



## Two new species and updated checklist of *Oxyethira* Eaton, 1873 (Trichoptera, Hydroptilidae) from Brazil

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### ABSTRACT

Two new species of *Oxyethira* Eaton, 1873 are described: *Oxyethira cascadata* sp. n. and *Oxyethira quadrilobata* sp. n. Description and illustrations of the new species are provided based on specimens collected in Parque Nacional da Serra da Canastra, Minas Gerais State, Southeast Brazil. Both species are assigned to the subgenus *Loxotrichia* but differ from other species mainly in morphology of the subgenital plate, subgenital processes and inferior appendages. Additionally, we provide an updated checklist of the *Oxyethira* species from Brazil.

**Key words:** aquatic insects, Canastra mountain range, Hydroptilinae, species list, taxonomy.

### INTRODUCTION

The genus *Oxyethira*, erected by Eaton (1873) for two species previously occupied in *Hydroptila* Dalman, 1819, is the most diverse genus of Hydroptilidae (Holzenthal and Calor 2017, Morse 2017). These microcaddisflies are included in the subfamily Hydroptilinae, with other 23 genera (Holzenthal et al. 2007), and have been the subject of several works describing new species, especially in the Neotropical Region (Angrisano and Sganga 2009, Santos et al. 2009, Thomson and Holzenthal 2012, Souza and Santos 2017). However, the diversity of *Oxyethira* is poorly known and several

undescribed species are still to be found, not only in unexplored regions but also in localities previously studied (Souza and Santos 2017).

Over 200 species of *Oxyethira* are known from all biogeographical regions (Morse 2017, Souza and Santos 2017). Adults of Neotropical *Oxyethira* are recognized by having head and antennae unmodified, three ocelli, maxillary palps with five segments, labial palps with three segments, tibial spur formula 0-3-4, venation distinct with veins reaching wing margin, mesoscutellum without transverse suture, metascutellum pentagonal and abdomen without visible modifications (Marshall 1979, Kelley 1984, Souza and Santos 2017).

In Brazil, 34 species are reported in five subgenera: *Dactylotrichia* Kelley, 1984,

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*Dampftrichia* Mosely, 1937, *Loxotrichia* Mosely, 1939, *Oxytrichia* Mosely, 1939 and *Tanytrichia* Kelley, 1984 (Santos et al. 2017, Souza and Santos 2017). Others subgenera are recognized, but because of the large morphological differences observed in the groups, many species remain unplaced to any of them.

Currently, four species of *Oxyethira* are registered from Minas Gerais State: *Oxyethira espinada* Holzenthal & Harris, 1992, *O. parce* (Edwards & Arnold, 1961), *O. tica* Holzenthal & Harris, 1992 and *O. zilaba* (Mosely, 1939). Here we provide descriptions and illustrations of two new species based on specimens collected in Parque Nacional da Serra da Canastra, a protected area in the Cerrado biome, Minas Gerais State, Southeast Brazil. Additionally, we provide an updated checklist of the *Oxyethira* species from Brazil (Table I).

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#### MATERIALS AND METHODS

The adult specimens were collected with Pennsylvania light traps (Frost 1957) and preserved in 96% ethanol. In order to observe genital structures, male abdomens were diaphanized in a heated KOH 10% solution, then kept in 50% acetic acid for five minutes, washed in distilled water and transferred to 96% ethanol. Genitalia were examined under a compound microscope (Carl Zeiss, Axio Lab) equipped with a camera lucida, and their diagnostic structures drawn in pencil. The sketches were used as templates to trace graphic vectors in ADOBE ILLUSTRATOR (v. 16.0.0, Adobe Systems, Inc.). The terminology for morphology follows Kelley (1984).

The specimens examined are deposited in the Coleção Entomológica Professor José Alfredo

Pinheiro Dutra, Departamento de Zoologia, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil (DZRJ).

