Note to R. Holzenthal: include specimen from Panama from Brian Armitage?

1 **Etymology.** From Latin *hasta* = spear, *pullus* = dark-colored, blackish. This is a reference to the
2 sclerotized tips of the dorsolateral processes and tergum X.

3

4 *Oecetis plenuspinnosa* Quinteiro & Holzenthal, n. sp. urn:lsid:zoobank.org:act:9C9C4C21-B3F3-
5 454C-B5B3-A1D9709ABBCF

6 Fig. 9

7 **Diagnosis.** This new species can be placed close to those of the *reticulata*-group, as defined by
8 (Neboiss, 1989), *because of* *Oecetis plenuspinnosa* can be distinguished from the other
9 species of *Oecetis* by the shape of the inferior appendage, which lacks dorsal and ventral lobes,
10 by the ventral lobe of tergum X₂ with two lateral, posteriorly pointing, digitate projections, and
11 by the distinctly clavate dorsal lobe of tergum X. Additionally, the phallic apparatus has ten short
12 spines, distributed symmetrically in two groups of five.

13 In the Neotropical region the only similar species, described to date, is *O. iara* Henriques-
14 Oliveira, et al., 2014. *Oecetis plenuspinnosa*, n. sp. differs from *O. iara* due to its terete dorsal
15 lobe of tergum X₂ with a clavate apex, while *O. iara* has the same structure broad basally,
16 tapering toward an acute apex. Also, the new species has two digitate processes on the ventral
17 margin of the ventral lobe of tergum X and a truncate apex on the inferior appendage, while *O.*
18 *iara* does not have these processes on tergum X and has the inferior appendage with the apex
19 digitate.

20 **Description. Male:** forewing length 5 mm (n= 1).

21 **Head.** Color pale yellow (pinned specimen). Antennae 3 times length of forewing; scape
22 stout, elongate; pedicel enlarged in width, subequal to other flagellomeres in length, shorter than
23 scape. Maxillary palps yellow, 5-segmented, setose. Labial palps pale yellow, 3-segmented.

24 **Thorax.** Pterothorax yellowish brown; forewing yellow; dark bands over cord absent;
25 dark spots absent on wing; forks I and V rooted; sectoral crossvein (s) not aligned with *r-m*. Hind
26 wing with forks I and V present. Legs yellowish brown, mid leg with longitudinal row of spines
27 on tibia and tarsal segments. Tibial spur formula 1,2,2.

28 **Abdomen.** Segments V, VI, VII and VIII with honeycomb texture on terga (Figs. 9A–C),
29 segment VIII with honeycomb cells smaller than others (Fig. 9C); segment IX annular, short
30 (Figs. 9D–E). Preanal appendage digitate, bearing apical setae (Figs. 9D–E). Tergum X, in
31 lateral view, divided into dorsal and ventral lobes; dorsal lobe divided mesally into two short
32 processes, apex acuminate (Figs. 9D–E); ventral lobe divided into two digitate, sclerotized
33 processes, slender, curved slightly upward, rounded tip (Figs. 9D–E). Inferior appendage 1-
34 segmented, broad basally, setose (Figs. 9D, 9F); dorsal lobe absent (Figs. 9D, 9F); ventral lobe
35 rounded (Figs. 9D, 9F); distal lobe narrow, cylindrical, distal half enlarged, apex truncate; short
36 and stout spine-like setae absent (Figs. 9D, 9F). Phallic apparatus bilaterally symmetrical, curved
37 downward, cylindrical, elongate, distal half enlarged, apex truncate, pair of short processes

Comment [23]: It is possible that the South American specimens are closest to Australian species. I have not studied the issue. However, there is a group of North America species, including *O. cinerascens*, *O. sphyræ*, and *O. persimilis*, that also have reticulate modifications on the tergites of some abdominal segments. The general term for this group is the *O. testacea* group, named for an Old World species with the same characteristics.

Deleted: lacking

Formatted: Font:Italic

Deleted: its

Deleted: pointing posteriorly

Deleted: a

Comment [24]: The word *terete* means cylindrical, tapering at each end. I have not commented on its use previously, but it does not seem to apply here. It would be better simply to describe tergum X as being clavate.

Deleted: and

Comment [25]: OK, you have lost me. This does not seem to correspond to the diagnosis.

