Two new species of *Chilocorus* Leach, 1815 from Laos (Coleoptera Coccinellidae Chilocorini)

Wenjing Li[‡], Bingxu Chen[‡], Chantharath Toulakhom[§], Xingmin Wang[§]

‡ Guangdong Provincial Key Laboratory of High Technology for Plant Protection, Plant Protection Research Institute, Guangdong Academy of Agricultural Sciences, Guangzhou, China
§ Key Laboratory of Bio-Pesticide Innovation and Application, Engineering Technology Research Center of Agricultural Pest Biocontrol, Guangdong Province; Engineering Research Center of Biological Control, Ministry of Education & Guangdong Province, South China Agricultural University, Guangzhou, China

Corresponding author: Xingmin Wang (32457430@qq.com)

Academic editor: Li Ren

ZooBank: urn:lsid:zoobank.org:pub:6FC89E55-0E70-4D44-9D49-E00600B871EC

Abstract

Background

Chilocorus Leach, 1815 the largest genus of Chilocorini, contains more than 80 species, mainly preying on Coccoidea. Many species of *Chilocorus* are economically important as they are widely used as biological control agents.

New information

In this study, two new species of the genus *Chilocorus* Leach are described from Laos: *C. toulakhomianus* Li & Wang, sp. n. and *C. vientianicus* Li & Wang, sp. n. Diagnoses and detailed descriptions of the new species are given. Each species is illustrated in detail, including genitalia. Distribution maps are presented.

Keywords

Coleoptera, Coccinellidae, *Chilocorus*, new species, Laos

Introduction

Chilocorus Leach, 1815 the largest genus of Chilocorini, contains 81 species in the recent world checklist (Li et al. 2018). However, morphological characters of the genus *Chilocorus* are relatively heterogeneous at species level. Chapin (1965) considered *Chilocorus* as a non-monophyletic genus. Miyatake (1970), who studied East-Asian species, subdivided

©
.

Chilocorus into seven groups depending on the characters of the pronotal oblique line, prosternal process, prosternal hypomeral foveae, elytral epipleural foveae and elytral outer margin. Recently, the molecular and morphology-based phylogenetics of Chilocorini indicated *Chilocorus* as not a monophyletic group. Four other genera (*Phaenochilus* Weise, *Anisorcus* Crotch, *Egius* Mulsant and *Simmondsius* Ahmad & Ghani) were recovered as embedded in the clade of *Chilocorus*; meanwhile, these four genera were synonymised with *Chilocorus* (Li et al. 2020b).

Untill now, there is scarce literature to investigate and research Coccinellidae species in Laos. Prior to the prsent study, except for *C. politus* Mulsant, 1850 (Li et al. 2018), no other Chilocorini species was recorded in this country. This paper adds two new species to the world fauna of this genus from Laos. These two new species are extremely similar to *C. politus* in body shape and colouration.

Materials and methods

Specimens, examined in this study, were collected in Laos. Type specimens of the new species are deposited at the Department of Entomology, South China Agriculture University (SCAU), Guangzhou.

External morphology was observed with a dissecting stereomicroscope (SteREO Discovery V20, Zeiss). Male and female genitalia were dissected, cleared in 10% solution of sodium hydroxide (NaOH) by boiling for several minutes and examined with an Olympus BX51 microscope. Photographs of the genitalia and other morphological characters were taken with digital cameras (AxioCam HRc and Coolsnap-Procf & CRI Micro*Color), attached to microscopes using AxioVision Rel. ver. 4.8 and Image-Pro Plus ver. 6.0. Images were cleaned up and laid out in plates with Adobe Photoshop CS ver. 8.0. Terminology follows Ślipiński (2007).

Abbreviations

TL = total length: length from apical margin of clypeus to apex of elytra; TW = total width: width across both elytra at widest part; TH = body height measured across the highest point of the elytra; HW = head width in a frontal view; PL = pronotal length: from middle of anterior margin to base of pronotum; PW = pronotal width at widest part; EL = elytral length: from apex to base including scutellum; EW = elytral width, equal to TW.