#### RESULTS

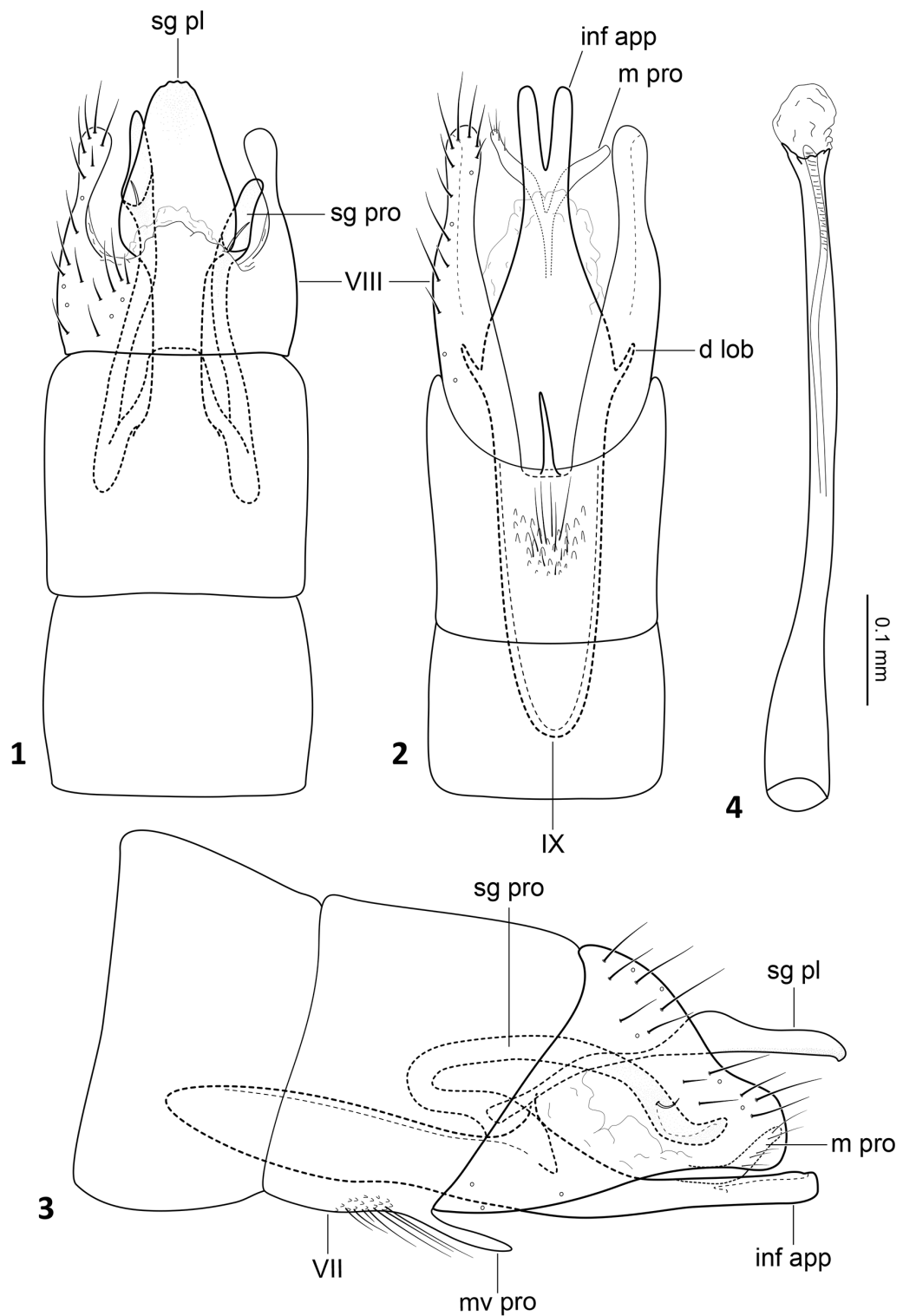
*Oxyethira cascadata* sp. n.

Figures 1-4

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**Description.** *Adult male.* Forewing length: male holotype, 2.3 mm; male paratype, 2.5 mm. Head yellowish-brown with brown setae. Dorsum of thorax light-brown, yellowish-brown laterally. Fore- and hind wings covered with light brown setae. Segment VII annulate with small patch of setae anterior to the mesoventral process. Tergum VIII setose, posterodorsal margin U-shaped, sternum with deep mesal incision reaching anterior margin of the segment.