Comment [26]: I am not seeing this!

Comment [27]: Possibly enlarged, but not especially elongate, with respect to width.

Deleted: d

dorsally, both slender, acuminate (Fig. 9G), ten phallic spines present, small, sickle shaped, symmetrically distributed in two groups of five (Fig. 9G, one side represented); in caudal view, with apex short, cylindrical, endotheca enlarged, bilobate laterally. Phallotremal sclerite present, horseshoe-shaped.

Deleted: ;

Deleted: Ten phallic spines present, small, sickle shaped, symmetrically distributed in two groups of five (Fig. 9G, one side represented).

Distribution. Costa Rica (Limón).

Material examined. Holotype (male): COSTA RICA, Limón, E.A.R.T.H., forest reserve arroyo, 7.5 km (air) NW Pocora, 10°13'48"N, 083°33'36"W, 10, 4-5.ii.1992, Holzenthal, R.W., Muñoz, F., Kjer, K.M. (UMSP).

Etymology. From Latin *plenus* = full, plenty, *spinosus* = thorny. This is a reference to the many small spines present in the phallic apparatus.

Taxonomic comments: Neboiss (1989) mentioned that the species in the *reticulata*-group are diagnosed by the shield-like tergum VIII covering part of the subsequent genital segments as well as the reticulate surface pattern on the abdominal terga. *Oecetis iara*, from Brazil is the only Neotropical species that has reticulate abdominal terga, but lacks the shield-like tergum VIII as in *O. plenuspinosa* n. sp. Also, there are many species that possess this reticulate pattern, but also do not have the shield-like tergum VIII, such as *O. orientalis* Tsuda, from Japan, and *O. akimi* Gibbs from Ghana (Neboiss, 1989). Even though they are not formally included in the *reticulata*-group, all these species may be closely related or belong to a closely related species group (Neboiss, 1989), including *O. plenuspinosa*, n. sp.

Comment [28]: See previous comment

Oecetis machaera Quinteiro & Holzenthal, n. sp. urn:lsid:zoobank.org:act:ED8452F1-64C2-4432-8B55-CCCAD8E58DC1

Fig. 10

Diagnosis. This species is distinguished from the others in the *falicia* group by its bilobate inferior appendage, with its ventral lobe elongate, cylindrical, and apically acute.

Oecetis machaera, n. sp. is similar to *O. prolongata* Flint, 1981 due to the short, slightly ventrally bent, dorsolateral process on segment IX. However, *O. prolongata* has the ventral lobe of the inferior appendage absent. *Oecetis machaera*, n. sp. has the ventral lobe distinctly projected, cylindrical, and with an acute apex. Additionally, the phallic apparatus of *O. prolongata* is very long and strongly bent ventrally, while the phallic apparatus of the new species is short and almost straight.

Deleted: short

Deleted: same

Description. Male: forewing length 4.8 mm (n= 1).

Head. Color yellowish brown (pinned specimen). Antennae 3.5 times length of forewing; scape stout, elongate; pedicel enlarged in width, subequal to other flagellomeres in length, shorter than scape. Maxillary palps yellowish brown, 5-segmented, setose.

1 **Thorax.** Pterothorax yellowish brown; forewing yellowish brown; dark bands over cord
2 absent; dark spots absent; forks I and V rooted; sectoral crossvein (s) not aligned with *r-m*. Hind
3 wing with forks I and V present. Legs yellowish brown, mid leg with longitudinal row of spines
4 on tibia and tarsal segments. Tibial spur formula 0,2,2.

5 **Abdomen.** Segment IX annular, short, bearing pair of dorsolateral processes, *each* thick,
6 straight, apex slightly bent ventrad, *enlarged in height*, flattened on basis, tapering posteriorly,
7 shorter than phallic apparatus (Fig. 10A). Preanal appendage long, digitate, bearing apical setae
8 (Figs. 10A–B). Tergum X, in lateral view, divided *into* dorsal and ventral lobes (Fig. 10A); dorsal
9 lobe modified into single cylindrical structure, apex digitate, shorter than ventral lobe, with short
10 apical setae (Figs. 10A–B); ventral lobe divided medially by V-shape incision, broad basally,
11 acute apically (Figs. 10A–B). Inferior appendage 1-segmented, *broad basally*, setose (Figs. 10A,
12 10C); dorsal lobe absent (Fig. 10A); ventral lobe elongate, slightly shorter than distal lobe, *apex*
13 acute (Figs. 10A, 10C); distal lobe narrow, tapering posteriorly, apex rounded in lateral view
14 (Figs. 10A, 10C); short, stout spine-like setae absent (Figs. 10A, 10C). Phallic apparatus
15 bilaterally symmetrical, curved downward, cylindrical, elongate, *membranous apically* (Fig.
16 10D); in caudal view, apex elongate, *endotheca slightly enlarged in width apically*; one
17 projection on left side, acute, sclerotized (Fig. 10D). Phallic spine absent (Fig. 10D).
18 Phallotremal sclerite horseshoe-shaped (Fig. 10D).

