



Short note

First Report of *Euphaea refulgens* Hagen in Selys, 1853 (Odonata: Euphaeidae) on Mayon Volcano Natural Park, with Some Records from Luzon and Mindoro Islands, the Philippines

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Abstract. *Euphaea refulgens* Hagen in Selys, 1853 is one of the three *Euphaea* species endemic in the Philippines and known only in Greater Luzon faunal region and Mindoro Island. This short note reports the first published documentation of *E. refulgens* in Mayon Volcano Natural Park, an active stratovolcano and a protected area situated in the Bicol peninsula, Luzon Island. In addition, some records of *E. refulgens* from institutional collections and field observations were provided.

Key words: Albay, Bicol peninsula, *Euphaea*, Philippines.

Introduction

Euphaea Selys, 1840 is a small genus of damselfly predominantly occurring in the Oriental faunal region. *Euphaea* damselflies usually exhibit wing sexual dimorphism wherein males tend to have prominent iridescent colorations. On the other hand, females usually have dull coloration (Phan *et al.*, 2018). *Euphaea* species usually inhabit forested streams on semi- closed or closed canopies. Currently, the genus *Euphaea* is represented by more than 30 species distributed across Southeast Asia, extending to India, southern China, Taiwan, Japan, and the Lesser Sunda.

Mayon Volcano is an active stratovolcano situated in the Bicol Peninsula, the southern region of Luzon

Island (Lagmay *et al.*, 2005). This volcano is also a part of the Luzon Volcanic Belt and considered as the most active volcano in the Philippine archipelago (Kinoshita *et al.*, 2008). Currently, Mayon Volcano was designated as natural park and home to a variety of native flora and fauna (Dinets, 2001; Buot, Jr., 2009; Siler *et al.*, 2017; Kyriazis *et al.*, 2018; Menard & Siler, 2018). To date, there is no published account of *Euphaea* species occurring on Mayon Volcano Natural Park. In addition, zygopteran fauna is poorly known in this protected area. This paper presents the first published record of *Euphaea refulgens* Hagen in Selys, 1853 on Mayon Volcano Natural Park, an endemic species found in Greater Luzon

faunal region. Also, additional records of *E. refulgens* from Luzon and Mindoro islands are provided.

Material and methods

Records of *Euphaea refulgens* presented in this paper were obtained by examining specimens deposited in the following institutional collections in the Philippines and Taiwan: **ADMU**- Ateneo de Manila University Biodiversity Laboratory, Manila, Philippines; **ENT-NMNH**- Entomology Collections-National Museum of Natural History, Manila, Philippines; **ITL**- Insect Taxonomy Laboratory, College of Agriculture and Food Science, University of the Philippines Los Baños, Laguna, Philippines; **NTNU**- National Taiwan Normal University. Additional field observations were also provided along with geographic coordinates.

Results and Discussion

Order Odonata Fabricius

Suborder Zygoptera Selys

Superfamily Calopterygoidea Selys

Family Euphaeidae Jacobson & Bianchi

Euphaea refulgens Hagen in Selys, 1853 (Figs. 2-3)

Euphaea refulgens Hagen in Selys, 1853: 53. Type locality: Philippines (Manila). Holotype: ♂ in Naturhistorisches Museum Wien (Austria).

Euphaea semperi Selys, 1879.

Material examined: PHILIPPINES:

LUZON ISLAND: ALBAY: 1♂, Mt. Mayon, 21-31.V.1981, leg. Alagar & Samarita (ENT-NMNH).

Additional material examined:

LAGUNA: 4♂, 6♀, Molawin creek, Mt. Makiling, Los Baños, VII.2019, leg. CB Cuevas & GA Gestia (NTNU); 1♂, Mt. Makiling, Laguna, 17.II.2016, leg. CS Reach (ITL-CSR006); 1♂, Jamboree, Los Baños, Luzon, 30.III.2001, leg. LD Reyes (ILT-25410); 1♂, College, Los

