A New Species of the Genus *Eucorydia* (Blattodea: Corydiidae) from Chiang Mai in Northern Thailand

Shizuma Yanagisawa¹,⁷, Yositaka Sakamaki², Sopark Jantarit³, and Satoshi Shimano⁴,⁵,⁶

¹ Ryuyo Insect Nature Observation Park, Oonakaze, Iwata, Shizuoka 438-0214, Japan
E-mail: yokoyama070821@gmail.com
² Entomological Laboratory, Faculty of Agriculture, Kagoshima University, Korimoto, Kagoshima 890-0065, Japan
³ Excellence Center for Biodiversity of Peninsular Thailand, Faculty of Science, Prince of Songkla University, Hat Yai, Songkhla, 90110, Thailand
⁴ Science Research Center, Hosei University, 2-17-1 Fujimi, Chiyoda, Tokyo 102-8160, Japan
⁵ Visiting Researcher, International Center for Island Studies, Kagoshima University, Korimoto, Kagoshima 890-8580, Japan
⁶ Visiting Researcher, Graduate School of Science, Tokyo Metropolitan University, Minami-osawa, Hachioji, Tokyo 192-0397, Japan
⁷ Corresponding author

(Received 1 April 2021; Accepted 12 July 2021)

http://zoobank.org/512723F6-1BD0-4F71-AD66-F305AA0373E8

Specimens of the genus *Eucorydia* Hebard, 1929 from Chiang Mai, northern Thailand, were compared with eight closely similar congeners: *E. aenea* (Brunner von Wattenwyl, 1865), *E. dasytoides* (Walker, 1868), *E. yunnanensis* Woo, Guo, and Feng, 1986, *E. pilosa* Qiu, Che, and Wang, 2017, *E. guilinensis* Qiu, Che, and Wang, 2017, *E. tangi* Qiu, Che, and Wang, 2017, *E. linglong* Qiu, Che, and Wang, 2017, and *E. tokaraensis* Yanagisawa, Sakamaki, and Shimano, 2020, and turned out to be a different species from eight congeners. This species from Thailand is characterized by the specific male genitalia shape: right phallomere 2 (R2) slightly elongated, the basal left area of R2 forming a triangular protrusion, and the basal half of left phallomere 7 (L7) protruded to the left with long spatulate distal half and with a beak-like apex. This species is also characterized by the tegmina containing three orange markings in the middle, and with a pair of orange markings at its base. Based on the above, this species is described as a new species, *Eucorydia asahinai* sp. nov.

Key Words: morphology, male genitalia, taxonomy, anal area of tegmen, taxonomic key, cockroach.

Introduction

Most species of the cockroach genus *Eucorydia* Hebard, 1929 are characterized by a metallic greenish blue pronotum and tegmina in adults and some orange markings on the tegmina and/or abdomen. This genus includes 21 species distributed from Southeast Asia and South Asia to the Japanese Nansei Islands and has been previously described by Hebard (1929), Princis (1963), Asahina (1971), Woo et al. (1986), Woo and Feng (1988), Qiu et al. (2017), and Yanagisawa et al. (2020).

According to Qiu et al. (2017), *E. aenea* (Brunner von Wattenwyl, 1865) is the only species of the genus *Eucorydia* found in Thailand. Dr. S. Asahina, who visited Thailand in 1965, under a research project of the US-Japan Science Cooperation Program, reported two specimens of *E. aenea* collected in Doi Pui, Chiang Mai Province in northern Thailand (Asahina 1971). However, Qiu et al. (2017) referred that these specimens did not correspond to *E. aenea*, and must have been undescribed species. We examined the specimens treated in Asahina (1971) deposited in the National Institute of Infectious Diseases (NIID) in Japan.

As a result of morphological comparison of the specimens with the close similar congeners [*E. aenea, E. dasytoides* (Walker, 1868), *E. yunnanensis* Woo, Guo, and Feng, 1986, *E. pilosa* Qiu, Che, and Wang, 2017, *E. guilinensis* Qiu, Che, and Wang, 2017, *E. tangi* Qiu, Che, and Wang, 2017, *E. linglong* Qiu, Che, and Wang, 2017, and *E. tokaraensis* Yanagisawa, Sakamaki, and Shimano, 2020], we confirmed that the specimens from Chiang Mai represent an undescribed species having suggested by Qiu et al. (2017). Therefore, it is described here as a new species.

