

## Description of *Coelliccia phamiha* sp. n. from central Vietnam (Odonata: Platycnemididae)

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*Coelliccia phamiha* sp. n. (holotype male and paratype female from Dak Et bridge, Deo Lo Xo, Phuoc Son district, Quang Nam Province, Central Vietnam, deposited in zoological collection of Duy Tan University) is described based on both sexes. Judging by the structure of genital ligula and appendages of the male and prothorax of the female it seems close to *C. mienTrung* Kompier & Phan, 2017, but it is easily separated by its markings and structural details. Differential diagnosis between the new species and its allied species is provided.

<http://www.zoobank.org/urn:lsid:zoobank.org:pub:C45FDC5F-CC12-4312-A4AB-7ED4E76B8790>

**Keywords:** dragonfly; new species

### Introduction

Males of the damselfly genus *Coelliccia* Kirby, 1890 are noted for their colorful blue, orange or yellow markings on the thorax, abdominal tip and anal appendages; females are generally not as vividly colored, but have varying patterns of mostly yellowish stripes or sometimes dots on the thorax. The male genital ligula shows remarkable variation. Many have two apical flagella, but their positioning is variable. In Vietnam, Kosterin and Kompier (2017) listed a 19 *Coelliccia* species (including *C. ambigua* Asahina, 1997) and added a new species *C. rolandorum* Kosterin & Kompier, 2017. *C. yamasakii* Asahina, 1984 also occurs in Vietnam (Steinhoff & Do, 2013), and To, Phan, and Tran (2017) added *C. bhriulieci* To, Phan & Tran, 2017, bringing the current total to 22 species. During a field survey between Quang Nam and Kon Tum Provinces of central Vietnam, we discovered a new species, *Coelliccia phamiha* sp. n., with blue dorsal markings in the form of large shields (Figure 1b–c). Such large blue markings are shared with several southeast Asian *Coelliccia* species (for instance see Dow, 2016), and are especially similar to those seen in *C. uenoi* Asahina, 1997 of northern Vietnam (Figure 4b). However, the genital ligula of the male and prothorax structure of the female are more similar to *C. mienTrung* Kompier & Phan, 2017, and *C. pyriformis* Laidlaw, 1932 (Kompier & Phan, 2017). This structural similarity also extends to three other species currently being described, two of which also have somewhat similar dorsal shields (Kompier, pers. comm.). These two species however clearly differ in other aspects of coloration and structure (Kompier, pers. comm.) The combination of body coloration, structure

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of genital ligula, and prothorax of the female readily help to separate *C. phamiha* from all other known southeast Asian *Coelliccia* species.

## Materials and methods

The new species was photographed and collected from the type locality by the first author. Specimens of *C. mienstrup* were collected in Bach Ma National Park, Thua Thien Hue Province on 28 June 2017 by the first author and his colleagues. Photos of *C. uenoi* and *C. mienstrup* in nature reproduced here were taken by digital camera Nikon D3300 (Nikon factory, Ayuthaya, Bangkok, Thailand) with lens Tamron AF 70–300mm F4–5.6 (Optical Foshan Co. Ltd., Foshan, Guangdong, China) in Cuc Phuong National Park, Ninh Binh Province (5 July 2010) and Bach Ma National Park, Thua Thien Hue Province (28 June 2017) respectively by the first author.

Morphological nomenclature used for damselfly structures mostly follows Dow (2016).

Preparation of specimens follows standard practice as for instance described in Paulson (2017): specimens were collected in the field by net, then placed in envelopes until dead, then steeped in 100% acetone for 8–12 hours, then removed and left to dry for 4–6 hours.

Photos were taken with Axiocam Erc 5s camera on a Zeiss Stemi 508 stereomicroscope (Carl Zeiss AG, Oberkochen, Germany). Illustration of figures by using Adobe Photoshop 7.0 (Adobe Systems Incorporated, Mountain View, California, U.S.).

Abbreviation: S1–10 = abdominal segments 1 to 10.

## Taxonomy

### *Coelliccia phamiha* sp. n.

(Figures 1, 2, 3a, 4a)

#### *Etymology*

The specific name “*phamiha*” is derived from the full name of the first author’s daughter, Phan Minh Hanh: *phamiha*, a noun in apposition.