Taxon treatments

Chilocorus Leach, 1815

Nomenclature

Chilocorus Leach, 1815: 116.

Type species

Coccinella cacti Linnaeus, 1767

Diagnosis

The genus *Chilocorus* can be distinguished from the other genera of the tribe Chilocorini by the following combination of characters: body with dorsum glabrous, rarely with pubescence; outer elytral margin slightly reflexed, without distinct bead; antenna stout, composed of 7 or 8 antennomeres (Fig. 1e); terminal maxillary palpomere elongate, from 1 to 2 times as long as basal width, with sides nearly parallel or moderately expanded to apex (Fig. 1f); prosternal process long, narrow and subparallel without carina (Fig. 1d); legs with stout femora, tibiae with a triangular tooth at basal 1/3, without tibial spurs (Fig. 1i–j); tarsal claws stout, with approximately rectangular basal tooth, about 1/2–2/3 as long as claw (Fig. 1k).

Chilocorus toulakhomianus Li & Wang sp. nov.

- ZooBank C6F187F8-0E6C-473D-861D-3D5BA2C58C27

Materials

Holotype:

a. scientificName: ***Chilocorus toulakhomianus*** Li & Wang, sp. n.; country: Laos; locality: Itou, Pakxong; georeferenceProtocol: label; samplingProtocol: sweeping; eventDate: 06/12/2006; individualCount: 1; sex: 1 male; lifeStage: adult; recordNumber: No. 202107-01; recordedBy: Wenjing Li; previousIdentifications: ***Chilocorus politus***; identifiedBy: Wenjing Li; dateIdentified: 2021; occurrenceID: 8F36BFFF-90F0-56E2-9C9E-AC867770D171

Paratypes:

a. scientificName: ***Chilocorus toulakhomianus*** Li & Wang, sp. n.; country: Laos; locality: Itou, Pakxong; georeferenceProtocol: label; samplingProtocol: sweeping; eventDate: 06/12/2006; individualCount: 19; sex: 13 male, 6 female; lifeStage: adult; recordedBy: Wenjing Li; previousIdentifications: ***Chilocorus politus***; identifiedBy: Wenjing Li; dateIdentified: 2021; occurrenceID: 5B0CE16D-5423-53A3-92BE-B8407CB8E8F2

b. scientificName: ***Chilocorus toulakhomianus*** Li & Wang, sp. n.; country: Laos; locality: Seleuy, Xam Nua; georeferenceProtocol: label; samplingProtocol: sweeping; eventDate: 06/09/2007; individualCount: 4; sex: 3 male, 1 female; lifeStage: adult; recordedBy: Wenjing Li; previousIdentifications: ***Chilocorus politus***; identifiedBy: Wenjing Li; dateIdentified: 2021; occurrenceID: 0DB3CE6E-67EB-5AC2-B113-D5928D93ECC9

Description

TL: 4.80–6.00 mm, TW: 4.45–5.28 mm, TH: 2.88–3.32 mm, TL/TW: 1.08–1.14, PL/PW: 0.57–0.61, EL/EW: 0.97–0.99.

Body roundish, strongly convex. Head, mouthparts and antenna brownish-red, sparsely covered with short, greyish pubescence. Pronotum, scutellum and elytra glabrous, brownish-red (Fig. 1a–c). Underside brownish-yellow, sparsely covered with short, greyish pubescence.