Baños, Laguna, I.2001, leg. RT Subagan (ITL-25412); 1♂, flat rocks, Mt. Makiling, 03.III.2001, leg. SD Letana (ITL-25419); 1♀, College, Los Baños, Laguna, III.2001, leg. M Cervantes (ITL-25417); 1♂, College, Los Baños, Laguna, 09.V.2016, leg. HT Caldso (ITL-25430); 1♂, Jamboree, Los Baños, Luzon, 30.III.2001, leg. LD Reyes (ITL-25413); 1♂, Jamboree, Los Baños, Luzon, 30.III.2001, leg. LD Reyes (ILT-25416); 1♂, El Kabayo, Subic, Zambales, 24.III.2016, collector n/a (ITL-25463); 1♂, Canlubang, Laguna, 27.II.1999, H Dupo Jr. (ITL-25489); Canlubang, Laguna, 03.VIII.1998, leg. AL Barrion (ITL-25492); Mt. Makiling, Laguna, 25.II.2005, leg. RPB Malijan (ITL-25494); UP Los Baños, Laguna, II.1994, leg. HP Roy Jr. (ITL-25495); Mt. Makiling, Laguna, 25.II.2005, leg. RPB Malijan (ITL 25496); Mt. Makiling, Laguna, III.2019, leg. PJ San Diego (ITL-25499); Los Baños, Laguna, I.2002, leg. Y Suami (ITL-25501); UP Los Baños, Laguna, 16.I.2008, leg. JC Banasihan (ITL-25502); UP Los Baños, Laguna, 16.I.2008, leg. JC Banasihan (ITL-25503); Molawin creek, Mt. Makiling, 15.VIII.2007, leg. ND Tung (ITL-25505); 1♂, flat rocks, Mt. Makiling, 11.III.2001, leg. S Padua (ITL-25508); Mt. Makiling, Laguna, 24.III.2007, leg. AC Acebes (ITL-25512); Botanical Garden, UP Los Baños, Laguna, 11.III.1989, leg. E Alviar (ITL-25528); 1♀, New Dorm, UP Los Baños, Laguna, 27.I.2008, leg. JPT Sanchez (ITL-25519).

LA UNION: Bacnotan, La Union, Luzon, 16.VIII.1998, leg. Tabafunda (ITL-25493). **MANILA:** 1♂, Ermita, Manila, 07.VII.1951, leg. FS Gachalian (ENT-NMNH); 1♀, Sta. Mesa Heights, Quezon City, 14.VI.1953, collector n/a (ENT-NMNH).

NUEVA ECIJA: Muñoz, Nueva Ecija, 22.II.2001, leg. MG Patricia (ITL-25500).

QUEZON: Dolores, Quezon, III.1999, leg. J Villarante (ITL-25497);

1♂, Dolores, Quezon, XII.1998, leg. JDL Villarante (ITL-25506) 1♂, National Botanical Garden, Land Grant, Real, Quezon, X.1975, leg. RE Alagau et al. (ENT-NMNH).

ZAMBALES: 1♂, El Kabayo, Subic, 24.III.2016, leg. JE Umeres (ITL-25462); El Kabayo, Subic, 14.III.2014, leg. GPR Tamayo (ITL-25460); 1♂, Binictican, Subic, Zambales, 19.III.1997, leg. M Sanlog (ITL-25491); Binictican, Subic, Zambales, 12.IV.1997, leg. VP Gapud (ITL-25509); Binictican, Subic, Zambales, 12.IV.1997, leg. VP Gapud (ITL-25520); 1♂, Binictican, Subic, Zambales, 12.IV.1997, leg. VP Gapud (ITL-25521); 1♂, Binictican, Subic, Zambales, 12.IV.1997, leg. VP Gapud (ITL-25523); 1♂, Binictican, Subic, Zambales, 12.IV.1997, leg. VP Gapud (ITL-25524); 1♂, Binictican, Subic, Zambales, 12.IV.1997, leg. VP Gapud (ITL-25526); 1♂, Binictican river, Subic, 27.IV.1998, leg. VP Gapud (ITL-25527).

MINDORO: 1♀, 2♂, San Vicente, Roxas, Oriental Mindoro, 30.VI.2012, leg. C Pangantihon (ADMU).

Additional field observations (see Fig. 1): Bayugin Falls, Bulusan, Sorsogon, Luzon (124.119066, 12.738507), 19.VII.2019; Busay Falls, Malilipot, Albay, Luzon (123.794997, 13.308381), 30.III.2018; Buntot Palos Falls, Pangil, Laguna, Luzon (121.493378, 14.415406), 20.VIII.2018; Vera Falls, Malinao, Albay, Luzon (123.621299, 13.352393), 03.VI.2018.