19 **Distribution.** Brazil (Amazonas).

20 **Material examined. Holotype (male): BRAZIL, Amazonas,** Am. 010, km 246, 20 km W
21 Itacoatiara, 12-15.vii.1979, J. Arias et al. (NMNH, loan to UMSP).

22 **Etymology.** From Latin *machaera* = bent sword from ancient Greece, dirk, dagger. This specific
23 epithet refers to the shape of the dorsolateral processes on segment IX in dorsal view, resembling
24 the bent blade of some swords.

25

26 *Oecetis blahniki* Quinteiro & Holzenthal, n. sp. *urn:lsid:zoobank.org:act:9B6B3CF0-067A-*
27 *4C51-B1CB-FD3CC15A08EF*

28 Fig. 11

29 **Diagnosis.** Even though this new species does not have characteristics that allow us to place it in
30 a species group, it can be distinguished from other *Oecetis* by a combination of characters. It has
31 tergum X divided dorsoventrally, segment IX with two lateral rounded processes, projecting
32 between the dorsal and ventral lobes of tergum X, the endotheca bilobed, and the inferior
33 appendage with the ventral margin of the distal lobe angular, and a ventral lobe *that is projecting*
34 *and cylindrical*, with a rounded apex.

35 This new species is similar to *O. gibbosa*, n. sp., *O. traini* Rueda-Martín, Gibon &
36 Molina, 2011, and *O. rafaeli* Flint, 1991, due to the presence of a distinct lateral process *on*

Comment [29]: ? omit?

Comment [30]: ?

Deleted: in dorsal view (

Deleted: ,

Deleted: in lateral and ventral views,

Deleted: d

Deleted: d

Deleted: projecting, cylindrical

Deleted: of

segment IX and ~~its~~ short phallic apparatus. However, in *O. traini* and *O. rafaeli* the lateral processes are slender, with acute apices, while in *O. blahniki*, n. sp. and *O. gibbosa*, n. sp. the apices are rounded, ~~uniformly wide~~ along their lengths, and project between the dorsal and ventral lobes of tergum X. The ~~diagnostic~~ difference between the two new species relies especially on the shape of the inferior appendage. *Oecetis blahniki*, n. sp. has the ventral margin of the distal lobe strongly angular and a projecting, cylindrical ventral lobe, while *O. gibbosa*, n. sp. does not have a ventral lobe and its dorsal and distal lobes are terete and elongate. Additionally, *O. blahniki*, n. sp. has the endotheca bilobed, while in *O. gibbosa*, n. sp. it is single lobed.

Deleted: the

Deleted: and enlarged

Description. Male: forewing length 6.5 mm (n= 1).

Head. Color yellowish brown (pinned specimen). Scape stout, elongate; pedicel enlarged in width, subequal to other flagellomeres in length, shorter than scape. Maxillary palps yellowish brown, 5-segmented, setose. Labial palps yellow, 3-segmented.

Thorax. Pterothorax yellowish brown; forewing brown; dark bands over cord absent; dark spots absent; forks I and V rooted; sectoral crossvein (s) not aligned with *r-m*. Hind wing with forks I and V present. Legs yellowish brown, mid leg with longitudinal row of spines on tibia and tarsal segments. Tibial spur formula 0,2,2.