#### *Type specimens*

Holotype ♂: male from 15.30250° N 107.72777° E, alt. 639 m, Dak Et bridge, Deo Lo Xo, Phuoc Son District, Quang Nam Province, central Vietnam, 25 May 2017, Quoc Toan Phan leg. – Paratypes: 5 ♂, 3 ♀, same date, location and collector as holotype. The holotype male, 2 male and 2 female paratypes of the new species will be deposited in the zoological collection of Duy Tan University, Da Nang, Vietnam; the other paratypes are deposited in the first author’s private collection.

#### *Diagnosis*

The male of *Coelliccia phamiha* can be distinguished from all other southeast Asian *Coelliccia* by the combination of the following characters: a large blue shield on the mesepisternum; S9–10 black and caudal appendages pale yellowish; terminal segment of genital ligula with a flap-like apical fold and flagella originating laterally from its apical corners, their apical half wider (Figure 2a–d). The female of *Coelliccia phamiha* can likely be separated from most other *Coelliccia* species by anterior and posterior pronotal lobes of prothorax entirely black but all yellow middle pronotal lobe (Figure 3a), in combination with the rounded triangular extension of the posterior pronotal lobe. However, not all females of *Coelliccia* species are unknown.

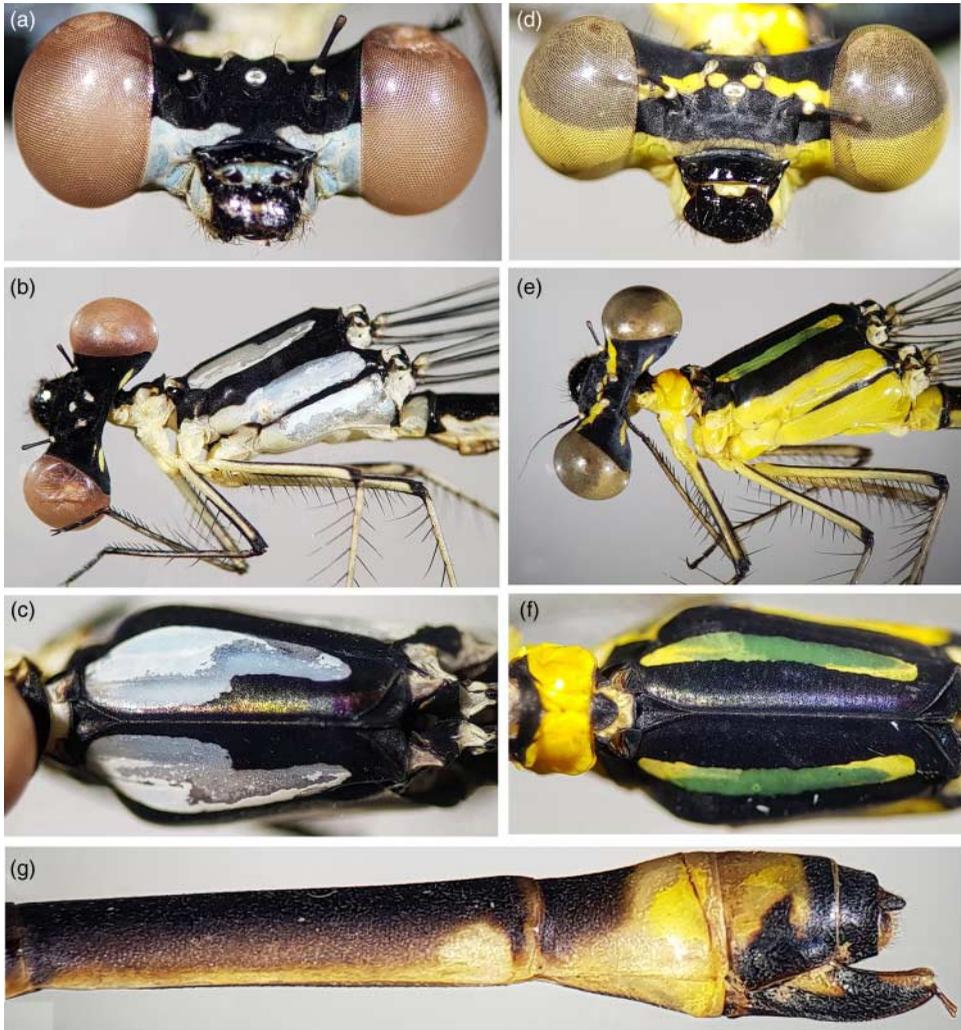


Figure 1. *Coeliccia phamiha* sp. n. (a–c) holotype ♂; (d–g) paratype ♀. (a, d) head in frontal view; (b, e) head and thorax in lateral view; (c, f) thorax in dorsal view; (g) tip of abdomen.