Head relatively large, 0.52–0.54 times pronotal width, punctures on frons large and densely distributed, 0.5–1.5 diameters apart, surface polished between punctures. Eyes approximately oval, densely faceted, interocular distance 0.45× as wide as head (Fig. 1c). Pronotum 0.50-0.52× as wide as elytra, pronotal punctures moderately large and moderately densely distributed, smaller than those on head, 1.5–3.0 diameters apart, surface polished between punctures. Punctures on elytra moderately large and sparsely distributed, 2.0–3.5 diameters apart, similar to those on pronotum. Prosternal process moderately broad, slightly expanded to apex. Abdominal postcoxal lines incomplete, reaching posterior margin of abdominal ventrite 1 and running along posterior margin, then almost reaching lateral margin. Posterior margin of male abdominal ventrite 5 broadly rounded and ventrite 6 slightly emarginate medially (Fig. 1 l).

Male genitalia: penis slender, penis capsule with long outer and short inner arm, with spiral texture from apical 1/5 to apical 1/3, apex of penis truncate with membranous appendage (Fig. 1m–n). Tegmen stout, penis guide slightly narrow at base, gradually broadened up to basal 1/2, abruptly tapering from apical 1/4 to apex, slightly asymmetrical in ventral view; penis guide in lateral view, widest at base, gradually converging to apex; parameres nearly as long as the penis guide with dense short setae on the inner sides and distal end with a group of short setae in lateral view (Fig. 1 o–p).

Female genitalia: coxites elongate, subtriangular, outer and inner margins almost straight, tapering to blunt apices (Fig. 1q).

Diagnosis

This species is very similar to *C. politus* and species *C. vientianicus,* sp. n. in the body size and colouration, but can be distinguished from them by penis with spiral texture from apical 1/5 to apical 1/3; penis guide widest at base, gradually converging to apex in lateral view. Furthermore, this species also can be distinguished from *C. vientianicus,* sp. n. by coxites with straight outer and inner margins. In *C. vientianicus,* sp. n., coxites outer margin is almost straight, but inner margin is distinctly concave near apical 1/3.

Etymology

The specific epithet is named after Toulakhom, the type specimen collector of this ladybird.

Distribution

Laos (Pakxong, Xam Nua) (Fig. 3).

Chilocorus vientianicus Li & Wang sp. nov.

- ZooBank 061FD264-E148-4274-A6CC-2FE0F2E76B37

Materials

Holotype:

a. scientificName: ***Chilocorus vientianicus*** Li & Wang, sp. n.; country: Laos; locality: VangVieng, Vientiane; georeferenceProtocol: label; samplingProtocol: sweeping; eventDate: 06/07/2006; individualCount: 1; sex: 1 male; lifeStage: adult; recordNumber: No. 202107-02; recordedBy: Wenjing Li; previousIdentifications: ***Chilocorus politus***; identifiedBy: Wenjing Li; dateIdentified: 2021; occurrenceID: 7571C6C8-C2D1-5D2A-9023-D93E92C2DC93

Paratype:

a. scientificName: ***Chilocorus vientianicus*** Li & Wang, sp. n.; country: Laos; locality: VangVieng, Vientiane; georeferenceProtocol: label; samplingProtocol: sweeping; eventDate: 06/07/2006; individualCount: 8; sex: 4 male, 4 female; lifeStage: adult; recordedBy: Wenjing Li; previousIdentifications: ***Chilocorus politus***; identifiedBy: Wenjing Li; dateIdentified: 2021; occurrenceID: 5187EC02-0A22-5A3F-8BBE-34270CA844CF

Description

TL: 4.91–5.66 mm, TW: 4.58–5.35 mm, TH: 3.07–3.75 mm, TL/TW: 1.05–1.07, PL/PW: 0.54–0.57, EL/EW: 0.98–0.99.

Body roundish, strongly convex. Head, mouthparts and antenna brownish-red, sparsely covered with short, greyish pubescence. Pronotum, scutellum and elytra glabrous, brownish-red (Fig. 2a–c). Underside brownish-yellow, sparsely covered with short, greyish pubescence.