Abdomen. Segment IX annular, short, bearing pair of lateral processes, thick, cylindrical, slightly sinuous, tapering posteriorly, apex rounded, shorter than phallic apparatus (Figs. 11A–B). Preanal appendage short, rounded, apex somewhat acuminate in dorsal view, bearing apical setae (Figs. 11A–B). Tergum X, in lateral view, divided in dorsal and ventral lobes (Figs. 11A–B); dorsal lobe modified into single cylindrical structure, apex acuminate, shorter than ventral lobe, with short apical setae (Figs. 11A–B); ventral lobe divided laterally by V-shaped incision, broad basally, digitate apically (Figs. 11A–B). Inferior appendage 1-segmented, setose (Fig. 11A, 11C); dorsal lobe absent (Fig. 11A); ventral lobe cylindrical, acuminate apex (Fig. 11A, 11C); distal lobe narrow, tapering posteriorly, apex acute, angular projection ventrally on mid region, apex acuminate (Fig. 11A, 11C); short, stout spine-like setae absent (Fig. 11A, 11C). Phallic apparatus bilaterally symmetrical, cylindrical, short, slightly curved ventrally (Fig. 11D); in caudal view, apex elongated. Endotheca longer than phallobase, bilobate (Fig. 11D). Two phallic spines present, straight. Phallotremal sclerite horseshoe-shaped.

Distribution. Brazil (Amazonas).

Material examined. Holotype (male): BRAZIL, Amazonas, Am. 010, km 246, 20km W Itacoatiara, 12-15.vii.1979, J. Arias et al. (NMNH loan to UMSP).

Etymology. This specific epithet honors our colleague Roger J. Blahnik for his contributions to caddisfly taxonomy and systematics.

1 *Oecetis gibbosa* Quinteiro & Holzenthal, n. sp. urn:lsid:zoobank.org:act:3118C6F6-3776-4624-
2 B2E2-9615553CF62A

3 Fig. 12

4 **Diagnosis.** Like some of the previous species presented here, this new sepcies, does not present
5 any distinct characteristic that would allow us to place it in a species group. However, it can be
6 diagnosed from the other *Oecetis* by its dorsoventrally divided tergum X, the presence of two
7 lateral processes on segment IX, with their apices truncate and projecting between the lobes of
8 tergum X, and by the inferior appendage, with a terete distal lobe and dorsal lobe, that is slightly
9 clavate apically, and with a rounded, mesal lobe at midlength.

10 This new species is similar to *Oecetis traini* Rueda-Martín, Gibon & Molina, 2011, *O.*
11 *rafaeli* Flint, 1991, and *O. blahniki*, n. sp., due to segment IX bearing a lateral process and also
12 the short phallic apparatus. However, the lateral processes on segment IX in *O. traini* and *O.*
13 *rafaeli* are slender, with acute apices, while the new species has them somewhat quadrate and
14 they do not project between the dorsal and ventral lobes of tergum X. *Oecetis gibbosa*, n. sp.
15 differs from *O. blahniki*, n. sp. in the lateral projections of segment IX, which have their apices
16 truncate in *O. gibbosa*, n. sp., while *O. blahniki*, n. sp. has them rounded. Also, *Oecetis gibbosa*,
17 n. sp. has the inferior appendage with elongate, terete dorsal and distal lobes, and with an inner
18 lobe on the dorsal lobe, while *Oecetis blahniki*, n. sp. does not have a developed dorsal lobe, and
19 the distal lobe has a very angular ventral margin.

20 **Description. Male:** forewing length 5 mm (n= 1).

21 **Head.** Color yellowish brown (pinned specimen). Scape stout, elongate; pedicel enlarged
22 in width, subequal to other flagellomeres in length, shorter than scape. Maxillary palps yellowish
23 brown, 5-segmented, setose. Labial palps yellow, 3-segmented.

24 **Thorax.** Pterothorax yellowish brown; forewing brown; dark bands over cord absent;
25 dark spots absent; forks I and V sessile; sectoral crossvein (s) not aligned with r-m. Hind wing
26 with forks I and V present. Legs yellowish brown. Tibial spur formula 0,2,2.