*Genitalia.* Sternum IX with anterolateral margin elongate, rounded anteriorly, retracted within segments VI–VIII, posterolateral margin with acute dorsal lobe, projected dorsad. Segment X membranous, difficult to discern. Inferior appendages fused to sternum IX, elongate, tapering posteriorly with bifid apex, interior mesal surface with two setose and slender membranous processes mesally connected. Subgenital plate long; in dorsal view (Fig. 1), anterior half narrow, posterior half enlarged, subtriangular, slightly crenulate and rounded at apex; in lateral view (Fig. 3), dorsal margin undulate, slightly concave ventrally with apex acute, beak-like, pointed downward. Subgenital processes slender; in dorsal view (Fig. 2), paired, asymmetrical (right process longer than left), both excavated apicodorsally with single short setae subapically; in lateral view (Fig. 3), strongly curved basally, apex directed apicodorsad, curved at tip. Phallus tubular, elongate, rod-like, stouter at



**Figures 1–4** - *Oxyethira cascadata* sp. n. Male genitalia (holotype). **1.** Dorsal view; **2.** Ventral view; **3.** Lateral view, left; **4.** Phallus, dorsal view. Abbreviations: **d lob** – dorsal lobe; **inf app** – inferior appendage; **m pro** – membranous processes; **mv pro** – mesoventral process; **sg pl** – subgenital plate; **sg pro** – subgenital processes; **VII** – sternum VII; **VIII** – segment VIII; **IX** – sternum IX.

base than apex, apex membranous, ejaculatory duct slightly sclerotized and protruding (Fig. 4).

*Female and immatures.* Unknown.

*Taxonomic notes.* Based on the deep mesal incision of the sternum VIII and the pair of asymmetric subgenital processes, the new species is assigned to the subgenus *Loxotrichia*. *Oxyethira cascadata* sp. n. is most similar to *O. azteca* (Mosely, 1937), having the inferior appendages fused basally, bifid distally, forming a long, slender fork. These species also share with *O. quadrilobata* sp. n. asymmetrical and strongly curved subgenital processes, each with a single subapical short seta. Additionally, *O. cascadata* sp. n. has two setose and slender membranous processes on the interior mesal surface of the inferior appendages, also present in *O. copina* Angrisano, 1995, *O. dalmeria* (Mosely, 1937) and *O. quadrilobata* sp. n., but absent in *O. azteca*. The subtriangular posterior half of the subgenital plate distinguishes *O. cascadata* sp. n. from all congeners.

**Type material.** Holotype male: Brazil, Minas Gerais, São Roque de Minas, Parque Nacional da Serra da Canastra, parte baixa da Cachoeira Casca D'anta, Rio São Francisco, 20°18.54'S, 46°31.37'W, ca 900 m elev, 03.IV.2014, JL Nessimian, LL Dumas, ALH Oliveira & SP Gomes leg. (DZRJ). Paratype: 1 male, same data as holotype (DZRJ).

**Distribution.** Brazil: Minas Gerais.

**Etymology.** The specific epithet of the new species refers to the Cachoeira Casca D'anta, the largest waterfall of the São Francisco River, where the specimens were collected.

*Oxyethira quadrilobata* sp. n.