Materials and Methods

Two specimens were borrowed from the Medical Entomology Laboratory at the National Institute of Infectious Disease (NIID) (Tokyo Metropolitan) and examined in Ryuyo Insect Nature Observation Park (Shizuoka Prefecture). These specimens had already been dissected and their abdominal endings and genitalia were preserved on glass slides. These specimens were collected by Drs. S. Asahina and Y. Miyatake in 1965 from in Doi Pui, Chiang Mai Province in northern Thailand, during the "US-Japan Science Cooperation Program".

The morphological terminology used in this paper mainly follows Qiu et al. (2017) and Yanagisawa et al. (2020). Each part of the male genitalia is indicated using following ab-
Abbreviations (L3, left phallomere 3; L7, left phallomere 7; R2, right phallomere 2). Male genital segments were observed under a stereomicroscope (SZ6045, Olympus) and drawings were made based on the same observations. Photographs were taken using a Nikon D5300 camera with a Nikon AF-S VR Micro-Nikkor 105 mm f/2.8G IF-ED lens.

The type series for *E. asahinai* sp. nov. were deposited into the Medical Entomology Laboratory at the NIID. Each specimen is specified by its specimen accession number, in the form "SY-XX"; where SY is an abbreviation of name of the first author, Shizuma Yanagisawa; XX is the identification number given to each specimen (SY-01 and SY-02).

**Fig. 1.** Male and female of *Eucorydia asahinai* sp. nov. A–B, Male (holotype); C–D, female (paratype); E, antenna; F, hindwing of male (holotype); G, dorsal view of the abdominal segments of male (holotype); H, ventral view of the abdominal 7th and 8th segments of male; I, subgenital plate of male (holotype); J, dorsal view of the abdominal 8th and 9th segments and supra-anal plate of male (holotype); K, supra-anal plate of female (paratype); L, ventral view of the abdominal 6th segment of female (paratype); M, subgenital plate of female (paratype); N, right phallomere with L7; O, R2; P, L7; Q, genital hook/L3. Scale bars: 5 mm.

**Taxonomy**

*Eucorydia asahinai* sp. nov.  
[New Japanese name: Itsutsuboshi-rurigokiburi]  
(Figs 1, 2)

_Eucorydia aenea_: Asahina 1971: 258 (not Corydia aenea Brunner von Wattenwyl, 1865).

_Eucorydia sp_. 1: Qiu et al. 2017: 53.

**Material examined.** Holotype: male (SY-01), elevation unknown (see Remarks section), Doi Pui (Chiang Mai), THAILAND, 17 June 1965, S. Asahina leg. Paratype: 1 fe-
A new species of Eucorydia from Thailand

male (SY-02), elevation unknown: same as holotype, Doi Pui (Chiang Mai), THAILAND, 17 June 1965, Y. Miyatake leg.

Diagnosis. The new species resembles E. aenea, E. dasytoides, E. yunnanensis, E. pilosa, E. guilinensis, E. tangi, E. linglong, and E. tokaraensis. However, it can be distinguished from other species by the combination of the following characteristics: genitalia shape of the male specimen, R2 slightly elongated and basal left protruded triangularly, basal half of L7 compressed subtrapezoidal, with its distal half long spatulate with a beak-like apex, tegmina with three orange markings in the middle and a pair of orange markings at the base of tegmina. This species can be distinguished from E. aenea by the position of the orange markings on the tegmen (Fig. 1A) and can also be distinguished from E. dasytoides and E. tokaraensis by R2 of the male genitalia, being slightly elongated with a triangular protrusion at the basal left (Fig. 1O). Additionally, it differs from E. yunnanensis, E. linglong, E. tangi, E. pilosa, and E. guilinensis by L7 of the male genitalia, that is compressed subtrapezoidal at the basal half and long spatulate with a beak-like apex at the distal half (Fig. 1P).

