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Taxonomic review of the genus *Eurystylus* Stål (Hemiptera: Miridae: Mirinae) from Vietnam, including a new species description

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Abstract

The plant bug genus *Eurystylus* Stål is taxonomically reviewed in Vietnam. Five species are recognized including one new species, *Eurystylus yasunagai* **sp. nov.** and a new record for the country, *E. sauteri*. Detailed morphological descriptions and diagnostic figures are provided for all species. An identification key to the Vietnamese fauna is also presented.

Key words: new species, plant bugs, Southeast Asia, taxonomy, true bugs

Introduction

The genus *Eurystylus* Stål, 1871 (Hemiptera: Miridae: Mirinae) currently comprises 34 described species and is distributed across the Oriental, Palearctic, Afrotropical, and Australian regions (Schuh 2002–2013). Although the genus is not particularly species-rich, several members exhibit remarkably broad distributions, with records extending from Central to northern Africa and from Central Asia to far eastern Russia (e.g., *E. bellevoyei* (Reuter, 1879) and *E. coelestialium* (Kirkaldy, 1902), respectively). Such patterns suggest high ecological adaptability.

Within Mirinae, *Eurystylus* is morphologically distinctive and relatively easy to recognize at the generic level, based on several morphological characters: the noticeable antennal structure (flattened first antennal segment and clavate second antennal segment), a pair of recognizable spots usually presenting on frons and pronotum; stout pronotal collar; strongly declivous cuneus; and elevated body in lateral view (Yasunaga *et al*. 2017). However, many species of *Eurystylus* share similar external features, which may result in newly collected material being tentatively identified as known species without careful morphological examination. In several cases, minor characters such as the coloration of the apical antennal segment or the lateral thoracic structures may be oeverlooked in routine surveys but are critical for correct identification. The need for detailed morphological investigation, combined with the perceived widespread nature of species, may have contributed to inflated distributional ranges and/or the underestimation of actual diversity.

In addition to potentially cryptic undescribed species, historical studies of *Eurystylus* have revealed a notable number of synonymies. Some species (e.g., *E. bellevoyei*; *E. lineaticollis* Poppius, 1911) originally described independently from different regions or countries were later synonymized through comprehensive taxonomic reviews (e.g., Stonedahl 1995; Yasunaga *et al*. 2017). These synonymy cases are mostly associated with species described in the early to mid-20th centry, a period when limited access to specimens from other regions and insufficient scholarly

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exchange likely contributed to the redundant description of widely distributed species. Moreoever, some *Eurystylus* species have a broad host range including various ornamental plants (Yasunaga *et al*. 2017), which may facilitate human-mediated introductions and complicate our understanding of their true distribution. Taken together, these factors highlight the importance of accumulating diverse taxonomic data on this genus.

No comprehensive review of *Eurystylus* has yet been conducted for mainland Southeast Asia. Vietnam, which stretches longitudinally along the eastern Indochina Peninsula and encompasses diverse landscapes such as coastal lowlands and central highlands, occupies a substantial portion of the region. In genera like *Eurystylus*, which exhibit broad host ranges, high ecological adaptability, wide distributions, and potentially unrecognized diversity, taxonomic research in Vietnam can provide not only critical insights into local biodiversity – such as the discovery of new species and/or new record – but also a valuable foundation for future studies across the Indochina Peninsula and adjacent areas. Furthermore, this study extends previous work focused on the Palaearctic Region into the Oriental Region, contributing to a more comprehensive understanding of species diversity and distribution in this genus.

In the present study, the *Eurystylus* fauna of Vietnam is reviewed, resulting in the discovery of one new species and one newly recorded species. Detailed morphological information for both new taxa is presented. Additionally, a key to *Eurystylus* species in Vietnam is provided.