Figures 5-8

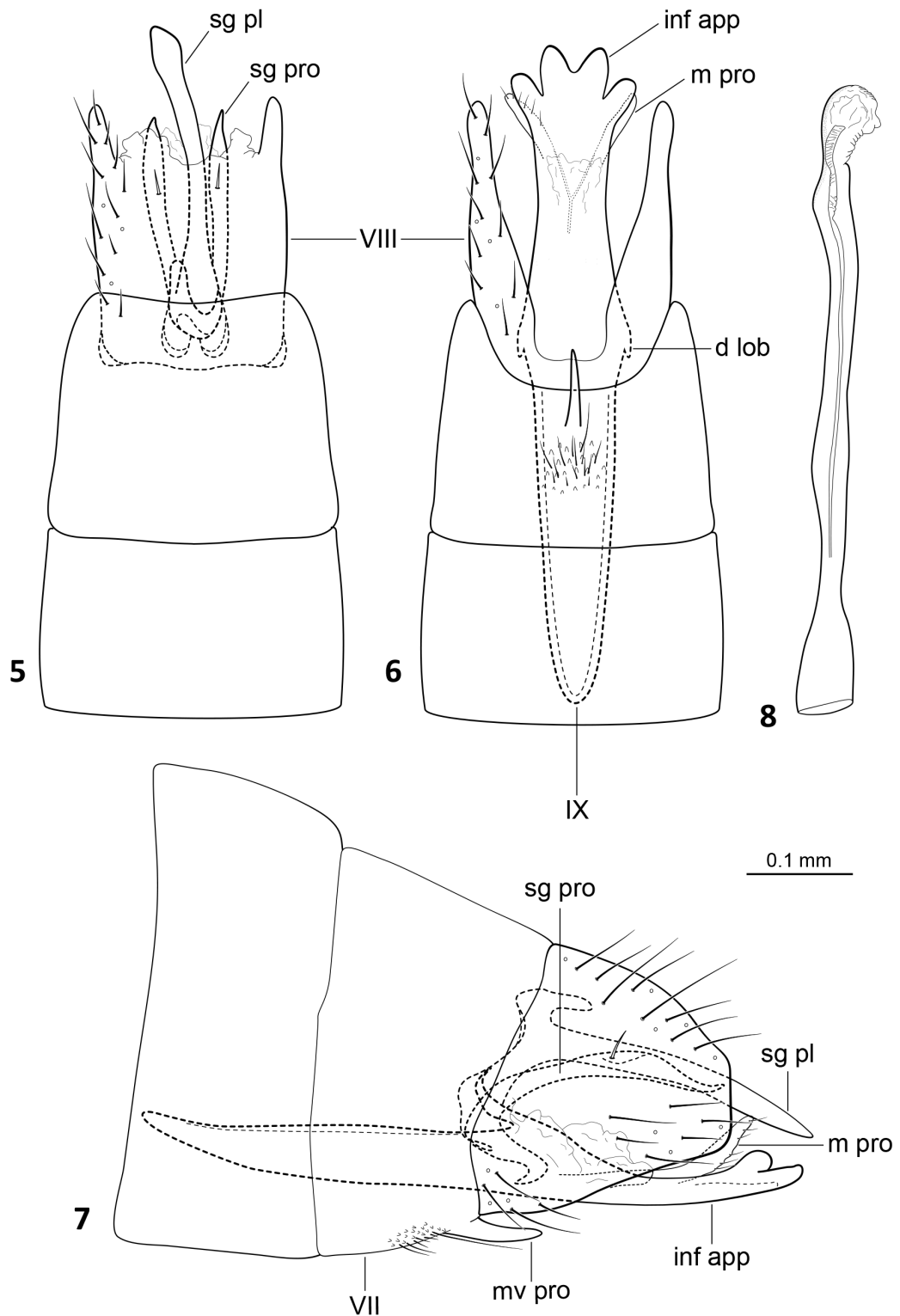
ZooBank Life Science Identifier (LSID) - urn:lsid:zoobank.org:act:469A759C-E472-4824-8A86-BE88A9817CE4

**Description.** *Adult male.* Forewing length: male holotype, 2.2 mm; male paratypes, 2.1–2.5 mm (n = 8). Head yellowish-brown with brown setae. Dorsum of thorax brown, yellowish-brown laterally. Fore- and hind wings covered with light brown setae. Sternum VII with small patch of setae anterior to mesoventral process. Tergum VIII setose, in dorsal view (Fig. 5) subrectangular; in lateral view (Fig. 7) subtrapezoidal; sternum with deep mesal U-shaped incision, almost reaching anterior margin of segment.

