



Description of new damselfly *Coeliccia schorri* sp. n. (Odonata: Zygoptera: Platynemididae) with a discussion of the *Coeliccia hayashii*-group in Vietnam

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Coeliccia schorri sp. n. is described based on both sexes (holotype male from Dak Roong Commune, K'bang district, Gia Lai province, central highlands of Vietnam). The combination of the characters of a large pruinose spot on the synthorax, blue abdominal tip, and white appendages in the male and a long spine on the posterior pronotal lobe of the prothorax in the female help distinguish it from all other *Coeliccia* species. The *Coeliccia hayashii*-group, remarkable for the pruinose markings on the male prothorax and synthorax in combination with the structure of the genital ligula which is bifurcated from the base into two long flagella, is discussed.

<http://www.zoobank.org/urn:lsid:zoobank.org:act:925C6DA1-EFCA-4F28-976F-CE5276F67155>

Keywords: New species; dragonfly

Introduction

The genus *Coeliccia* Kirby, 1890 is represented in Vietnam by 22 species (Phan & Tran, 2018). Moreover, several new species to science and new records to the country await publication in the near future (Kompier pers. comm.; Phan pers. data). Three named species from the Central Highlands of Vietnam differ from all other members of the genus by the pruinose markings of the male prothorax and sometimes synthorax in combination with structure of the terminal segment of the genital ligula, which is bifurcated from the based into two long flagella. These are *Coeliccia duytan* Phan, 2017, *C. hayashii* Phan & Kompier, 2016 and *C. mattii* Phan & Kompier, 2016. These species are considered here to form a species group, the *hayashii*-group. The name of the group is taken from the first described member of this group, *Coeliccia hayashii*, published in Phan and Kompier (2016). A brief discussion of the *hayashii*-group is also provided in this paper.

In May 2017, during a field survey with the first author in Phuoc Son District, Quang Nam Province, central Vietnam, Mr Haruki Karube collected a female specimen that possessed an unique long horn (among the Vietnamese *Coeliccia* species) on its prothorax. Since the male was

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not available, the taxonomic status of this female could not be decided. Subsequently, in April 2018, the second author collected several male specimens of an unknown *Coelliccia* species from Gia Lai Province that is described here as *Coelliccia schorri* sp. n. One month later, the first author was able to collect both male and female (in tandem) of the same species from Gia Lai Province. Interestingly, the female of *Coelliccia schorri* sp. n. was similar to the female specimen from Phuoc Son District, having the same body coloration and the same long horn on the posterior pronotal lobe of the prothorax although the horn of Gia Lai's female is relatively longer and acutely pointed compared to the Quang Nam's specimens. In August 2018, the second author also discovered and collected several male and female specimens of *Coelliccia schorri* sp. n. from the mountain area of Tay Giang District, Quang Nam Province. The new female specimen from Tay Giang District closely resembled the female specimen from Phuoc Son District, demonstrating that the Phuoc Son specimen also belongs to the new species *Coelliccia schorri* sp. n.

Materials and methods

Collecting and preservation of specimens

The methodology of collecting and preservation follows Paulson (2018). Specimens were collected along the stream using an aerial insect net, placed alive in triangular envelopes and kept in a plastic box for about 24 hours in order for them to void their intestinal contents. Specimens were then steeped in 100% acetone for 8–12 hours before drying and labeling. Each specimen, wings folded back, is preserved in a triangular envelope with plastic covering and labeled with scientific name, collecting date, coordinates, elevation, location and collector of the specimen.

Photos and illustration

Color photos presented here were executed by the following methods. Habitus of male/female were taken by using the digital camera Nikon D3300 (Nikon factory, Ayuthaya, Bangkok, Thailand) with lens Nikon AFS DX Micro Nikkor 85 mm f/3.5G ED VR. Photos of *Coelliccia schorri* in nature were taken with a digital camera Nikon D3300 with a Nikon AF Micro 200 mm f4D IF-ED lens. Other color photos were taken by using Axiocam Erc 5s (Carl Zeiss AG, Oberkochen, Germany) on Zeiss Stemi 508 stereo microscope (Carl Zeiss AG, Oberkochen, Germany). Black and white illustrations of genital ligula were made with Adobe Photoshop 7.0 (Adobe Systems Incorporated, Mountain View, California, USA).