#### *Description of holotype male*

**Head** (Figure 1a, b). Labrum shining black with dark oblong yellow mark centrally. Genae blue. Mandibles blue basally becoming black distally. Anteclypeus blue with one black spot on either side. Postclypeus entirely black. Antefrons with blue extending dorsally almost to base of antennae and extending over the postclypeus, but interrupted medially by black to largely black epicranium. Antennae black except for whitish dorsally on first and base of second segments. Epicranium matte black with a small white spot next to each lateral ocellus. Rear of head black with a narrow yellow tear-shaped postocular spot.

**Thorax** (Figure 1b, c). Anterior and posterior pronotal lobes of prothorax entirely black; middle pronotal lobe black dorsally with pale yellow area laterally; notopleural suture and propleuron entirely yellowish. Synthoracic pattern blue and black; a large blue shield covering most of mesepisternum, abruptly narrowed medially at upper half and gradually narrowing to a parallel stripe half as wide as base (Figure 1c). Mesepimeron almost completely black with the

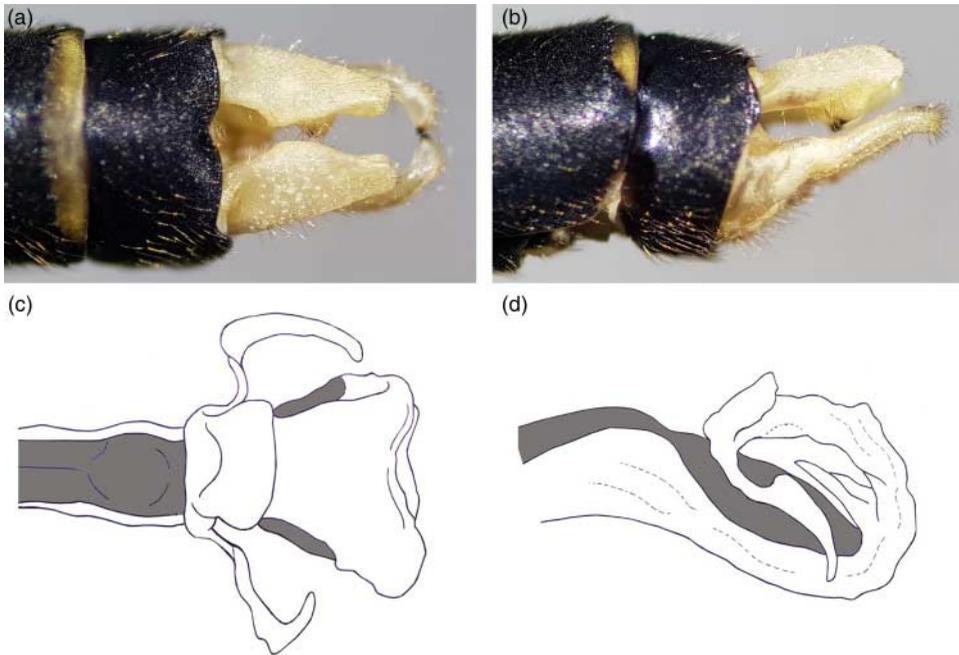


Figure 2. *Coeliccia phamiha* sp. n., holotype ♂. (a) caudal appendages, dorsal view; (b) caudal appendages, lateral view; (c) genital ligula, dorsal view; (d) genital ligula, lateral view.

blue marking from the metepisternum just extending dorsally of the suture. Metepisternum and metepimeron blue except for narrow metapleural black stripe extending ventrally along anterior margin of metinfraepisternum. Mesinfraepisternum black except for small yellow spot bordering mesocoxa.