Materials and Methods

Photographs of the examined specimens were taken using a ZEISS Stemi 508 stereomicroscope equipped with a BKONV300 Digital Camera. The figures were prepared using Adobe Photoshop 2020. Measurements were taken using ToupView software installed on the same camera and were provided in millimeters (mm). To examine male and female genitalia, the abdomen was detached and immersed in a 10% KOH solution for 5 minutes at 70°C until the internal structures became observable. The type specimens are deposited in the Zoological Collection of Duy Tan University, Da Nang, Vietnam (ZCDTU). Additional specimens examined are deposited in the Laboratory of Systematic Entomology, Chungnam National University (CNU), and in Institut royal des Sciences naturelles de Belgique, Département d'Entomologie, Brussels, Belgium (ISNB). The terminology for external and genital morphological structures primarily follows Yasunaga *et al*. (2017) and partially Tatarnic & Cassis (2008). As the majority of references for the species for Miridae are already compiled in the online catalogue by Schuh (2002–2013), this paper includes only additional references for species described after that period.

Results

Taxonomy

Genus *Eurystylus* Stål, 1871

Eurystylus Stål 1871: 671. Type species: *Eurystylus costalis* Stål, 1871. Yasunaga *et al.* 2017: 305; Yasunaga *et al*. (2023).
Eurycyrtus Reuter 1879: 33 (syn. by Reuter, 1910a: 166). Type species: *Eurycyrtus bellevoyei* Reuter, 1879.
Olympiocapsus Kirkaldy 1902: 255 (syn. by Reuter, 1910b: 51). Type species: *Olympiocapsus coelestialium* Kirkaldy, 1902.
Sabellicus Distant 1904a: 114 (syn. by Carvalho, 1952: 88). Type species: *Capsus apicifer* Walker, 1873.

Eurystylus yasunagai Kim & Jung sp. nov.

(Figs 1A–E, 2A–D)

Diagnosis. Recognized by the almost fuscous or blackish brown dorsum; pronotum entirely blackish brown; propleuron mostly blackish brown, anterior part with creamy yellows band; posterior part of mesepisternum creamy yellow, plate dorsal to mesepisternum entirely creamy yellow, forming a continuous yellowish band; mesepimeron and metepimeron entirely blackish brown (Fig. 1E); scutellum almost blackish brown with indistinct pale marking apically; hemelytra entirely blackish brown; hypophysis of left paramere broad and rounded; right paramere slightly curved; endosoma membranous with three sclerites (Fig. 2A–D).

Description. **MALE:** *Coloration*: unicolorous, mostly fuscous or blackish brown. **Head:** mostly fuscous with brownish spots near compound eye; antennae mostly fuscous; first segment entirely fuscous; second, third and fourth segments mostly fuscous except for pale base; labium mostly fuscous except for brownish third labial segment. **Thorax:** pronotum entirely fuscous; propleuron mostly fuscous, with creamy yellow band along anterior margin; mesepisternum partly creamy yellow and fuscous, posterior part creamy yellow, above plate entirely creamy yellow; mesepimeron and metepimeron entirely fuscous; scent efferent system mostly creamy yellow; scutellum mostly entirely or mostly fuscous except for indistinct pale apex; hemelytra entirely fuscous; legs mostly fuscous; middle tibiae with pale marking medially; hind tibiae with pale ring medially. **Abdomen:** partly brown and fuscous. *Surface and vestiture*: body weakly glossy, minutely and vaguely punctured, covered with golden or silver tuft of hair. *Structure*: body elongated, length 5.11–5.23. **Head:** prognathous, width longer than length; vertex wider than single compound eye width; antennae shorter than body length; first segment flattened, longer than head width, as long as 0.6 times second segment; second segment clavate, longer than combined third and fourth segment; third and fourth segments linear, third segment longer than fourth segment; proportion of first to fourth antennal segments 1.15: 2.05: 0.83: 0.57; labium reaching middle coxae. **Thorax:** pronotum hexagonal, longitudinal length as long as 0.65 times basal maximal width, posterior margin sinuate; calli weakly swollen; pronotal collar stout, broad, diameter subequal to maximum diameter of first antennal segment; scutellum flat, anterior width shorter than length, as long as 0.68 pronotal maximal width, longitudinal length longer than commissure length; lateral margin of hemelytra almost straight; cuneus small. **Abdomen:** rounded, reaching to apex of cuneus. **Genitalia:** left paramere C-shaped, hypophysis broad and rounded, apex sharp, sensory lobe narrow; right paramere slightly curved, hypophysis hook-shaped; endosoma membranous with three sclerites; primary lobal sclerite (*pl*) straight, its apex enlarged and blunt; median lobal sclerite (*ml*) long, tapered to apex; third lobal sclerite (*tl*) short, tapered to apex (Fig. 2A–E). **FEMALE:** *Coloration*: as in male except for second antennal segment brown and dark brown with small pale spot in dorsal side. *Surface and vestiture*: as in male. *Structure*: as in male, except for body length, 5.48 and proportion of antennal segments: 1.25: 2.04: 0.78: 0.57.

