



The first record of the monospecific genus *Rhinopalpa* (Lepidoptera: Nymphalidae) from China

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Abstract

Background

The family Nymphalidae is the largest group of butterflies with high species richness. *Rhinopalpa polynice* (Cramer, [1779]), a forest species, was discovered in the mid-stream of the Yuanjiang-Red River Valley of Yunnan Province for the first time, which represents the first record of the genus *Rhinopalpa* in China.

New information

The species *R. polynice* (Cramer, [1779]) is the first record of the genus *Rhinopalpa* from China. The specimen was collected in the mid-stream of the Yuanjiang-Red River Valley of Yunnan Province. The female genitalia are described for the first time.

Keywords

Rhinopalpa polynice, China, new record, Yuanjiang-Red River Valley, forestry species

Introduction

Nymphalidae is a cosmopolitan family of Papilionoidea with high species richness, which includes about 6,100 species in 12 subfamilies and 350 genera (Ackery et al. 1999, Hsu 2013, Wu and Hsu 2017). Most species are medium or large-sized and variable in wing shapes, colours and markings (Wu and Hsu 2017). Some species also exhibit strong seasonal phenotypes (Hsu 2013, Wu and Hsu 2017).

The genus *Rhinopalpa* C. & R. Felder, 1860 is placed in subfamily Nymphalinae (Savela 1990, Monastyrskii 2019, Inayoshi 2021). According to the molecular study including genus *Rhinopalpa*, this genus was regarded as Victoriini (Wahlberg et al. 2005, Chazot et al. 2019). The genus *Rhinopalpa* contains only one species, *Rhinopalpa polynice* (Cramer, [1779]) (Monastyrskii 2019), which is distributed widely from Indochina to Indonesia and the Philippines, with 10 subspecies described to date (Savela 1990, Inayoshi 2021). *Rhinopalpa polynice* has two subspecies in mainland SE Asia, ssp. *eudoxia* from Indochina to Malay Peninsula and ssp. *birmana* (Savela 1990, Osada et al. 1999, Monastyrskii 2019, Inayoshi 2021). *Rhinopalpa polynice* is a typical forests species and the larvae can develop successfully to adult on species of *Poikilospermum* (Cecropiaceae) and *Dendrocnide* (Urticaceae) in the wild (Monastyrskii 2019). Three specimens were recorded from the Red River Valley in North Vietnam (Monastyrskii 2019, Inayoshi 2021). However, there has been no record of this species in China.

In this study, a female *R. polynice* was collected from Yuanyang County, southeast Yunnan, China, which sits in the mid-stream of the Yuanjiang-Red River Valley and is isolated from the sites in North Vietnam where *R. polynice* was previously recorded. The female genitalia are described for the first time. The specimen, collected in this study, is the first record of the genus *Rhinopalpa* in China. Both specimen and dissected genitalia are deposited in the insect collection of Southwest Forestry University (SFU), Kunming, China.

Materials and methods

Spread specimens were photographed by Canon 5DS (Canon, Japan) with medium grey background and the photos were adjusted using Adobe Photoshop CS (Adobe, USA).

To observe the female genitalia, the abdomen was treated with 1 ml 10% sodium hydroxide solution to digest soft tissue at 70°C for 1 h and then dissected in a water-filled Petri dish under a stereoscope. The genitalia were then transferred to 80% glycerol for 12 h to render them transparent. A solution of 2% chlorazol black was used to dye the membranous parts for 10 min in order to obtain better photographic results. Photographs were taken with a Nikon SMZ1500 stereoscope (Nikon, Japan) and automatically stacked using Helicon

Focus 7.5.8 (Helicon Software, USA). After observation and photography, a piece of card was cut, the genitalia were fixed to the card by white emulsion and pinned with the specimen to avoid confusion. The photographs were adjusted and arranged using Adobe Photoshop CS (Adobe, USA). Terminology of the female genitalia follows Hu et al. (2021).

Taxon treatment

Rhinopalpa polynice (Cramer, [1779])

Material

- a. scientificName: *Rhinopalpa polynice* (Cramer, [1779]); taxonomicStatus: accepted; kingdom: Animalia; phylum: Arthropoda; class: Insecta; order: Lepidoptera; family: Nymphalidae; taxonRank: species; vernacularName: The Wizard; genus: *Rhinopalpa*; specificEpithet: *polynice*; scientificNameAuthorship: (Cramer, [1779]); country: China; stateProvince: Yunnan Province; county: Yuanyang County; locality: Shalatuo Village; verbatimElevation: 928m; verbatimCoordinates: 23°6.047'N, 102°34.43'E; samplingProtocol: sweep net; year: 2020; month: 9; day: 29; habitat: Evergreen broad-leaved forest; individualCount: 1; sex: female; lifeStage: adult; recordedBy: Wen Shi; disposition: in collection; identifiedBy: Huihong Zhang; dateIdentified: 2020; basisOfRecord: PreservedSpecimen

Description

Female (Fig. 1): Forewing length 37 mm. Body brown covered with short hair dorsally, labial palpi brown, antenna straight and dark brown, legs greyish-yellow. Forewing: broad triangular with obvious zigzag termen, two angles at ends of veins M_1 and CuA_2 , forming hook-shaped apex; upperside brownish in basal one third, discal area reddish-brown, postdiscal to termen area dark brown, space CuA_2 with small subterminal black spot; underside dark brown, six fine purplish zigzag lines in brown basal area, six serial subterminal ocelli with purple pupil, brown iris and purple ring, terminal area with two parallel narrow purple wavy lines. Hindwing: square with obvious zigzag termen, acute short tail at end of vein M_2 ; upperside with same colour configuration as forewing, three small subterminal black spots in spaces M_1 to M_3 ; underside with same colour configuration as forewing, including the purple lines in basal area, seven serial subterminal ocelli as those of forewing.