Head relatively large, 0.52–0.53 times pronotal width, punctures on frons large and densely distributed, 0.5–1.5 diameters apart, surface polished between punctures. Eyes approximately oval, densely faceted, interocular distance 0.47× as wide as head (Fig. 2c). Pronotum 0.53× as wide as elytra, pronotal punctures moderately large and moderately densely distributed, smaller than those on head, 1.5–2.5 diameters apart, surface polished between punctures. Punctures on elytra moderately large and sparsely distributed, 2.0–3.5 diameters apart, similar to those on pronotum. Prosternal process moderately broad, slightly expanded to apex. Abdominal postcoxal lines incomplete, reaching posterior margin of abdominal ventrite 1 and running along posterior margin, then almost reaching lateral margin. Posterior margin of male abdominal ventrite 5 broadly rounded and ventrite 6 slightly emarginate medially (Fig. 2 d).

Male genitalia: penis slender, penis capsule with long outer and short inner arm, apex of penis truncate with membranous appendage (Fig. 2e–f). Tegmen stout, penis guide narrow at base, guide slightly narrow at base, gradually broadened up to basal 1/2, abruptly tapering from apical 1/4 to apex, approximately symmetrical in ventral view; penis guide in lateral view widest at base, parallel along basal 5/8, after that abruptly converging to apex; parameres nearly as long as the penis guide with dense short setae on the inner sides and distal end with a group of short setae in lateral view (Fig. 2 g–h).

Female genitalia: coxites elongate, subtriangular, outer margin almost straight, inner margin distinctly concave near apical 1/3 (Fig. 2i).

Diagnosis

This species resembles *C. toulakhomianus*, sp. n. in the body size and colouration, but can be distinguished by the following characters: apex of penis truncate with membranous appendage, without spiral grain; penis guide widest at base, parallel along basal 5/8, after that abruptly converging to apex in lateral view; coxites elongate outer margin almost straight, inner margin distinctly concave near apical 1/3.

Etymology

The specific epithet is named after Vientiane, the type locality of this ladybird.

Distribution

Laos (Vientiane) (Fig. 3).

Discussion

The species deversity of Chilocorini have been investigated in detail in many countries of East and Southeast Asia, such as China, Japan, Vietnam etc (Kamiya 1959; Miyatake 1970; Hoáng 1983; Li et al. 2020a). However, Chilocorini and even Coccinellidae in Laos are poorly taxonomically studied. In this paper, we describe two new species adding them to the world fauna of *Chilocorus* from Laos. As the largest genus of Chilocorini, the morphological characters of *Chilocorus* are relatively heterogeneous at species level. Compared with Asian fauna species, these two new species and their similar species *C. politus* can be easily distinguished by the following two characters: dorsum brownish-red without any spots; terminal maxillary palpomere moderately expanded to apex, the length nearly equal to the width.

Acknowledgements

The research was supported by the National Natural Science Foundation of China (31802003).

References

- Chapin EA (1965) The genera of the Chilocorini (Coleoptera, Coccinellidae). Bulletin of the Museum of Comparative Zoology, Harvard University 133: 227-271.
- Hoáng DN (1983) Coccinellidae of Vietnam. Part. 2. Nha zuat ban khoa hoc va ky thuat, Hanoi, 159 pp. [In In Vietnamese with English summary].
- Kamiya HA (1959) Revision of the tribe Chilocorini of Japan and the Loochoos (Coleoptera: Coccinellidae). Kontyu. 27 (2): 99-105.
- Li WJ, Huo LZ, Wang D, Ahren D, Wang XM (2018) Contribution to the genus *Chilocorus* Leach, 1815 (Coleoptera: Coccinellidae: Chilocorini), with descriptions of two new species from China. European Journal of Taxonomy 469: 1-34. https://doi.org/10.5852/ejt.2018.469
- Li WJ, Chen BX, Huo LZ, X.S. C, Wang XM (2020a) New records and checklist of Chilocorini (Coleoptera: Coccinellidae) from China. Biodiversity Data Journal 8.
- Li WJ, Łączyński P, Escalona HE, Eberle J, Huo LZ, Chen XS, Huang WD, Chen BX, Ahrens D, Ślipiński A, Tomaszewska W, Wang XM (2020b) Combined molecular and morphological data provide insights into the evolution and classification of Chilocorini ladybirds (Coleoptera: Coccinellidae). Systematic Entomology 45: 447-463. https://doi.org/10.1111/syen.12409
- Miyatake M (1970) The East-Asian coccinellid beetles preserved in the California Academy of Sciences. Tribe Chilocorini. Memoirs of the College of Agriculture, Ehime University 14 (3): 19-56.
- Ślipiński A (2007) Australian ladybird beetles (Coleoptera: Coccinellidae), their biology and classification. ABRS, Canberra, 286 pp.