Measurements (in mm). Male (n=4)/Female (n=1) Body length, clypeus–apex of membrane: 5.11–5.23/5.48; head length, excluding collar: 0.79–0.81/0.82; head width, including compound eyes: 1.08–1.10/1.12; vertex width: 0.44–0.45/0.45; 1st antennal segment length: 1.15–1.18/1.25; 2nd antennal segment length: 2.05–2.09/2.04; 3rd antennal segment length: 0.83–0.84/0.78; 4th antennal segment length: 0.57–0.58/0.57; total antennal length: 4.60–0.69/4.63; mesial pronotal length: 1.30–1.32/1.24; posterior pronotal maximal width (straight): 1.97–1.98/1.97; anterior scutellar width: 1.32–1.34/1.34; mesial scutellar length: 1.28–1.30/1.34; commissure length: 1.11–1.14/1.05; maximal width across hemelytron: 1.09–1.10/1.18

Biology. This species was collected from the flowers of broad-leaved trees.

Distribution. Vietnam (Southern).

Etymology. The species is named in honor of Dr. Tomohide Yasunaga, a prominent specialist in the taxonomy of Miridae, in recognition of his extensive contributions to the family, particularly in the Oriental Region including studies on the genus *Eurystylus*. The name is a noun in the genitive case.

Material examined. **[ZCDTU] Holotype:** 1♂, Loc Tan (11.6463°N, 107.7036°E, 880 m altitude), Bao Lam District, Lam Dong Province, Vietnam, 30.iv.2025, J. Kim leg. (DTUHMM0060); **[ZCDTU] Paratypes:** 3♂♂1♀, same data as holotype (DTUHHM0061-0064).

Discussion. The new species differs from most congeners by the unicolorous fuscous dorsum. *Eurystylus yasunagai* **sp. nov.** is distinguished from the most similar congener from Taiwan, *E. jingfui* Yasunaga *et al*. 2017 by entirely fuscous posterior margin of propleuron (vs. posterior margin with white band); posterior part of mesepisternum creamy yellow (vs. mesepisternum entirely fuscous); plate dorsal to mesepisternum entirely creamy yellow (vs. mostly fuscous with yellowish margin); metepimeron entirely fuscous (vs. posterior part metepimeron white); and endosoma with three sclerites (vs. endosoma with one long and apically sharp sclerite).

Meanwhile, in the original description of *E. jingfui*, Yasunaga *et al*. (2017) mentioned a population from Thailand and Southeast Asia that resembles *E. jingfui* but have white longitudinal striae on the lateral sides. Considering both external morphology and distribution, this population is most likely our new species, *E. yasunagai* **sp. nov.**