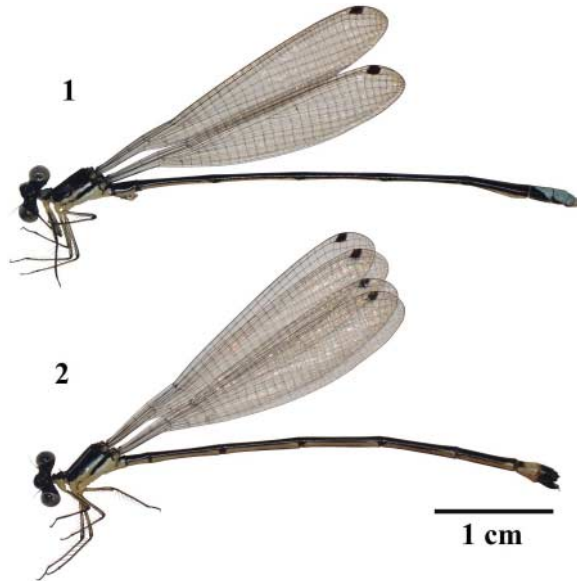
Morphological terminology

Morphological terminology follows Phan and Tran (2018). Abbreviations: S1–10, abdominal segments 1 to 10; Px, postnodal crossveins; HW, hind wing; FW, forewing; alt., altitude.

Taxonomy

Family **Platynemididae** Yakobson & Bianchi, 1905
 Subfamily **Calicnemiinae** Fraser, 1957
 Genus ***Coelliccia*** Kirby, 1890

***Coelliccia schorri* sp. n.**
 (Figures 1 – 17)



Figs 1–2. Habitus of (1) holotype ♂ and (2) paratype ♀ of *Coeliccia schorri* sp. n.

Etymology

This species is named in honor of Dr Martin Schorr in appreciation of his support of odonatological research in Vietnam through the International Dragonfly Fund to the first author. A noun in the genitive case.

Type specimens

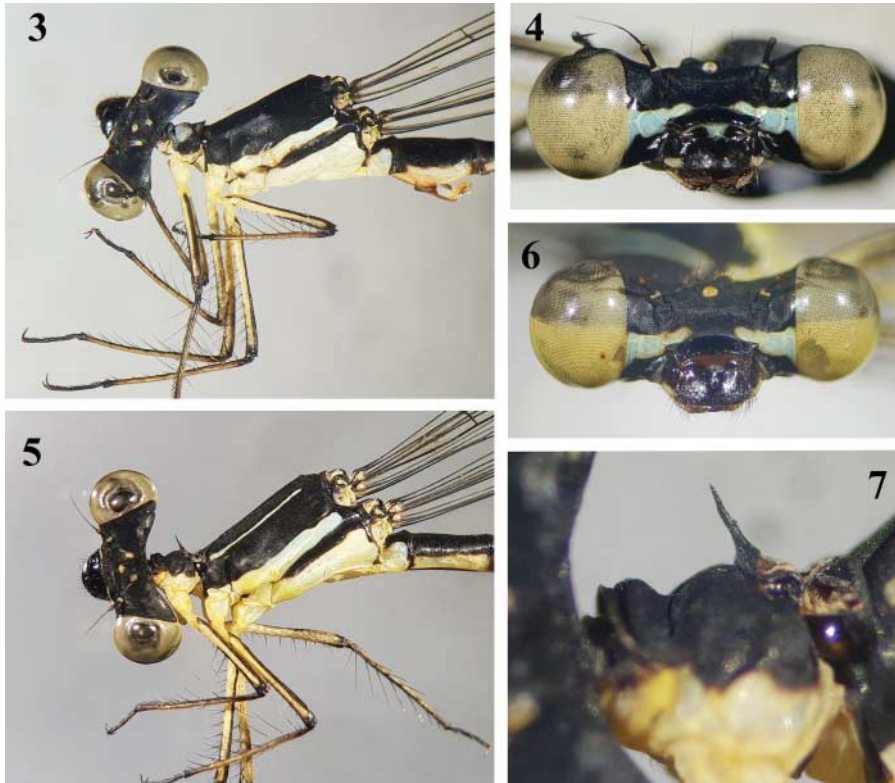
Holotype ♂: a mature male collected in a marsh near a hydroelectric dam at Dak Roong Commune (14.684 N, 108.766 E, alt. 923 m), K’Bang District, Gia Lai Province, Vietnam, 24 May 2018, Quoc Toan Phan leg. – Paratypes: 6 ♂, 2 ♀, same data as holotype; 1 ♀ (immature), mountain stream, Dak Hro village (14.366 N, 108.410 E, alt. 1130 m), Dak Roong Commune, K’Bang District, Gia Lai Province, Vietnam, 22 May 2018, Quoc Toan Phan leg. (Q.T. Phan’s coll.); 3 ♂ (1 immature), same location, 3 April 2018, Van Quang To leg. (V.Q. To’s coll.). A female specimen from the same location as the holotype is used for the description.