Description. Male (n=1): Body length unknown [14.5 mm in Asahina (1971)], since the abdomen had already been removed and dissected; overall length (from the head to the tip of the tegmen) 16.9 mm; pronotum length 4.0 mm×6.0 mm in width; tegmen length 13.8 mm [though 13.0 mm in Asahina (1971)] (Fig. 1A, B).

Head shiny, black. Antenna black with four whitish subapical segments (Fig. 1E). Pronotum metallic blue to metallic bluish-green. Tegmina metallic blue to metallic bluish-green, becoming brownish toward the apex; a pair of orange pubescent blotches large, distinct at the base near scutellum; three orange spots arranged in the middle. Hindwings hyaline, pale brown, becoming darker toward the apex with an obscure orange blotch in the middle of costa (Fig. 1F). Sc single; RA+RP with 9–13 branches; M with 2 branches, but with some crossveins in the middle; CuA with approximately 7–9 branches; CuP single; AA+AP with 17–20 branches (Fig. 1F). Legs shiny black.

Dorsal side of abdomen yellow, from 6th to 8th segment with lateral black area, 9th segment black (Fig. 1G, J). Ventral side yellow, 5th and 6th segments becoming black laterally, 7th and 8th segments black (Fig. 1B, H). Supra-anal plate black, semi-circular in shape (Fig. 1K). Subgenital plate black, rounded (Fig. 1M).

Genitalia (Fig. 1N–Q): Left phallomere: L3 slender and curved, gradually narrowing toward the apex with a distinct hook (Fig. 1Q); basal half of L7 protruded to the left, forming compressed subtrapezoid, distal half of L7 long spatulate with a beak-like apex (Fig. 1P). Right phallomere: R2 slightly elongated with a truncated apex and a triangular protrusion at the basal left (Fig. 1O).

Female (n=1): Body length unknown [14.0 mm in Asahina (1971)], since the abdomen had already been removed and dissected; pronotum length 3.4 mm×6.5 mm in width. Tegmen length 9.5 mm [though 9.0 mm in Asahina (1971)] (Fig. 1C, D). Head, pronotum, and tegmen similar in color to the male specimen (Fig. 1C). Dorsal side of abdomen yellow, from 6th to 8th segment black (Fig. 1C, K). Ventral side of abdomen black with yellow lateral area, 7th and 8th segments black (Fig. 1D, I). Supra-anal plate black, semi-circular in shape (Fig. 1K). Subgenital plate black, rounded (Fig. 1M).

Distribution. Until present, the new species described here has been found only from Doi Pui, Chiang Mai, northern Thailand.

Etymology. The new species was named in honor of Dr. Syozo Asahina, for the outstanding contribution to the study of cockroaches.

Remarks. The elevation at which the specimens were obtained is unknown. Asahina (1971) referred it as 1685 m, but specimen label gives it as 1865 m (Fig. 3), since the summit of Mt. Doi Pui is actually 1685 m, Asahina (1971) might have meant to say that the collection site was near the summit.

Discussion

Asahina (1971) identified one pair of specimens described in the present study as E. aenea. However, Qiu et al. (2017) stated that Asahina (1971) misidentified the specimens as E. aenea, and they treated these specimens as an undescribed species, “Eucorydia sp. 1”. Unfortunately, Qiu et al. (2017) did not have the opportunity to directly examine specimens of this species.
Hebard (1929) divided the genus *Eucorydia* into five groups. One of these groups, "the second group" is characterized by its immaculate pronotum and metallic tegmen, and by the presence of a broad transverse orange band on the tegmen. Based on the color pattern of the tegmina, it is clear *E. asahinai* sp. nov. can be placed in "the second group". In "the second group", this species has a unique character, which is an orange-yellow, oval-shaped pubescent area in the anal field of the tegmen. "*Eucorydia* sp. 2" in Qiu et al. (2017) also has a similar pubescence in the anal field of the tegmen, but this pubescent area forms a short strip. The orange-yellow pubescent area in the anal field of the tegmen is shared only by the new species and "*Eucorydia* sp. 2". Thus, they may be closely related in the second group.