27 **Abdomen.** Segment IX annular, short (Figs. 12A–B). Preanal appendage long, digitate,
28 bearing apical setae (Figs. 12A–B). Tergum X, in lateral view, divided into dorsal and ventral
29 lobes (Figs. 12A–B); dorsal lobe modified into single cylindrical structure, apex digitate, nearly
30 same length as ventral lobe, with short apical setae (Figs. 12A–B); ventral lobe divided laterally
31 by shallow V-shape incision, apex truncate (Figs. 12A–B). Inferior appendage 1-segmented,
32 broad basally, setose (Figs 12A, 12C); dorsal lobe long, slender, apex clavate, with distinct
33 rounded projection at mid region on mesal surface (Figs. 12A, 12A'); ventral lobe absent (Figs
34 12A, 12C); distal lobe narrow, tapering posteriorly, apex rounded, forming 90° angle with dorsal
35 lobe (Figs 12A, 12C); short, stout spine-like setae absent (Figs 12A, 12C). Phallic apparatus
36 bilaterally symmetrical, curved downward, cylindrical, elongate, membranous apically (Fig.
37 12D); in caudal view, apex short, cylindrical. One phallic spine present, slightly bent dorsally
38 (Fig. 12D). Phallotremal sclerite absent (Fig. 12D).

Deleted: As

Deleted: one

Deleted: also

Deleted: s

Deleted: apex

Deleted: lobes

Deleted: a terete

Deleted: ,

Deleted: ,

Deleted: inner

Deleted: a

Comment [31]: I would say they do, by the illustration, unless I am interpreting it wrong.

Deleted: that

Deleted: a

Deleted: apex

Formatted: Font:Italic

Comment [32]: See previous comment

Deleted: with

Comment [33]: The interpretation and description does not seem to correspond to the diagnosis.

Comment [34]: Would the setae on the mesal process of the dorsal lobe correspond to these?

Deleted: d

Comment [35]: ?

Distribution. Brazil (Amazonas).

Material examined. Holotype (male): BRAZIL, Amazonas, Am. 010, km 229, 38km W Itacoatiara, 29.i.1975, O.S. Flint Jr. (NMNH loan to UMSP).

Etymology. From Latin *gibbosus* = very humped. This species name is a reference to the projection observed at the mid region of the inferior appendage in caudal view.

Oecetis pertica n. sp. Quinteiro & Holzenthal, n. sp. urn:lsid:zoobank.org:act:3DA312EC-F046-4F36-8FD6-D61FFID9E4AD

Fig. 13

Diagnosis. Although it does not have diagnostic characters that allow us to place it in a species group, *O. pertica* n. sp. can be diagnosed from the other *Oecetis* by the long and **terete** dorsal lobe of tergum X, **together with** the somewhat quadrate dorsal lobe of the inferior appendage, with **its** apex truncate, and the presence of a protruding ventral lobe **on the** inferior appendage, with **a** very angular margin and acute **apex**. **The** very conspicuous phallic spines are **also** divided into two groups in different regions of the phallic apparatus. Finally, the quadrate lateral lobe on segment IX of this species is unique in *Oecetis*.

This species has the inferior appendage similar to *O. doesburgi* (Flint, 1974), since both have a C-shaped incision between dorsal and distal lobes, and a dorsal lobe **that is** broad **at its** base, with **its** apex projecting distally. Differently **from** *O. doesburgi*, the new species has the dorsal lobe of inferior appendage with distinct truncate apex, **whereas** *O. doesburgi* presents it rounded. Also, *O. doesburgi* has **the** distal lobe enlarged apically, while *O. pertica* n. sp. has it narrow. The long dorsal lobe of tergum X and the mesally divided ventral lobe of tergum X of this new species are similar to *O. prolongata* Flint, 1981, but *O. pertica* n. sp. does not have the dorsolateral processes on segment IX **that are** diagnostic of the *falcia*-group **and** present in *O. prolongata*. Finally, *O. rafaelli* Flint, 1991, and *O. blahniki* n. sp. **also** have a pair of lateral processes on segment IX, as **in** *O. pertica* n. sp., **but neither** of them has the lateral process quadrate, as in the new species.

Description. Male: forewing length 4.5 mm (n= 1).

Head. Color yellowish brown (pinned specimen). Scape stout, elongate; pedicel enlarged in width, subequal to other flagellomeres in length, shorter than scape. Maxillary palps yellowish brown, 5-segmented, setose. Labial palps yellow, 3-segmented.

Thorax. Pterothorax yellowish brown; forewing yellowish; small patches of dark setae present at junction of most veins, with patches of white setae adjacent to these; forks I and V sessile; sectoral crossvein (s) not aligned with *r-m*. Hind wing with forks I and V present. Legs yellowish brown. Tibial spur formula 0,2,2.