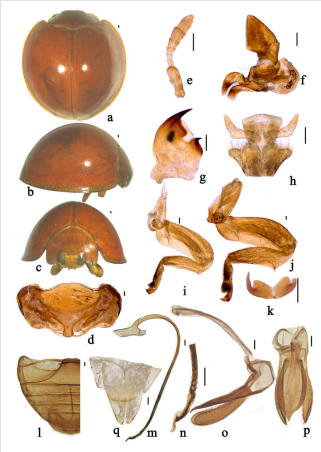


Figure 1.

Chilocorus toulakhomianus Li & Wang, sp. n. **a** dorsal view; **b** lateral view; **c** frontal view; **d** prothorax; **e** antenna; **f** maxilla; **g** mandible; **h** labium; **i** front leg; **j** hind leg; **k** tarsal claw; **l** abdomen; **m** penis; **n** apex of penis; **o** tegmen, lateral view; **p** tegmen, ventral view; **q** ovipositor. Scale bars: 0.1 mm.

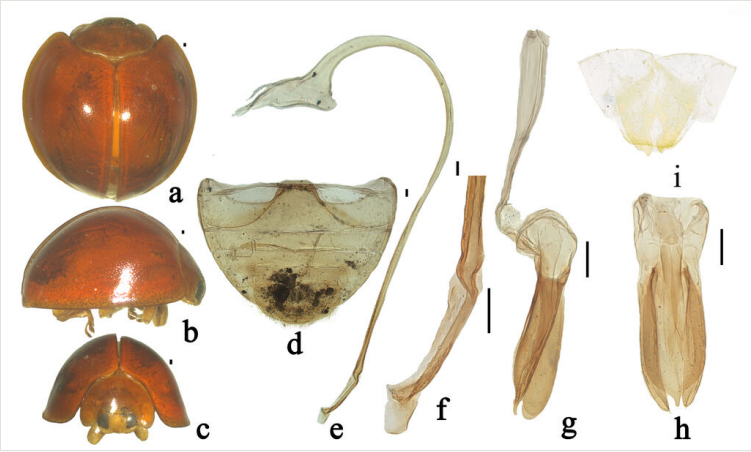


Figure 2.

Chilocorus vientianicus Li & Wang, sp. n. **a;** dorsal view **b** lateral view; **c** frontal view; **d** abdomen; **e** penis; **f** apex of penis; **g** tegmen, lateral view; **h** tegmen, ventral view; **i** ovipositor. Scale bars: 0.1 mm.

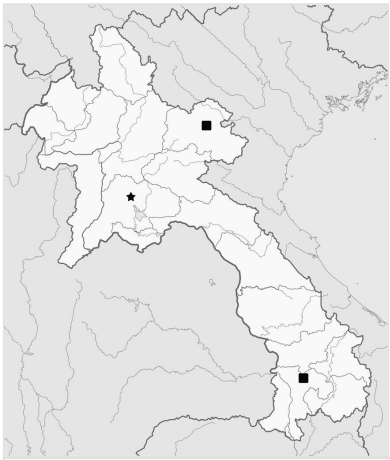


Figure 3.

Distribution map. (■) *Chilocorus toulakhomianus* Li & Wang, sp. n. (★) *Chilocorus vientianicus* Li & Wang, sp. n.