*Genitalia.* Sternum IX with anterolateral margin elongate, pointed anteriorly, retracted within segments VI–VIII, posterolateral margin with curved and acute dorsal lobe, produced anterodorsad. Segment X membranous, difficult to discern. Inferior appendages fused to sternum IX, elongate, divided apically into four rounded lobes, interior mesal surface with two setose and slender membranous processes, connected mesally. Subgenital plate long and slender; in dorsal view (Fig. 5) slightly expanded subapically, digitiform projection at anterodorsal margin with circular opening at base; in lateral view (Fig. 7), scimitar-like, slightly curved, with anterodorsal digitiform projection directed posterad. Subgenital processes slender, asymmetrically paired (left process slightly longer than the right), subapically with a single short dorsal setae; in lateral view (Fig. 7), strongly curved at base, apically acute. Phallus tubular, elongate, narrow, stouter at base than apex, apex membranous with ejaculatory duct slightly sclerotized, not protruding (Fig. 8).

*Female and immatures.* Unknown.

*Taxonomic notes.* As in other species of the subgenus *Loxotrichia*, the new species also has a deep mesal incision in the sternum VIII, as well as having two asymmetrical subgenital processes. *Oxyethira quadrilobata* sp. n. is very similar to *O. cascadata* sp. n. as discussed under that species.



**Figures 5–8** - *Oxyethira quadrilobata* sp. n. Male genitalia (holotype). **5**. Dorsal view; **6**. Ventral view; **7**. Lateral view, left; **8**. Phallus, dorsal view. Abbreviations: **d lob** – dorsal lobe; **inf app** – inferior appendage; **m pro** – membranous processes; **mv pro** – mesoventral process; **sg pl** – subgenital plate; **sg pro** – subgenital processes; **VII** – sternum VII; **VIII** – segment VIII; **IX** – sternum IX.

However, it can be easily distinguished from all congeners by the distinct inferior appendages, fused basally and divided apically into four lobes, and the elongate and slender subgenital plate directed anterodorsally.

**Type material.** Holotype male: Brazil, Minas Gerais, São Roque de Minas, Parque Nacional da Serra da Canastra, parte baixa da Cachoeira Casca D'anta, Rio São Francisco, 20°18.54'S, 46°31.37'W, ca 900 m elev., 03.IV.2014, JL Nessimian, LL Dumas, ALH Oliveira & SP Gomes leg. (DZRJ). Paratypes: 8 males, same data as holotype (DZRJ).

**Distribution.** Brazil: Minas Gerais.

**Etymology.** The name *quadrilobata* (Latin: *quadri* = four; greek: *lobulo* = prominent part of an organ) refers to the distinctive shape of the fused

inferior appendages, divided apically into four rounded lobes.

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TABLE I

List of *Oxyethira* species known from Brazil. State abbreviations: AL – Alagoas; AM – Amazonas; BA – Bahia; CE – Ceará; MA – Maranhão; MG – Minas Gerais; PA – Pará; PB – Paraíba; PE – Pernambuco; PI – Piauí; PR – Paraná; RJ – Rio de Janeiro; RR – Roraima; SC – Santa Catarina; SE – Sergipe; SP – São Paulo.

Subgenus / Species	Distribution / Reference
<b><i>Oxyethira (Dactylotrichia) Kelley, 1984</i></b>	
<i>Oxyethira guariba</i> Souza & Santos, 2017	PB (Souza and Santos 2017)
<i>Oxyethira iannuzzae</i> Souza & Santos, 2017	AL, BA (Souza and Santos 2017)
<i>Oxyethira retrosa</i> Souza & Santos, 2017	AL, SE (Souza and Santos 2017)
<i>Oxyethira santiagensis</i> Flint, 1982	Brazil (Kelley 1984, Paprocki et al. 2004)
<b><i>Oxyethira (Dampftrichia) Mosely, 1937</i></b>	
<i>Oxyethira calori</i> Souza & Santos, 2017	BA (Souza and Santos 2017)
<i>Oxyethira circarverna</i> Kelley, 1983	AM (Santos et. al 2009), BA, MA, PB (Souza and Santos 2017)
<i>Oxyethira discaelata</i> Kelley, 1983	AM (Kelley 1983, Paprocki et al. 2004)
<i>Oxyethira hyalina</i> (Müller, 1879)	SC (Müller 1879, Paprocki et al. 2004)
<i>Oxyethira lagunita</i> Flint, 1982	PR (Kelley 1984, Paprocki et al. 2004)
<i>Oxyethira spissa</i> Kelley, 1983	AM, PA (Kelley 1984, Paprocki et al. 2004)
<b><i>Oxyethira (Loxotrichia) Mosely, 1939</i></b>	
<i>Oxyethira cascadata</i> sp. n.	MG
<i>Oxyethira graciliano</i> Souza & Santos, 2017	AL, BA (Souza and Santos 2017)
<i>Oxyethira parce</i> (Edwards & Arnold, 1961)	CE (Takiya et al. 2016), MG (Blahnik et al. 2004, Paprocki et al. 2004)
<i>Oxyethira quadrilobata</i> sp. n.	MG