**Legs** (Figure 1b). Coxae yellowish. Femora and tibiae pale yellow with flexor and extensor surfaces black. Tarsi and spines black.

**Wings** hyaline, 19–20 postnodal crossveins in both wings. Pterostigma brown with narrow pale margin, covering 1.5 underlying cells.

**Abdomen.** Black with pale yellow markings as follows: S1 largely yellowish, black dorsally; S2 has dorsal half black and ventral half yellowish white; S3–8 black but pale ventrally which expands into a subapical half-ring at the posterior margin of each segment; S9 black except for pale dorsal half of posterior margin and pale venter; S10 entirely black.

**Genital ligula** (Figure 2c, d) the terminal segment with a flap-like fold and with a pair of long flagella lateroapically; the apical half of each flagellum widens somewhat into a scimitar-like shape, as shown in Figure 2d.

**Caudal appendages** (Figure 2a, b) pale yellow, typical shape to the genus with cercus slightly longer than S10, each with a tooth-bearing lobe on the third quarter of its inferior margin and tipped at its proximal corner with a black tooth; paraproct longer than cercus, gently rising with tip curved inward and ending in a black tooth.

**Measurements** (in mm). Hind wing 29; abdomen + appendages 45.

*Description of paratype female*

**Head** (Figure 1d, e). Head similar to male excepted following characters: labrum entirely black; two spots on anteclypeus extend to its inferior margin; the yellow extends over the postclypeus

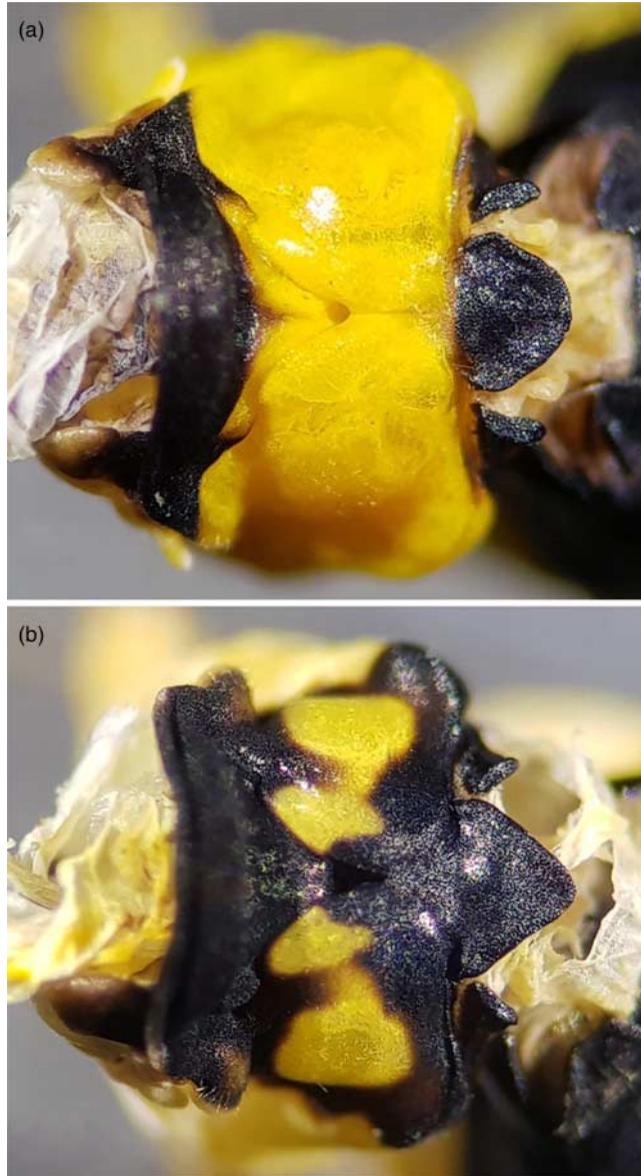


Figure 3. *Coeliccia* spp. prothorax ♀. (a) *C. phamiha* sp. n.; (b) *C. mientrung*, Bach Ma National Park, 28 June 2017.

to form an uninterrupted yellow band. The yellow band across the epicranium extends from the seam of the left compound eye to the seam of the right compound eye, running behind the antennae to the lateral ocelli and from there to the central ocellus.