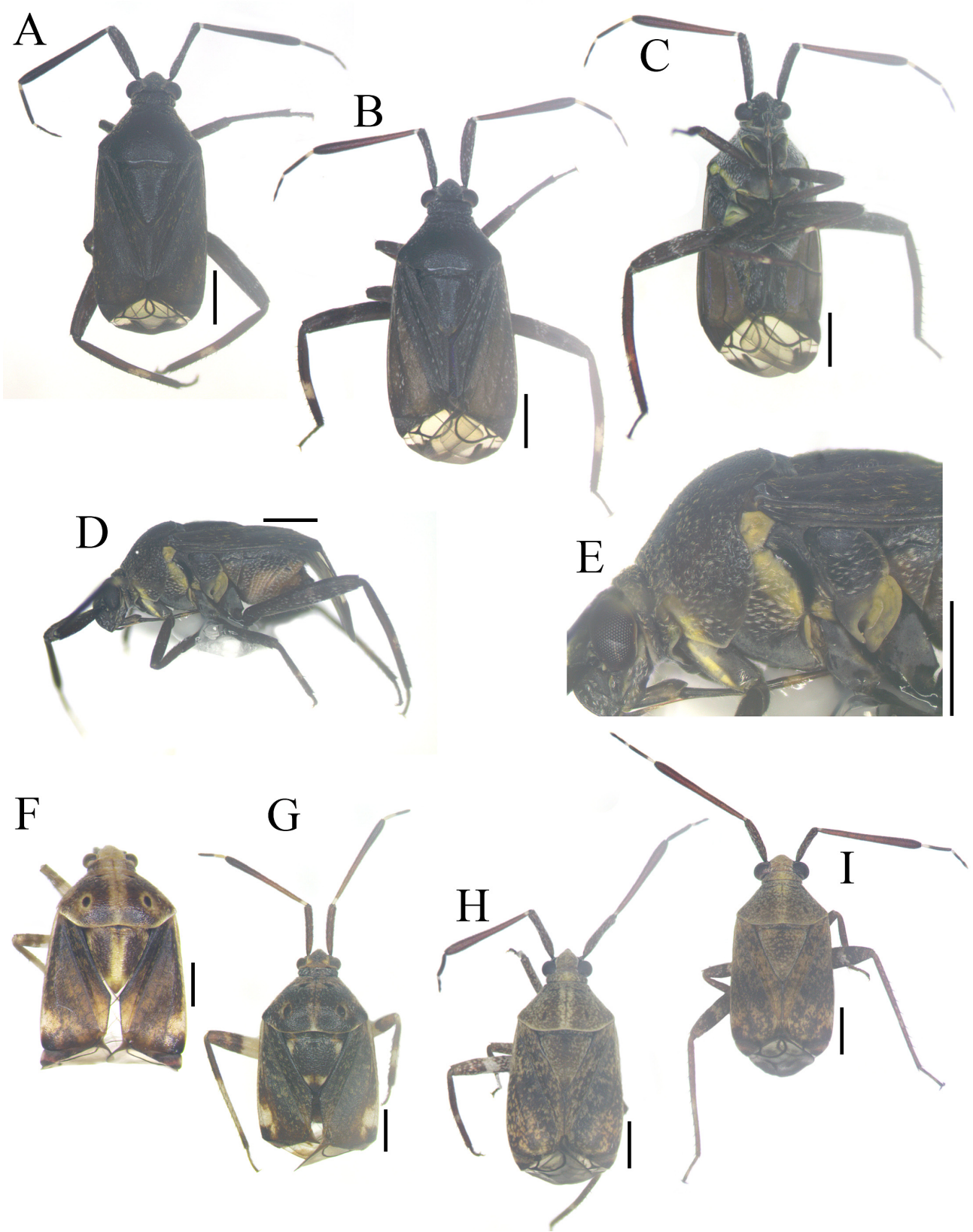

FIGURE 1. Habitus of *Eurystylus* spp. A–E: *Eurystylus yasunagai* **sp. nov.**; F: *E. burmanicus*; G: *E. coelestialium*; H: *E. ryukyus*; I: *E. sauteri*; A: Holotype male in dorsal view; B: *ditto*, in lateral view; C: Paratype female in dorsal view; D: *ditto*, in ventral view; E: thorax in lateral view. Scale bar: 1 mm.

