

First Discovery of *Euploea eunice* (Godart, 1819) (Lepidoptera, Nymphalidae) from Korea

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국내미접 푸른줄까마귀왕나비(나비목, 네발나비과) 보고

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ABSTRACT: The genus *Euploea* Fabricius is reported from Korea with an unrecorded species, *E. eunice* (Godart) for the first time. Illustration of adult and genitalia of examined species provided, with all available information. DNA barcode sequence for precise identification of the species is also provided.

Key words: Blue-Danded King Crow, Danainae, DNA Barcode, Tropical Distribution

초 록: 본 연구를 통해 국내미기록속인 까마귀나비속의 푸른줄까마귀왕나비를 최초로 보고한다. 푸른줄까마귀왕나비의 암컷 형태와 생식기, 채집지 등의 정보를 제공하였다. 또한 신속한 종 동정을 위한 DNA 바코드 염기서열을 정보를 제공하였다.

검색어: 푸른줄까마귀왕나비, 왕나비아과, 열대분포, DNA Barcode

The family Nymphalidae consists of 559 genera with 6,152 described species (van Nieukerken et al., 2011). Phylogenetically, Nymphalidae have been placed in the superfamily Papilionoidea (van Nieukerken et al., 2011). The genus *Euploea* Fabricius belongs to the subfamily Danainae of the butterfly family Nymphalidae, based on the type species, *Papilio corus* Fabricius, 1793 (Hendry, 2010). In the world, the genus *Euploea* has been known 54 species, which was distributed in the Oriental and Australian regions (Lambkin, 2010). The larvae of the genus *Euploea* feed on families Apocynaceae, Asclepiadaceae, and Moraceae (Hendry, 2010). *Euploea eunice* (Godart, 1819) is known to migrate and overwinter in Taiwan (Wang and Emmel, 1990).

In the present study, *E. eunice* is newly recognized from Korea for the first time. Also, all the available information is presented, including the collecting site and photos of diagnostic character. DNA barcode sequence is also provided for precise identification of the species.

Materials and Methods

The materials examined in this study are based on the Entomological Collection of the Honam National Institute of Biological Resources, Mokpo, Korea (ECHNIBR). Specimens were dissected and examined after mounting on slide glass; female genitalia in euparal mountant. Photographs of adults were taken using a MP-E 65mm f/2.8 1-5x Macro Photo attached to 5D Mark IV digital camera (Canon, Tokyo, Japan). Photographs of the female genitalia was taken using a DFC

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495 digital camera (Leica, Wetzlar, Germany) attached to a Leica M205A stereomicroscope (Leica, Wetzlar, Germany). Terminology and morphological characters of the wing follows Martin and Reed (2014).

Genomic DNA was extracted from the hind leg of dried specimen, preserved in 100% alcohol using a DNeasy Blood & Tissue Kits (Qiagen, Inc, Hilden, Germany), according to the manufacturer's protocol. A specimen was sequenced for 638 bp fragment of the mitochondrial cytochrome c oxidase I (*COI*) gene, and the DNA barcode was amplified using the primer LCO1490, HCO2198 (Folmer et al., 1994). PCR conditions for amplification followed Herbert et al. (2003) using accupower PCR premix (Bioneer, Daejeon, Korea). Purifying the amplicons and sequencing directly were performed at Macrogen (Seoul, Korea). Contigs were assembled using Geneious prime (Biomatters, Auckland, New Zealand). Sequence was uploaded to GenBank (accession number. OL774796).

Taxonomic Accounts

Genus *Euploea* Fabricius, 1807 까마귀왕나비속(신칭)

Euploea Fabricius, 1807: 280.

Type species: *Papilio corus* Fabricius, 1793.

Synonymic list see in the Lepidoptera and Some Other Life Forms (<http://www.nic.funet.fi>)

Euploea eunice (Godart, 1819) 푸른줄까마귀왕나비(신칭)

Danais Eunice Godart, 1819: 177. Type locality: Java.