*Thorax* (Figures 1e, f, 3a). Anterior and posterior pronotal lobes of prothorax entirely black, middle pronotal lobe, notopleural suture and propleuron yellow. The posterior margin of the posterior pronotal lobe with three structures: a larger central flattened protrusion, triangular, but apical margin rounded, and a smaller dorsoposteriorly directed earlike structure that curve apically on either side (Figure 3a). Mesepisternum and mesepimeron of synthorax black with only a distinct green, parallel-sided antehumeral stripe (Figure 1e, f). Remainder of thorax as in



Figure 4. *Coeliccia* spp. in nature. (a) *C. phamiha* sp. n. in tandem; (b) *C. uenoi* ♂; (c) *C. mientrung* ♂; (d) *C. pyriformis* ♂ (rearranged from figure 6 in Kompier & Phan, 2017).

male but yellow instead of blue and metapleural stripe narrower and ending above metathoracic spiracle.

*Wings* hyaline, 18 postnodal crossveins in both wings. Pterostigma brown with narrow pale margin, covering 1.5 underlying cells.

*Abdomen*. S1 yellow, but dorsum narrowly black and whole posterior margin black; S2 black with pale venter; S3–7 black with pale yellow posterior subapical half-ring, venter pale yellowish, S3 also with anterior apical half-ring; S8 yellow, but anterior half of dorsum blackish; S9 yellow with black posterior margin; S10 entirely black. Cerci black, ovipositor black with small yellow anterior spot and dorsum of apex (Figure 1g).

*Measurements* (in mm). Hind wing 28; abdomen appendages 41.5.

#### *Coloration of male and female in life*

Compound eyes of *C. phamiha* are two-colored, blue ventrally and black dorsally in the male and greenish ventrally black dorsally in the female. Synthoracic pattern of the male is shining blue in life (Figure 4a) and becomes pale blue after acetone treatment (Figure 1b, c). Abdomen of female S3–7 black with bluish-white marking (Figure 4a), not pale yellow as in the female using for the description.



Figure 5. Habitat of *Coeliccia phamiha* sp. n. in Dak Et bridge, Quang Nam Province, central Vietnam. (a) rocky stream, viewed from bottom up; (b) the same, another section, viewed from above.

#### *Variation in paratype males*

Two paratype males differ from the holotype male by the lateral yellow areas on middle pronotal lobe being smaller. In three paratype males the posterior margin of S10 has a small yellow spot, not entirely black as in holotype. Hind wing 26–29.5 mm; Abdomen (including appendages): 43–46 mm. Range of postnodal crossveins 17–20.

#### *Variation in paratype females*

Paratype females show little morphological variation. Measurement ranges are hind wing 27–30 mm; abdomen + appendages 40–44 mm and 16–18 postnodal crossveins. One female has a yellow rather than green antehumeral stripe.

#### **Habitat and ecology**

*Coeliccia phamiha* was found along a small side branch of a large (10–12 m wide) rocky stream. This branch was probably created by rainwater erosion from the mountain resulting in a narrow (about 1–2 m) stream with large stones, and poorly lighted, humid, shaded by bushes of broadleaf trees within pristine forest (Figure 5). Only one other species, the widespread *C. scutellum* Laidlaw, 1932, was found here.

#### **Discussion**

The male of *Coeliccia phamiha* shares the shape of the genital ligula (with an apical fold of the terminal segment and two flagella originating laterally from its apical margin) with at least