TABLE I (continuation)

Subgenus / Species	Distribution / Reference
<i>Oxyethira tica</i> Holzenthal & Harris, 1992	AM (Santos et al. 2009), AL, BA, MA, PB, PE, SE (Souza and Santos 2017), CE, PI, RJ (Takiya et al. 2016), MG (Blahnik et al. 2004)
<i>Oxyethira zilaba</i> (Mosely, 1939)	MG, PR, SC, SP (Mosely 1939, Paprocki et al. 2004)
<b><i>Oxyethira (Oxytrichia)</i> Mosely, 1939</b>	
<i>Oxyethira longipennis</i> Santos, Henriques-Oliveira & Nessimian, 2009	AM (Santos et al. 2009)
<i>Oxyethira peruviana</i> Harris & Davenport, 1999	AM (Santos et al. 2009)
<i>Oxyethira presilla</i> Harris & Davenport, 1999	AM (Santos et al. 2009)
<i>Oxyethira sinistra</i> Santos, Henriques-Oliveira & Nessimian, 2009	AM (Santos et al. 2009)
<i>Oxyethira spirogyrae</i> (Müller, 1879)	SC (Müller 1879, Paprocki et al. 2004)
<b><i>Oxyethira (Tanytrichia)</i> Kelley, 1984</b>	
<i>Oxyethira bettyae</i> Thomson & Holzenthal, 2012	PE (Souza et al. 2013)
<i>Oxyethira bicornuta</i> Kelley, 1983	AM (Kelley 1983, Paprocki et al. 2004)
<i>Oxyethira espinada</i> Holzenthal & Harris, 1992	AL (Souza and Santos 2017), MG (Blahnik et al. 2004, Paprocki et al. 2004)
<i>Oxyethira longissima</i> Flint, 1974	AM (Santos et al. 2009)
<i>Oxyethira luanae</i> Santos, Henriques-Oliveira & Nessimian, 2009	AM (Santos et al. 2009)
<i>Oxyethira macrosterna</i> Flint, 1974	AM (Santos et al. 2009), MA (Souza and Santos 2017)
<i>Oxyethira merga</i> Kelley, 1983	BA (Souza and Santos 2017), PI (Takiya et al. 2016), RR (Flint 1991, Paprocki et al. 2004)
<i>Oxyethira picita</i> Harris & Davenport, 1999	AM (Santos et al. 2009)
<i>Oxyethira septentrionalis</i> Souza & Santos, 2017	PI (Souza and Santos 2017)
<i>Oxyethira singularis</i> Souza & Santos, 2017	BA (Souza and Santos 2017)
<i>Oxyethira una</i> Souza & Santos, 2017	BA (Souza and Santos 2017)
<b><i>Incertae sedis</i></b>	
<i>Oxyethira brasiliensis</i> Kelley, 1983	PA (Kelley 1983, Paprocki et al. 2004)
<i>Oxyethira diplospissa</i> Souza & Santos, 2017	AL (Souza and Santos 2017)
<i>Oxyethira maranhensis</i> Souza & Santos, 2017	MA (Souza and Santos 2017)
<i>Oxyethira rafaeli</i> Souza & Santos, 2017	BA, PI (Souza and Santos 2017)

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