**Key to *Eucorydia asahinai* sp. nov. and some congeners; based on Qiu et al. (2017) (*E. aenea, E. dasytoides, E. yunnanensis, E. pilosa, E. guilinensis, E. tangi, and E. linglong*) and Yanagisawa et al. (2020) (*E. tokaraensis*)**

1. Tegmina with white, yellowish white, or orange pubescence .............................................. 2
   - Tegmina without white, yellowish white, or orange pubescence ........................................ 3
2. Tegmina with uninterrupted yellow or orange band ... 4
   - Tegmina with yellow or orange spots ....................... 5
   - Overall length more than 18 mm in male . *E. dasytoides*
   - Overall length less than 17 mm in male ............... 6
   - Pronotum without white or yellowish white pubescence .................................................. *E. pilosa*
   - Pronotum with white or yellowish white pubescence ... 7
   - Orange pubescence on anal area of tegmina ........... *E. asahinai* sp. nov.
     - Not as above ............................................. 8
   - Tegmina with wide yellow band ........... *E. yunnanensis*
   - Tegmina with twice interrupted orange band ........... *E. tokaraensis*
   - Body length more than 12 mm in male .......... *E. tangi*
   - Body length less than 12 mm in male ........... *E. guilinensis*
   - Pubescence on tegmina band shaped .............. *E. linglong*
   - Pubescence on tegmina circle shaped ............. *E. aenea*

**Acknowledgements**

We appreciate Dr. Yukiko Higa (Department of Medical Entomology, National Institute of Infectious Diseases) for her great cooperation on the specimen survey. We would like to express our respects to the late Dr. Syoziro Asahina for his great contribution to cockroach study and also our sincere gratitude to him for collecting and preserved the specimens of *E. asahinai* sp. nov. in his collection. This
study was supported, in part, by the Kagoshima University “Establishment of Research and Education Network on Biodiversity and its Conservation in the Satsunan Islands” project conferred by the Ministry of Education, Culture, Sports, Science, and Technology in Japan to YS, and Tokyo Metropolitan University Fund for TMU Strategic Research (Leader: Prof. Noriaki Murakami; FY2020–FY2022) and Research Funds of the Asahi Glass Foundation to SJ and SS. SJ checked the collection data, shared locality information on the specimens from Thailand with responsibility for the Nagoya Protocol on Access and Benefit-sharing (ABS). We are grateful to two anonymous reviewers for their comments to improve the manuscript.

The authors would like to thank Enago (www.enago.jp) for the English language review.

References

Asahina, S. 1971. Notes on the cockroaches of the genus *Eucorydia* from the Ryukyus, Taiwan, Thailand and Nepal. Kontyû 39: 256–262.

Hebard, M. 1929. Studies in Malayan Blattidae (Orthoptera). Proceedings of the Academy of Natural Sciences of Philadelphia 81: 1–109.

Princis, K. 1963. Blattariae: Suborde Polyphagoidea: Fam.: Homoeogamiidae, Euthyrhaphidae, Latindiidae, Anacompidae, Atticolidae, Attaphilidae; Subordo Blaberoidae: Fam. Blaberidae. Pp. 76–172. In: Beier, M. (Ed.) Orthopterorum Catalogus, Pars 4. Uitgeverij Dr W Junk,’s-Gravenhage.

Qiu, L., Che, Y., and Wang, Z. Q. 2017. Revision of *Eucorydia* Hebard, 1929 from China, with notes on the genus and species worldwide (Blattodea, Corydioidea, Corydiidae). ZooKeys 709: 17–56.

Woo, F. C. and Feng, P. Z. 1988. Blattoptera: Corydiidae, Blattidae, Epiplanidae, Phyllodromiidae, Blaberidae. Pp. 29–32. In: Huang F.-S. (chief Ed.) *Insects of Mt. Namjagbarwa Region of Xizang*. Science Press, Beijing. [In Chinese]

Yanagisawa, S., Hiruta, F. S., Sakamaki, Y., Liao, J. R., and Shimano, S. 2020. Two new species of the genus *Eucorydia* (Blattodea: Corydiidae) from the Nansei Islands in southwest Japan. Zoological Science 38: 90–102.