Type specimen deposition

Holotype, two paratype males and one paratype female collected from the site of the holotype by the first author will be deposited in the Zoological collection of Duy Tan University; the others are deposited in the authors’ private collections.

Other examined specimens

1 ♀, Dak Et bridge (15.302 N, 107.727 E, alt. 639 m), Deo Lo Xo, Phuoc Son District, Quang Nam Province, Vietnam, 25 May 2017, Haruki Karube leg. (Q.T. Phan’s coll.); 10 ♂, 1 ♀, Agrong village (15.907 N, 107.436 E, alt. 810 m), A Tieng Commune, Tay Giang District, Quang Nam Province, Vietnam, 16 August 2018, Van Quang To leg. (V.Q. To’s coll.).



Figs 3–7. *Coelliccia schorri* sp. n., (3, 4) holotype ♂ and (5–7) paratype ♀. (3, 5) head and thorax in lateral view; (4, 6) head in frontal view; (7) prothorax in lateral view.

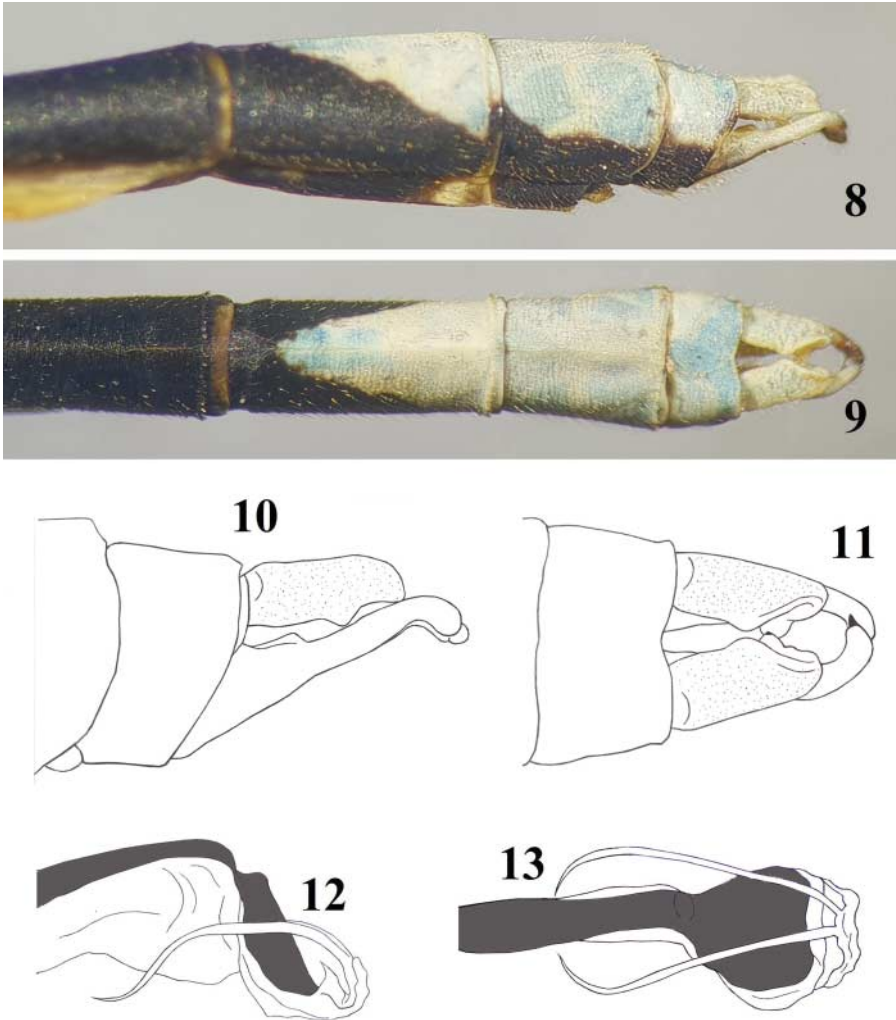
Diagnosis

The male of *Coelliccia schorri* sp. n. can be separated by the pruinosity on the synthorax and the genital ligula structure from all other species, apart from the species in *hayashii*-group, from which it can be separated on the basis of synthoracic pruinosity spot is smaller, dorsal S8–10 blue and white appendages (Figures 8, 9). The supposed female is characterized by a long erect horn on posterior pronotal lobe of prothorax (Figures 7, 14, 15), although somewhat similar to that of *C. rolandorum* Kosterin & Kompier, 2017 (see Kosterin & Kompier, 2017, Figure 9e, p. 522). However, the absence of the lapel structure of that species and the difference in body coloration will easily help to separate the females of these two species.

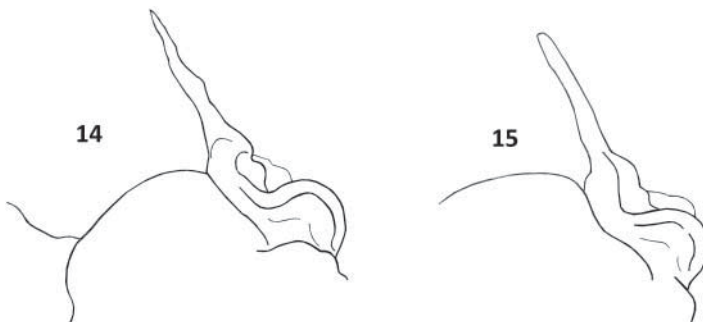
Description of holotype male

Head (Figures 3, 4) Labium pale yellow, tip of movable hooks black, labrum, mandibles black with distal edge of former blue, anteclypeus blue with two separated black spots, postclypeus entirely black, genae blue with black triangular mark extending to sides of antefrons, postfrons black, antennae black except apical part of first segment yellowish; epicranium entirely black with two small yellow spots adjacent to lateral ocelli, rear of head black dusted with pruinosity above (Figure 3) and with two slender yellowish postocular spots.