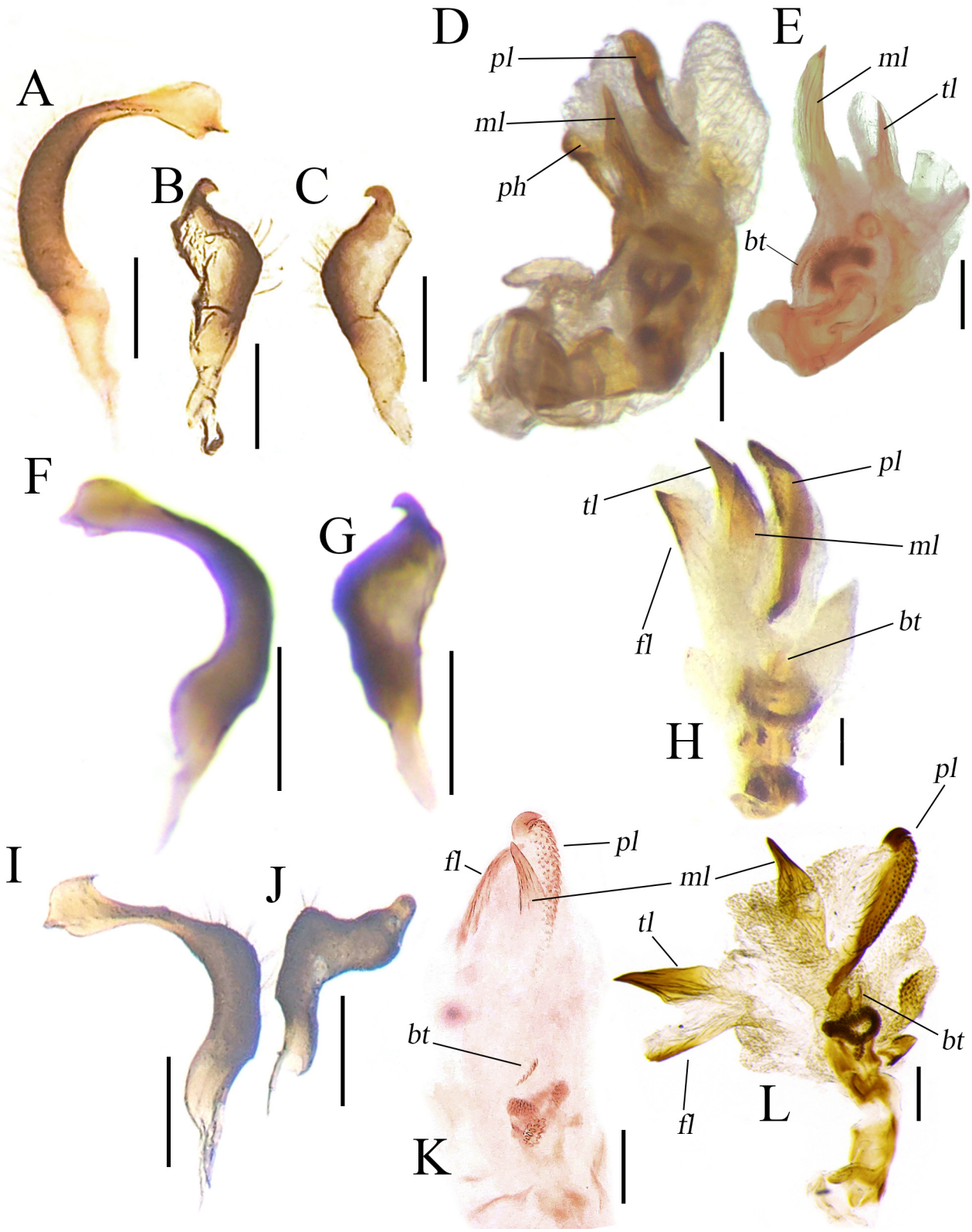

FIGURE 2. Male genitalia of *Eurystylus* spp. A–E: *Eurystylus yasunagai* **sp. nov.**; F–H: *E. ryukyus*; I–L: *E. sauteri*; A, F, I: left paramere; B–C, G, J: right paramere; D–E, H, K, L: endosoma; *bt*: basal sclerotized teeth; *fl*: fourth lobal sclerite; *ml*: median lobal sclerite; *ph*: phallotheca; *pl*: primary lobal sclerite; *tl*: third lobal sclerite. Scale bar: 0.2 mm.

***Eurystylus burmanicus* (Distant, 1904)**
(Fig. 1F)

Paracalocoris burmanicus Distant 1904b: 450.
Eurystylus burmanicus Yasunaga *et al*. 2017: 304, fig. 2E; Kim *et al*. 2025: 29.