Comment [36]: see previous comments on use of this term

Deleted: allied

Deleted: to

Deleted: of

Comment [37]: Again, following the description requires the reader to be able to distinguish what constitutes a dorsal, ventral, and distal lobe, which is not always obvious. What I would interpret as a ventral lobe only appears angular in lateral view, but is actually broadly rounded, as viewed ventrally.

Deleted: Also, the

Deleted: on

Deleted: of

Deleted: and

Deleted: a

Deleted: well as

Deleted: However, none

1 **Abdomen.** Segment IX uneven dorsoventrally, tergum IX noticeably shorter than sternum
2 | IX, segment bearing pair of broad, slightly quadrate lateral processes from the posterior margin,
3 projecting underneath ventral lobe of tergum X; acrotergite absent (Figs. 13A–B). Preanal
4 appendage long, digitate, bearing apical setae (Figs. 13A–B). Tergum X, in lateral view, divided
5 | into dorsal and ventral lobes (Figs. 13A–B); dorsal lobe modified into single cylindrical
6 structure, apex slightly clavate, nearly same length as ventral lobe, with short apical setae (Figs.
7 13A–B); ventral lobe divided medially by V-shape incision, broad basally, apex acute (Fig.
8 13B). Inferior appendage 1-segmented, broad basally, setose (Figs. 13A, 13C); dorsal lobe
9 slightly quadrate, projecting distally, apex truncate (Fig. 13A); ventral lobe slightly protruding,
10 keeled, apex acute, margin very angular (Figs. 13A, 13C); distal lobe broad, tapering distally,
11 slightly bent dorsad, apex rounded, forming with dorsal lobe shallow C-shaped incision; short
12 and stout spine-like setae absent (Figs. 13A, 13C). Phallic apparatus bilaterally symmetrical,
13 curved ventrally, tubular, elongate, membranous apically, constricted at mid portion, enlarged
14 | distally, apex quadrate (Fig. 13D). Endotheca with approximately 12 short, straight, phallic
15 spines, 5-7 at mid region, 5-7 at apex (exact number difficult to discern, endothecal membranes
16 not everted on specimens examined) (Fig. 13D). Phallotremal sclerite absent (Fig. 13D).

Comment [38]: With anterior margin projecting midlaterally,

Comment [39]: See previous comment

Comment [40]: ?

Deleted: Approximately

17 **Distribution.** Brazil (Amazonas).

18 **Material examined. Holotype (male):** BRAZIL, Amazonas, Am. 010, km 229, 38 km W
19 Itacoatiara, 29.i.1975, O.S. Flint Jr. (NMNH).

20 **Etymology.** From Latin *pertica* = long pole. This species name refers to the long dorsal lobe of
21 tergum X.

22

23 *Oecetis licina* n. sp. Quinteiro & Holzenthal, n. sp. urn:lsid:zoobank.org:act:9BFC14F7-FCD1-
24 4FF3-AA38-F62B52439CCD

25 Fig. 14

26 **Diagnosis.** This species does not have characters that allow us to place it in a diagnosed species
27 group. However, it can be distinguished from the other *Oecetis* by the enlarged dorsal lobe of
28 | tergum X, the triangular lateral process of segment IX, and the distinctly curved inferior
29 appendage.

30 *Oecetis licina* n. sp. is similar to *O. gibbosa* n. sp., since they both share a segment IX
31 lateral process protruding underneath tergum X, as well as a cylindrical dorsal lobe of tergum X
32 and a phallic apparatus that is cylindrical, slightly curved ventrally and bearing one phallic spine.
33 However, these two species differ greatly in the inferior appendage shape. *Oecetis gibbosa* n. sp.
34 has the dorsal lobe of inferior appendage terete, with apical and mesal inner projections. *Oecetis*
35 *licina* n. sp. has the dorsal lobe of inferior appendage discreetly projected and rounded. The
36 distal lobe of inferior appendage in *O. licina* n. sp. is conspicuously enlarged compared to the

Deleted: the

Deleted: cylindrical

Deleted: the

Comment [41]: At least superficially, I would say that it may be more similar to *O. blahniki*, based on the broad, mesally curved, dorsal (or distal) lobe of the inferior appendage and rounded preanal appendages.