five species in Vietnam including *C. mientrung*, *C. pyriformis* and three other species currently being described (Kompier & Phan, 2017; Kompier, pers. comm.). With three of these, including *C. mientrung* and *C. pyriformis*, it also shares the basic structure of the appendages (Figure 2a, b). However, it is characterized by the apical half of flagella widening into a scimitar-like shape (Figure 2c, d) and black S9–10 (Figure 2a, b). The male *C. phamiha* is also easily distinguished from *C. mientrung* and *C. pyriformis* by the large blue shield-like markings covering most of the mesepisternum (Figure 1b, c). In *C. mientrung* (Figure 4c) and *C. pyriformis* (Figure 4d) these are reduced to antehumeral stripes, short in the former and longer and curved in the latter. S9–10 are yellow dorsally in *C. mientrung* and *C. pyriformis* (Figure 4c, d); *C. pyriformis* differs from both *C. phamiha* and *C. mientrung* by the direction of the flagella of the genital ligula, which run perpendicular to the terminal segment. Their apices are hammerhead shaped (Kompier & Phan, 2017, figure 2C, p. 133). The female of *C. phamiha* differs from *C. mientrung* by the entirely black labrum and from both *C. mientrung* and *C. pyriformis* as follows: (1) frontal yellowish pattern forming a continuous band above postclypeus (Figure 1d) but interrupted in *C. mientrung* and all black above postclypeus in *C. pyriformis* (Kompier & Phan, 2017, figure 3B, F, p. 134); (2) middle lobe of prothorax entirely yellow (Figure 3a), but middle lobe black-yellow in *C. mientrung* and *C. pyriformis*; (3) central protrusion of posterior pronotal lobe triangular, rounded apically (Figure 3b), but squarish in *C. pyriformis* and posterior lobe projection rounded or triangular in *C. mientrung* (Kompier & Phan, 2017, figure 3D, p. 134). The closest in appearance to *C. phamiha* in Vietnam is *C. uenoi*. *C. uenoi* similarly has large blue shield-like markings on dorsum of synthorax (Figure 4b). *C. phamiha* can be easily separated from *C. uenoi* by the shape of the apical flagella of the genital ligula widening, forming a scimitar-like shape in *C. phamiha*, but narrow towards the apex in *C. uenoi*; by S9–10 being mostly black, but yellow in *C. uenoi*; the blue on the metepisternum and metepimeron in *C. phamiha* is broader, covering metinfraepisternum (Figure 1b) while in *C. uenoi*, this marking restricted at the level of metathoracic spiracle with metinfraepisternum entirely black (Figure 4b). Finally, in the female of *C. phamiha* the structure of posterior pronotal lobe is very simple with the central protrusion rounded apically (Figure 3a), while in *C. uenoi* the posterior lobe complex structurally with the central protrusion curving backward, forming two laterally pointed posterior lobe (Asahina, 1997, figure 33, p. 25).

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## References

- Asahina, S. (1997). Records of the Northern Vietnamese Odonata taken by the expedition embers from the National Science Museum, Tokyo. 5. Coenagrionidae, Protoneuridae, Platycnemididae. *Bulletin of the National Science Museum, Series A Zoology*, 23(1), 17–34.
- Dow, R. A. (2016). Revision of the genus *Coeliccia* Kirby in Borneo part II: Two new species from the *membranipes*-group, with a redescription of *C. macrostigma* Laidlaw (Odonata: Zygoptera: Platycnemididae). *Zootaxa*, 4184(1), 79–103. doi:10.11646/zootaxa.4184.1.5
- Kompier, T., & Phan, Q. T. (2017). *Coeliccia mientrung* sp. n. from central Vietnam (Odonata: Platycnemididae). *Zootaxa*, 4247(2), 131–140. doi:10.11646/zootaxa.4247.2.4

- 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: Platynemididae). *Zootaxa*, 4341(4), 509–527. doi:10.11646/zootaxa.4341.4.4
- Paulson, D. R. (2017, October). Collecting dragonflies (Odonata) and maintaining a collection. Available from <https://www.pugetsound.edu/academics/academic-resources/slater-museum/biodiversity-resources/dragonflies/collecting-preserving-specim>
- Steinhoff, P. O. M., & Do, M. C. (2013). Notes on some *Coeliccia* species from Vietnam (Zygoptera, Platynemididae). *Odonatologica*, 42(4), 347–357.
- To, V. Q., Phan, Q. T., & Tran, V. B. (2017). Description of *Coeliccia bhriulieci* sp. nov. (Odonata: Zygoptera: Platynemididae). *Zootaxa*, 4341(2), 279–282. doi:10.11646/zootaxa.4341.2.9