The genus *Euphaea* in the Philippines is represented by four species: *E. amphicyana*, *E. cora*, *E. refulgens*, and *E. subcostalis*. The former three are endemic while *E. subcostalis* is a Bornean species. Account of *E. subcostalis* in the Philippines was first reported by Hämäläinen & Müller (1997) from

specimen collected in Palawan Island. During the last ice age, Palawan and its nearby smaller islands have been connected to Borneo and shares certain Sundaic faunal affinity to the latter (Heaney, 1985; Piper *et al.*, 2011). *Euphaea amphicyana* Ris, 1930 is endemic to the Greater Mindanao faunal region and have been recorded in the islands of Samar, Leyte, Panaon, Homonhon, Mindanao, Dinagat, and Basilan (Ris, 1930; Hämäläinen & Müller, 1997; Villanueva, 2011; Guadalquiver *et al.*, 2022). *Euphaea cora* Ris, 1930 is also another Greater Mindanao faunal region endemic and have been recorded from Samar, Mindanao, and Basilan (Hämäläinen & Müller, 1997). Both *E. amphicyana* and *E. cora* were first described from male specimens collected on unspecified locality in Surigao (Mindanao Island) (Ris, 1930).

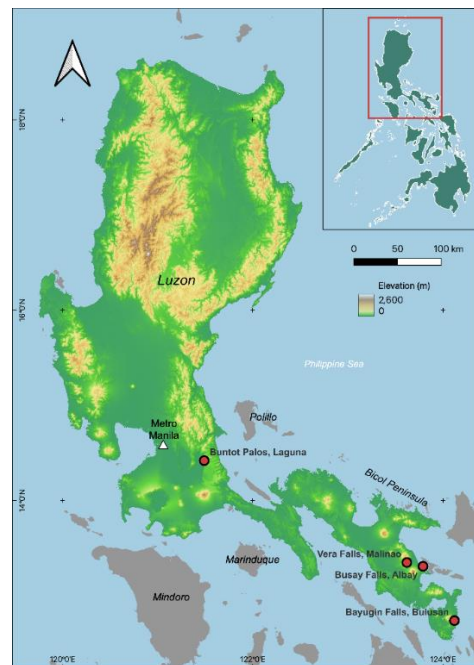


Fig. 1. Additional field observation records of the Luzon gossamerwing (*Euphaea refulgens*) in Southern Luzon, Philippines (red dots).

On the other hand, *E. refulgens* is endemic to Greater Luzon faunal region. This species was first described from a male specimen collected in Manila (Selys, 1853). *Euphaea refulgens* is a widespread forest-dwelling species and have been documented in several islands across the Greater Luzon faunal region such as Calayan, Luzon, Polillo, Marinduque, Catanduanes, and Mindoro (Needham & Gyger, 1939; Hämäläinen & Müller, 1997; Gapud, 2006; Villanueva, 2009, 2010; Villanueva & Gil, 2011; Villanueva *et al.*, 2012; Estacio *et al.*, 2020; Amarga & Mercado, 2022). *Euphaea refulgens* inhabit forest streams with semi-closed canopy (Gapud, 2006). In addition, Lok & Orr (2009) noted that *E. refulgens* can breed in pools beneath waterfalls. Furthermore, this record adds to the account of Odonata fauna inhabiting Mayon Volcano National Park as well as contribute to the current distribution records of *Euphaea refulgens* in Luzon Island, Philippines.

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Fig. 2. Fore- and hind wings of a male *Euphaea refulgens* showing metallic coloration.

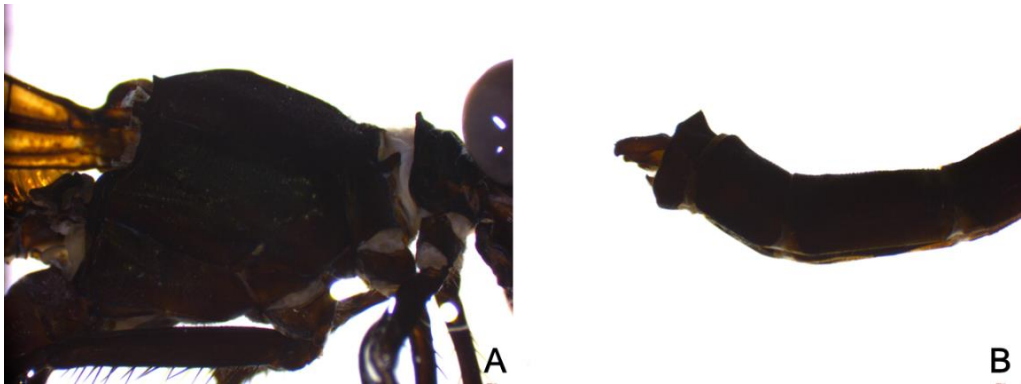


Fig. 3. Lateral view of thorax (A) and terminal region of abdomen (B) of male *E. refulgens*.

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