1 | terete distal lobe of inferior appendage in *O. gibbosa* n. sp. Also, the phallic apparatus in *O.*
2 | *licina* n. sp. is disproportionally large compared to the remainder of the genitalia.

Deleted: o

3 | **Description. Male:** forewing length 5.5 mm (n= 1).

4 | **Head.** Color yellowish brown (pinned specimen). Scape stout, elongate; pedicel enlarged
5 | in width, subequal to other flagellomeres in length, shorter than scape. Maxillary palps yellowish
6 | brown, 5-segmented, setose. Labial palps yellow, 3-segmented.

7 | **Thorax.** Pterothorax yellowish brown; forewing light brown; faint band over cord; dark
8 | spots apically; forks I and V sessile; sectoral crossvein (*s*) not aligned with *r-m*. Hind wing with
9 | forks I and V present. Legs yellowish brown. Tibial spur formula 0,2,2.

10 |

11 | **Abdomen.**

12 | Segment IX annular, **with** short, triangular lateral processes present, broad basally, **acute**
13 | apically, projecting underneath ventral lobe of tergum **X**; acrotergite present as two structures
14 | dorsolaterally (Figs. 14A–B). Preanal appendages short, rounded, bearing apical setae (Figs.
15 | 14A–B). Tergum X, in lateral view, divided into dorsal and ventral lobes; dorsal lobe modified
16 | into single structure, **lobate (or digitate), inflated preapically, subacute apically**, same length as
17 | ventral lobe, with short setae (Figs. 14A–B); ventral lobe membranous, divided near apex by
18 | **shallow**, V-shaped incision, **apex rounded** (Fig. 14B). Inferior appendage 1-segmented, broad
19 | basally, setose (Figs. 14A, 14C); dorsal lobe smoothly projected, rounded, discrete (Figs. 14A);
20 | ventral lobe absent; distal lobe; **as viewed laterally**, broad basally, tapering distally, bent dorsally
21 | at mid region, keeled **ventrally**, ventral margin distinctly angular, apex **mesally curved and**
22 | rounded (Figs. 14A, 14C); short and stout spine-like setae present on dorsal lobe and apical inner
23 | portion (Figs. 14A, 14C). Phallic apparatus bilaterally symmetrical, elongate, **cylindrical, curved**
24 | ventrally (Fig. 14D). One phallic spine present, straight (Fig. 14D). Phallotremal sclerite absent
25 | (Fig. 14D).

Deleted: acuminate

Comment [42]: Does this refer to the angular projections at the level of the inferior appendages?

Deleted: cylindrical, apex slightly clavate

Deleted: shallow

Deleted: d

26 | **Distribution.** Guyana

27 | **Material examined. Holotype (male):** GUYANA, Essequibo [sic] R., Br. Guiana, July 1921,
28 | A. Busck coll [verbatim, no additional information given] (NMNH).

29 | **Etymology.** From Latin *licinus* = bent or turned upward. This species name refers to the distal
30 | lobe of inferior appendage bent dorsally.

31 |

32 | **Acknowledgements**

33 | We are grateful to Dr. Oliver S. Flint and Dr. Adolfo R. Calor for the generous loan of specimen
34 | loans. We appreciate the helpful suggestions on this manuscript of Adolfo R. Calor, Daniela M.
35 | Takiya, and Eduardo A. B. Almeida.