Diagnosis. Recognized by the following combination of characters: dorsum generally brown to dark brown with a pair of ocellate spots on pronotum; pronotum mostly brown with paler longitudinal stripe; scutellum brown with pale longitudinal stripe; legs partly pale brown and dark brown; femuora mostly pale brown, apical part dark brown; front and middle tibia mostly dark brown with pale spot in middle; hind tibiae mostly pale brown, 1/3 basal part dark brown; tarsi entirely dark brown.

Redescription. **FEMALE:** *Coloration*: partially brown to dark brown. **Head:** mostly almost unicolorous, pale brown with dark spots near compound eye; antennae mostly fuscous; first segment entirely fuscous; second and fourth segments mostly fuscous except for pale base; 1/2 basal part of third segment pale, remaining dark brown; labium partially pale and brown or dark brown, third and fourth segments dark brown. **Thorax:** pronotum mostly brown, with a pair of dark ocellate spots and with pale longitudinal stripe; propleuron mostly pale brown, with dark markings medially; mesepisternum mostly pale with dark marking medially; scutellum partially dark brown, with pale longitudinal stripe medially and with small pale marking anterolaterally; hemelytra mostly dark brown with paler mottled part; corium with pale part subapically; cuneus mostly dark brown tinged with red medially; legs partially pale and dark brown; front and middle tibia mostly dark brown, with pale spot in middle; hind tibiae mostly pale brown, 1/3 basal part dark brown; tarsi entirely dark brown. **Abdomen:** mostly pale brown with tiny dark spots medially. *Surface and vestiture*: body almost dull, minutely and vaguely punctured, covered with golden tuft of hair. *Structure*: body elongated, length 5.43. **Head:** prognathous, width longer than length; vertex wider than single compound eye width; antennae shorter than body length; first segment flattened, longer than head width, as long as 0.5 times second segment; second segment clavate, longer than combined third and fourth segment; third and fourth segments linear, third segment longer than fourth segment; proportion of first to fourth antennal segments 1.07: 2.03: 0.82: 0.54; labium reaching middle coxae. **Thorax:** pronotum hexagonal, longitudinal length as long as 0.7 times basal maximal width, posterior margin sinuate; calli weakly swollen; pronotal collar stout, broad, diameter subequal to maximum diameter of first antennal segment; scutellum flat, anterior width as long as length, as long as 0.55 pronotal maximal width, longitudinal length as long as 1.6x commissure length; lateral margin of hemelytra almost straight; cuneus small. **Abdomen:** elongate and rounded, exceeding apex of cuneus. **MALE:** not examined in this study.

Biology. Unknown.

Distribution. China, Myanmar, Vietnam (North-central).

Material examined. **[ISNB]** 2♂♂1♀, near Khe Che Station (18.3772°N, 105.3114°E), Vu Quang National Park, Ha Tinh Province, Vietnam, 13-15.vii.2023, J. Constant, J. Bresseel. & L. Semeraro leg. (FC n°s 11510-11512); **[ZCDTU]** 1♀, Bach Ma National Park (16.2000°N, 107.8500°E, 1450 m altitude), Loc Tri, Phu Loc District, Hue City, Vietnam, 16.xi.2024, by light trap, J. Kim leg. (DTUHMM0065).

Remarks. In a previous publication (Kim *et al*. 2025), a photo labeled as *E. coelestialium* (fig. 13) was mistakenly used. It was in fact an image of *E. burmanicus* and is correctly reused in the present work.

***Eurystylus coelestialium* (Kirkaldy, 1902)**
(Fig. 1G)

Olympiocapsus coelestialium Kirkaldy, 1902: 255.
Eurystylus coelestialium Yasunaga *et al*. 2017: 307; Kim *et al*. 2025: 29.

Diagnosis and description. See Yasunaga *et al*. (2017) for the diagnosis and Kirkaldy (1902) for the original description.

Biology. This species is primarily collected from the flowers of various broad-leaved trees; for a detailed list of host plants, see Yasunaga *et al*. (2017). In the Korean populations, this species has been collected from the following host plants: *Ligustrum obtusifolium* (Oleaceae), *Humulus japonicus* (Cannabaceae), *Rhus chinensis* (Anacardiaceae), and *Lespedeza bicolor* (Fabaceae), which are new records of the host plant.