Thorax (Figure 3) Pronotum of prothorax black covered with blue-gray pruinosity; propleuron mostly black, ventral margin yellow. Synthorax largely black with gray-blue pruinosity and



Figs 8–13. *Coelliccia schorri* sp. n., structures of holotype ♂. (8, 9) abdominal tip including appendages in lateral and dorsal view; (10, 11) appendages in lateral and dorsal view; (12, 13) genital ligula in lateral and ventral view.



Figs 14–15. Posterior pronotal lobe of female prothorax. (14) specimen from K'Bang District, Gia Lai Province; (15) specimen from Tay Giang District, Quang Nam Province.



Figs 16–17. Photos of (14) paratype ♂ and (15) paratype ♀ of *Coeliccia schorri* sp. n. in Dak Roong Commune, K’Bang District, Gia Lai Province, taken in 24 May 2018 by Quoc Toan Phan.

bluish stripes as follows: mesepisternum matte black; mesepimeron and dorsal half of mesinfraepisternum black, the latter yellow ventrally, lower half of mesepisternum and anterior half of mesepimeron covered by dusting of blue-gray pruinosity, metepisternum yellow with confluent black along border with metepimeron and interrupted at the level of spiracle, remainder of thorax pale except for moderately thick black metapleural stripe.

Legs (Figure 3) Coxae and trochanters yellow; femora and tibiae yellow with flexor and extensor surfaces black; tarsi and armature black.

Wings hyaline, venation black. 21 Px in both FW and 20–21 in HW. Pterostigma brown with narrow pale margin covering 1–1.5 cells.

Abdomen (Figures 1, 10–11) S1 black dorsally, pale blue laterally; S2–7 black with slender bluish stripes ventrally; S8–10 blue dorsally and black lateroventrally (Figures 8, 9); blue covering most of S9–10, gradually narrowing towards anterior margin of S8, thus forming a blue triangular-shaped spot (Figure 9).

Genital ligula as in Figures 12, 13 with two flagella separating at base, each becoming narrower apically.