References

- Angrisano EB., Sganga J V. 2009. Two new species of Trichoptera from Salto Encantado Provincial Park (Misiones Province, Argentina). *Aquatic Insects* 31:271–278. DOI: 10.1080/01650420903113729.
- Blahnik RJ., Holzenthal RW. 2014. Review and redescription of species in the *Oecetis avara* group, with the description of 15 new species (Trichoptera, Leptoceridae). *ZooKeys*:1–83. DOI: 10.3897/zookeys.376.6047.
- Blahnik RJ., Holzenthal RW., Prather AL. 2007. The lactic acid method for clearing Trichoptera genitalia. In: Bueno-Soria J, Barba-Álvarez R, Armitage BJ eds. *Proceedings of the XIIIth International Symposium on Trichoptera*. Columbus, Ohio: The Caddis Press, 9–14.
- Botosaneanu L. 1977. Trichoptères (imagos) de Cuba, capturés par moi-meme en 1973 (Insecta, Trichoptera). *Fragmenta Entomologica* 13:231–284.
- Bueno-Soria J. 1981. Estudios en insectos aquaticos de Mexico I. Trichoptera (Leptoceridae). Cinco nuevas especies de *Oecetis* McLachlan. *Folia Entomológica Mexicana* 49:103–120.
- Calor A., Mariano R. 2012. UV Light Pan Traps for Collecting Aquatic Insects. *Entomobrasilis* 5:164–166.
- Chen YE. 1993. Revision of the *Oecetis* (Trichoptera: Leptoceridae) of the World. Clemson University.
- Curtis J. 1834. Description of some hitherto nondescript British species of mayflies of anglers. *The London and Edinburgh Philosophical Magazine and Journal of Science* 3:120-125-218.
- Dallwitz M., Paine T., Zurcher E. 1999. User's Guide to the DELTA Editor. Australia: CSIRO Division of Entomology.
- Denning DG. 1947. New Trichoptera from Puerto Rico. *Annals of the Entomological Society of America* 40:656–661.
- Flint OS, Jr. 1974. The Trichoptera of Surinam. *Studies of Neotropical caddisflies, XV. Studies on the Fauna of Suriname and other Guyanas* 14:1–151.
- Flint OS, Jr. 1981. Studies of Neotropical caddisflies, XXVIII: the Trichoptera of the Río Limón basin, Venezuela. *Smithsonian Contributions to Zoology* 330:1–61.
- Flint OS, Jr. 1991. Studies of Neotropical Caddisflies, XLIV: On a collection from Ilha de Maraca, Brazil. *Acta Amazonica* 21:63–83.
- Hagen HA. 1861. Synopsis of the Neuroptera of North America with a list of the South American species. *Smithsonian Miscellaneous Collections* 4:1–347.
- Henriques-Oliveira A., Dumas L., Nessimian J. 2014. Three new species and new distributional records of *Oecetis* McLachlan 1877 (Trichoptera: Leptoceridae: Leptocerinae) from Brazil. *Zootaxa* 3753:273–282.
- Holzenthal RW., Calor AR. 2017. Catalog of the Neotropical Trichoptera (Caddisflies). *ZooKeys* 654:1–566. DOI: 10.3897/zookeys.654.9516.
- Lee SJ., Hwang JH., Bae YJ. 2012. The caddisfly genus *Oecetis* McLachlan (Trichoptera:

- 1 Leptoceridae) in Korea. *Entomological Research* 42:271–280. DOI: 10.1111/j.1748-
2 5967.2012.00466.x.
- 3 Malicky H. 2005. Beiträge zur Kenntnis asiatischer *Oecetis* (Trichoptera , Leptoceridae). *Linzer*
4 *Biologische Beiträge* 37:605–669.
- 5 McLachlan R. 1877. *A monographic revision and synopsis of the Trichoptera of the European*
6 *fauna (1874–1880)*. London: John van Voorst.
- 7 Navás L. 1924. Insectos de la América Central. *Broteria, Série Zoológica* 21:55–86.
- 8 Neboiss A. 1989. The *Oecetis reticulata* species-group from the South-West Pacific area
9 (Trichoptera: Leptoceridae). *Bijdragen tot de Dierkunde* 59:191–202.
- 10 Quinteiro FB., Calor AR. 2012. A new species of *Oecetis* McLachlan, 1877 (Trichoptera:
11 Leptoceridae) from Southeast Brazil: Validation of an unpublished species. *Zootaxa*
12 3442:53–61.
- 13 Quinteiro F., Calor A. 2015. A Review of the genus *Oecetis* (Trichoptera: Leptoceridae) in the
14 Northeastern Region of Brazil with the Description of 5 New Species. *PloS one*
15 10:e0127357. DOI: 10.1371/journal.pone.0127357.
- 16 Rueda-Martín P., Gibon FM., Molina CI. 2011. The genus *Oecetis* McLachlan in Bolivia and
17 Northwestern Argentina (Trichoptera: Leptoceridae), with new species and identification
18 key for males of *Oecetis* species from Mexico, Central and South America. *Zootaxa* 38:19–
19 38.
- 20 Schmid F. 1998. *The Insects and Arachnids of Canada. Part 7. Genera of the Trichoptera of*
21 *Canada and Adjoining or Adjacent United States*. NRC Research Press.