Distribution. China, Japan, Korea, Russia, Taiwan, Vietnam.

Material examined. **[CNU]** 4♂♂7♀♀, Gyejok-san (Mt), Jang-dong, Daeduk-gu, Daejeon, Korea, 12.viii.2014, Light trap, J. Kim leg.; **[CNU]** 3♂♂2♀♀, Boksu-dong, Seo-gu, Daejeon, Korea, 12.x.2014, on *Humulus japonicus*, J. Kim leg.; **[CNU]** 1♂, Bach Ma National Park, Loc Tri, Phu Loc, Hue City, Vietnam, 22.vi.2023, J. Jeon leg.; **[ISNB]** 2♂♂, Tam Dao National Park, Phu Tho Province, Vietnam, 25-28.viii.2010, J. Constant & P. Limbourg leg. (FC n° 11091-11092).

***Eurystylus ryukyus* Yasunaga, Nakatani & Chérot, 2017**
(Figs 1H, 2F–H)

Eurystylus ryukyus Yasunaga *et al*. 2017: 312; Kim *et al*. 2025: 29.

Diagnosis and description. See Yasunaga *et al.* (2017) for the diagnosis and the detailed original description. **Male genitalia:** left paramere with broad and round hypophysis (Fig. 2F); right paramere rod-shaped, with hook-shaped hypophysis (Fig. 2G); endosoma membranous, with five noticeable sclerites; primary lobal sclerite (*pl*) thick and curved; third lobal sclerite (*tl*), fourth lobal sclerite (*fl*) and median lobal sclerite (*ml*) broad and apically sharp; basal sclerotized teeth (*bt*) small near secondary gonopore (Fig. 2H).

Biology. This species is known to be primarily collected from the flowers of various plants. For detailed information on its specific host plants, see Yasunaga *et al*. (2017). In the present study, the specimen was also collected from the flowers of broad-leaved trees.

Distribution. Japan, Taiwan, Vietnam.

Material examined. **[ISNB]** 2♂♂, Tam Dao National Park, Phu Tho Province, Vietnam, 25-28.viii.2010, J. Constant & P. Limbourg leg. (FC n° 11089-11090); **[ISNB]** 1♂6♀♀, 1?, Cuc Phuong National Park, Ninh Binh Province, Vietnam, 11-18.vii.2010, J. Constant & P. Limbourg leg. (FC n°s 11081-11088); **[CNU]** 1♂, Bach Ma National Park, Loc Tri, Phu Loc, Hue City, Vietnam, 22.vi.2023, J. Jeon leg.; **[ZCDTU]** 1♀, Hoa Trung Lake (16.0891^0 N, 108.0425^0 E, 90 m altitude), Hoa Lien Ward, Hoa Vang District, Da Nang City, Vietnam, 10.iv.2025, J. Kim leg. (DTUHMM0066).

***Eurystylus sauteri* Poppius, 1915**
(Figs 1I, 2I–L)

Eurystylus sauteri Poppius 1915: 15; Yasunaga *et al*. 2017: 317
Eurystylus luteus Hsiao 1941: 247 (syn. by Yasunaga *et al*. 2017: 318).

Diagnosis and description. See Yasunaga *et al*. (2017) for diagnosis and detailed description. **Male genitalia:** left paramere somewhat angled, its neck angled and projected frontally, hypophysis roundly truncated posteriorly (Fig. 2I); right paramere L-shaped, hypophysis with a small protuberance (Fig. 2J); endosoma membranous, with five noticeable sclerites; primary lobal sclerite (*pl*) almost straight, enlarged and hook-shaped apically; third lobal sclerite (*tl*) narrow; fourth lobal sclerite (*fl*) and median lobal sclerite (*ml*) broad and apically sharp; basal sclerotized teeth (*bt*) small near secondary gonopore (Fig. 2K–L).