Anal appendages (Figures 10, 11) white; cerci slightly longer than S10, bearing a tooth mid-ventrally in lateral view (Figure 10). Apical third of cerci slightly swollen, apex rounded; in dorsal view (Figure 11) inner margin of cerci nearly touching at middle, then diverging posterodistally, apical half of cercus with a raised carina exposing concave medial surface thus



Figs 18–19. Habitat of *Coelliccia schorri* sp. n.: (18) the first author taking photos of the new species at the marsh near a hydroelectric dam (photographed by Mr Pham Anh Tuan); (19) mountain stream in Dak Hro village (photographed by Quoc Toan Phan).

exposing midventral tooth. Paraprocts longer than cerci, white apical fourth curved inward with black tooth.

Measurements (in mm) HW 24; abdomen + anal appendages 37.

Description of paratype female

As male unless otherwise stated:

Head (Figures 5, 6) Anteclypeus mostly brown (Figure 6).

Thorax (Figure 5) Propleuron yellow, prothorax entirely black with posterior pronotal lobe armed with a strongly erect spine (Figures 7, 14) directed anterodorsally. Mesepisternum with a complete slender yellow bluish antehumeral stripe.

Wings hyaline, venation black. 22 Px in FW and 19–20 in HW respectively. Pterostigma brown with narrow pale margin, covering 1.5 cells.

Abdomen (Figure 2) S1 black dorsally bluish yellow lateroventrally; S2–7 black dorsally, venter and ventral subapical half-ring yellow; S8 yellow, but basal third black dorsally; S9–10 black. Cerci black, ovipositor black with two obscure yellow spots dorsomedially and dorsoapically.

Measurements (in mm) HW 28; abdomen + anal appendages 37.

Coloration of male and female in life

Compound eyes bi-colored, green ventrally, black dorsally (Figures 14, 15). Pruinosity covering most of prothorax in live male specimens but not so clear in preserved holotype. The pruinose spot on synthorax of the holotype is less distinct than in the individual photographed in the field (Figures 3, 14). It is possible that the pruinosity was removed as a result of acetone treatment.

Variation in paratype males

Two paratype males from the same site as the holotype differ from the holotype by the following characters: mesepisternum with a short slender yellowish antehumeral stripe, blue of synthorax replaced by yellow; the abdominal blue extended further ventrally on S8–10. In an immature male, the coloration of abdominal tip and appendages replaced by yellow, not blue and white respectively as in mature specimens. Measurements 25.5 mm (HW) and 40.5 mm for abdomen + appendages.

Variation in paratype female

The other mature female specimen from the type locality is identical to the female described above. The pale body coloration of the immature female paler than in the holotype; middle pronotal lobe of prothorax with two oval yellow spots (whereas entirely black in mature female); pale lateral areas of synthorax yellow, not pale blue as in the mature female; S9–10 yellow, not entirely black as in the mature female.

The horn on the prothorax of the female specimens from Quang Nam Province is shorter and blunter (Figure 15) than that in the female specimen from Gia Lai Province used for the description above (Figure 14).

Habitat and ecology

In the typical locality, the new species was found in two different habitats at different elevations. The first one is a marsh near a hydroelectric dam (alt. 923 m) with muddy bottom (Figure 18). The second one is a shaded shallow narrow (about 1–3 m width) forest mountain stream in Dak Hro village (alt. 1130 m), with slow running water, with a swampy sandy bottom with many

large rocks (Figure 19). *Coeliccia rolandorum* Kosterin & Kompier, 2017, *C. hayashii* Phan & Kompier, 2016 and *C. scutellum* Laidlaw, 1932 were also found here.