Synonymic list see in the Lepidoptera and Some Other Life Forms (<http://www.nic.funet.fi>)

Adult. Female (Fig. 1A and B). Wingspan 78mm. Upperside: Forewing bluish black. The border ocelli well-developed with sky blue spots. Discalis I and II present with sky blue line. Hindwing blackish brown with oval light purple patch on the costal margin. The border ocelli present with smaller spots downwardly. Underside: Both wings brown. The border ocelli, discalis I and II present with white spots.

Female genitalia (Fig. 1C). Papillae anales thick, with few setae at the apical; ovipositor short, as long as the width of corpus bursae; ostium well-developed swollen; ductus bursae

long, approximately five times as long as the width of corpus bursae, and well sclerotized; corpus bursae sac shaped, with two granulated signum.

Male. Unkown in Korea.

Material examined. 1 ♀, Geoje Is., Gyeongsangnam-do, lat.34°57'52.81", long.128°40'00.05", 4.viii.2021 (J.S. Lee, J.W. Kim, H. Lee), genitalia mounted on euparal solution, gen. no. ECHNIBR0001.

Distribution. Korea (new record), Japan, China (Hinan), Taiwan, The Philippines (Palawan), Vietnam, Laos, Thailand, Indonesia (Bali, Bawean, Enggano, Java, Lombok, Nias, Sumatra, Sumba, Sumbawa), Malaysia (Langkawi, Malacca), Singapore, Borneo, India (Andamans, Nicobars), Guam.

DNA barcode. DNA barcode sequence were generated (NCBI accession number. OL774796). Multiple alignments using the BLAST tool in the NCBI database showed the following species as nearest neighbor: *Euploea eunice* (locality of reference data from Java) and *E. eunice leucogonis* (locality of reference data from Malaysia) 100%.

Remarks. In this study, the genus *Euploea* was confirmed for the first time in Korea. The genus *Euploea* is known to be distributed in the Oriental and Australian regions (Lambkin, 2010). Therefore, further distributional studies are needed, such as whether, this species has temporarily appeared according to weather conditions such as typhoons and winds during the migration, and whether it has settled and grown in Korea.

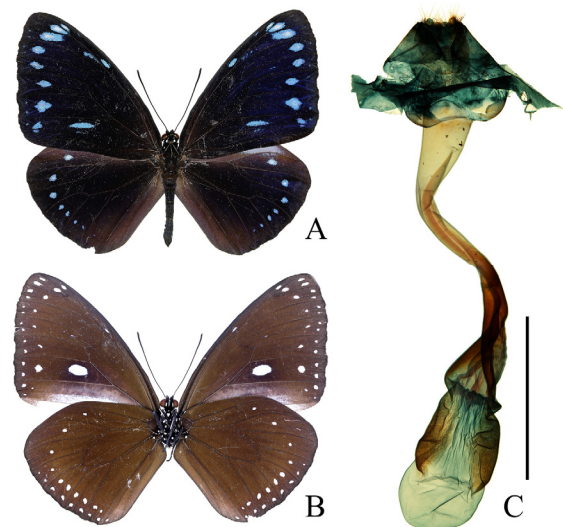


Fig. 1. *Euploea eunice*. A. Female, dorsal aspect; B. *ditto*, ventral aspect; C. Female genitalia, scales: 0.5 mm.

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Statements for Authorship Position & Contribution

Lee, D.J.: Honam National Institute of Biological Resources, Associate Researcher; Wrote the manuscript

Lee, J.S.: Honam National Institute of Biological Resources, Associate Researcher; Made the figure and wrote the descriptions

Kim, J.W.: Honam National Institute of Biological Resources, Researcher; Sampling and made the specimen

Lee, H.: Honam National Institute of Biological Resources, Researcher; Sampling and made the specimen

Roh, S.J: Honam National Institute of Biological Resources, Senior Researcher; Wrote the manuscript

All authors read and approved the manuscript.

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