Biology. This species has been found on the flowers of various broad-leaved trees (Yasunaga *et al*. 2017). In Korea, both nymphs and adults have been collected from *Rhus chinensis* (Anacardiaceae), which is the first record of the host plant of this species. In Vietnam, the specimen was also collected from the flowers of a broad-leaved tree.

Distribution. China, Japan, Korea, Taiwan, Vietnam (new record; Southern, Central Highlands).

Material examined. **[CNU]** 1♀, Daesong-san (Mt), Pyongyang, North Korea (in label: Tesong-san bei Pjongjang, Korea), 5.vii.1974, M. Josifov; **[CNU]** 1♂, Pyongyang, North Korea (in label: Phjongjang Bof. Garten, Korea), 27.viii.1989, M. Josifov; **[CNU]** 1♂1♀, Donam-ri, Geumnam-myeon, Sejong-si, Geumgang arboretum, 28.vii.2014, on *Rhus chinensis*, J. Kim; **[CNU]** 2♂♂3♀♀, Gung-dong, Yuseong-gu, Daejeon, 1.vi.2015, by light trap, J. Kim.; **[CNU]** 1♂, Hoenggye-ri, Daegwanryeong-myeon, Pyeongchang-gun, Korea, by light trap, 29.vi.2016, J. Kim.; **[CNU]** 1♂1♀, Sanghyo-dong, Seoguipo-si, Jeju-do (Is.), Korea, 30.viii.2017, by light trap, J. Kim; **[ZCDTU]** 1♂,

La Khuoi (14.2219°N, 107.9858°E, 650 m altitude), Chu Pah District, Gia Lai Province, Vietnam, 2.v.2025, J. Kim leg. (DTUHMM0067).

Remarks. In the present study, we identified this species based on the examination of male genital characters (Fig. 2I–K), which confirms its occurrence in southern Vietnam and thereby extends the known southern limit of its distribution. Notably, Yasunaga *et al*. (2017) synonymized *E. luteus* Hsiao, 1941, previously recorded from Korea, with this species. Our examination of specimens collected from North Korea (by M. Josifov) revealed identical genital structures, supporting this taxonomic treatment (Fig. 2L).

Furthermore, this species is distributed throughout the Korean Peninsula, including Jeju Island. Genetic analysis of the cytochrome c oxidase subunit I (COI) gene from populations collected across Korea – from Jeju Island to Gangwon-do near the northern border – revealed identical sequences. Some of these sequences have been published in public databases such as NCBI. Although COI sequences from the Vietnamese and North Korean populations were not available, the morphological uniformity and geographic continuity suggest, though do not definitively confirm, that these populations belong to the same species.

Given the species' broad host plant range and its ecological adaptability across both lowland and highland habitats, it is plausible that its actual distribution extends across much of the Indochinese Peninsula. Our findings therefore support the taxonomic treatment proposed by Yasunaga *et al*. (2017), while also highlighting the species' potential for a much wider distribution than previously recognized.

Key to the *Eurystylus* species in Vietnam

1. Dorsum mostly brown 2
– Dorsum entirely fuscous; thorax with yellowish stripes laterally; hypophysis of left paramere broad and rounded, posterior margin convex; endosoma with three distinct sclerites (Figs 1A–E, 2A–E) . . . . . *E. yasunagai* **sp. nov.**
2. Pronotum with a pair of noticeable circular dark spot 3
– Pronotum with a pair of elongate dark spot, sometimes indistinct. 4
3. Scutellum partly pale and dark brown, with longitudinal pale stripe medially (Fig. 1F). . . . . *E. burmanicus*
– Scutellum mostly dark brown, with pale spots at each apex (Fig. 1G) . . . . . *E. coelestialium*
4. Third antennal segment entirely dark brown; hypophysis of left paramere broad and rounded, posterior margin convex; right paramere almost straight; primary lobal sclerite curved (Figs 1H, 2F–H). . . . . *E. ryukyus*
– Third antennal segment mostly dark brown with pale base; hypophysis of left paramere broad and angled, posterior margin concave, truncated; right paramere twisted; primary lobal sclerite straight (Figs 1I, 2I–L) . . . . . *E. sauteri*

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