Comparison

Coeliccia schorri sp. n. belongs to the *hayashii*-group by sharing the same characters of pruinosity on prothorax and synthorax (Figure 3) and the shape of genital ligula (Figures 12, 13). However, the new species differs from the other members of the group by the combination of following characters: a reduced pruinose spot, bluish abdominal tip and whitish appendages in the male (Figures 3, 8, 9). The pruinose synthoracic spot is rectangularly shaped in *Coeliccia hayashii* and *C. duytan* (Phan, 2017, figure 1a, b, p. 196) or most of the synthorax is pruinose, as in *C. mattii* (Phan & Kompier, 2016, Figure 3C, p. 410). In these three species the abdominal tip and appendages are yellow, not blue as in *C. schorri*. The shape of cerci of *Coeliccia schorri* somewhat similar to *C. hayashii* by its long, tapering into a point apically in lateral view (Figure 10) while those short and robust, blunt at tip in *C. mattii* (Phan & Kompier, 2016, Figure 4F) and *C. duytan* (Phan, 2017, figure 2b). *Coeliccia schorri* is similar to *C. duytan* in that the flagella of the genital ligula of both species are acute apically (Figures 12, 13; Phan, 2017, figure 2c, p. 197). The apical fifth of the genital ligula is spatulate in *C. hayashii* and broadly triangular in *C. mattii* (Phan & Kompier, 2016, figure 4C, 4G, p. 411). The erect long horn on the posterior prothoracic lobe of the female of *Coeliccia schorri* (Figure 7) separates it from *C. mattii* and *C. duytan* (the female of *C. hayashii* is still unknown).

Discussion

At present there are about 70 named species of the genus *Coeliccia* Kirby (Schorr & Paulson, 2018). The character of pruinose marks on the male prothorax and synthorax is rare and has been found only in the species of the *hayashii*-group and the male of *Coeliccia ambigua* Asahina, 1997. However, the genital ligula of *C. ambigua* lacks flagella (see Asahina, 1997, figure 57) which is inconsistent with the genital ligula of the *hayashii*-group. One other Vietnamese species that possesses pruinosity on the prothorax is *Coeliccia montana* Fraser, 1933 as reported by Asahina (1969) and Steinhoff and Do (2013). The identification of this species is erroneous, as will be demonstrated in an upcoming paper (Kompier pers. comm.). Although the male lacks pruinosity on the synthorax, the pruinosity on the prothorax and the shape of genital ligula suggest it should be placed in the *hayashii*-group. Interestingly all members of the *hayashii*-group have only been found in the Central Highlands of Vietnam (known as “Tay Nguyen”), which is a plateau, surrounded by high mountain ranges and mountains.

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References

- Asahina, S. (1969). South Vietnam Odonata taken by Mr. Y. Inoue. *Japanese Journal of Zoology*, 16(1), 1–18.
- Asahina, S. (1997). Asahina, S. (1996) Records of the northern Vietnamese Odonata taken by the Expedition members from the National Science Museum, Tokyo. 5. Coenagrionidae, Protoneuridae, Platycnemididae. *Bulletin of the National Science Museum, Tokyo, Ser. A.*, 23(1), 17–34.
- Kosterin, O. E., & Kompier, T. (2017). *Coeliccia rolandorum* sp. nov. from eastern Cambodia and southern Vietnam, the eastern relative of *C. kazukoae* Asahina, 1984 (Odonata: Platycnemididae). *Zootaxa*, 4341(4), 509–527.
- Paulson, D. R. (2018, September). Collecting dragonflies (Odonata) and maintaining a collection. Available from <https://www.pugetsound.edu/academics/academic-resources/slater-museum/biodiversity-resources/dragonflies/collecting-preserving-specim/>
- Phan, Q. T. (2017). *Coeliccia duytan* sp. nov. from the Central Highlands of Vietnam (Odonata: Platycnemididae). *Zootaxa* 4324(1), 195–200. <https://doi.org/10.11646/zootaxa.4324.1.12>
- Phan, Q. T., & Kompier, T. (2016). Description of two new species of *Coeliccia* from Vietnam (Odonata: Platycnemididae). *Zootaxa*, 4196(3), 407–414. <http://doi.org/10.11646/zootaxa.4196.3.4>
- Phan, Q. T., & Tran, T. T. T. (2018). Description of *Coeliccia phamiha* sp. n. from central Vietnam (Odonata: Platycnemididae). *International Journal of Odonatology*, 21(1), 45–53. <https://doi.org/10.1080/13887890.2017.1419885>
- Schorr, M., & Paulson, D. (2018, September). World Odonata list. Available from <https://www.pugetsound.edu/academics/academic-resources/slater-museum/biodiversity-resources/dragonflies/world-odonata-list2/>
- Steinhoff, P. O. M., & Do, M. C. (2013). Notes on some *Coeliccia* species from Vietnam (Zygoptera: Platycnemididae). *Odonatologica*, 42(4), 347–357.