Female genitalia (Fig. 2): Papillae anales round and narrow. Lamella antevaginalis sclerotised and narrow, lamella postvaginalis sclerotised, with claw-like central part and two narrow lobes at both sides. Ductus bursae tubular and membranous, rather slender. Corpus bursae oval, signa comprised of two patches of tiny granules at both sides near base.

Distribution

This species is currently known from India, Myanmar, Laos, Vietnam, Thailand, Malaysia, Indonesia and Philippines (Savelle 1990, Osada et al. 1999, Ek-Amnuay

2012, Monastyrskii 2019, Inayoshi 2021); and China is the new distribution area. (Fig. 3).



Figure 1. [doi](#)

Female *Rhinopalpa polynice* (Cramer, [1779]) collected in Yuanyang County. **A.** upperside; **B.** underside; scale bar = 10 mm.

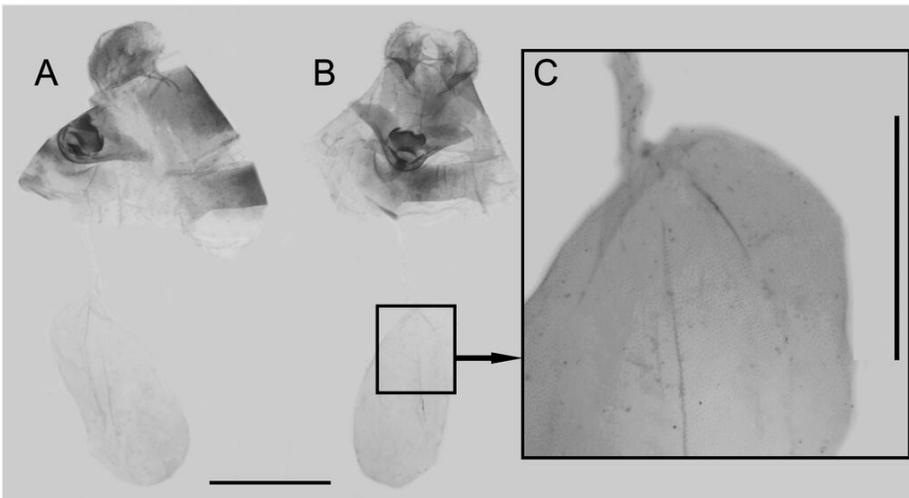


Figure 2. [doi](#)

Female genitalia of *Rhinopalpa polynice* (Cramer, [1779]) collected in Yuanyang County. **A.** lateral view; **B.** ventral view; Scale bar = 5 mm **C.** signa enlarged, scale bar = 1 mm.

Discussion

China is a country with high biodiversity of butterflies with about 2020 species in recent records (Wu and Hsu 2017), especially in south Yunnan where the environment is highly heterogeneous (Zhang et al. 2020). In recent years, many new taxa and new records of

butterflies were described and discovered (Hu and Zhang 2010, Hu et al. 2012aHu et al. 2012b, Lang 2012, Lang 2017, Zhang et al. 2020). Most of these new records are forest species and were previously mainly recorded in Indochina (Fig. 4; Savela 1990, Osada et al. 1999, Ek-Amnuay 2012Monastyrskii 2019, Inayoshi 2021). As south Yunnan is adjacent to Indochina, it is logical that a number of Indochinese species could also be found in south Yunnan as the environment is similar (Li 1995, Chen et al. 2012). In light of this situation, the distribution range of these Indochinese species could be much wider than we know. Amongst these species, forest species like *R. polynice* are difficult to notice because of their particular habitat requirements and lower tolerance to human disturbance (Monastyrskii 2019).



Figure 3. [doi](#)

The habitat of *Rhinopalpa polynice* (Cramer, [1779]) in China: Shalatuo Village, Yuanyang County, Yunnan Province, SW China.

In recent years, three cryptic species of butterflies were discovered from Indochina, *Graphium* (*Pazala*) *daiyuanae* Hu, Zhang & Cotton, 2018, *Graphium* (*Pazala*) *wenlingae* Hu, Cotton & Monastyrskii, 2019 and *Losaria doubledayi* (Wallace, 1865), all of them being forest species (Hu et al. 2018, Hu et al. 2019, Xu et al. 2020). Hence isolations are very likely between different populations in Indochina as a result of geographical barriers and environment heterogeneity, especially in forest species (e.g. the swampy grassland and savannah vegetation in the central part of Indochina). *Rhinopalpa polynice* is a typical forest species living in lowland forests (Monastyrskii 2019), two subspecies of *R. polynice* are found in Indochina to Malay Peninsula, with ssp. *eudoxia* (type locality “Cote Malaye”) in South Thailand to Malay Peninsula and ssp. *birmana* (type locality “Lower Burmah”) in Assam, Myanmar and Indochina (Savela 1990, Osada et al. 1999, Monastyrskii 2019, Inayoshi 2021). *Rhinopalpa p. birmana* is different from *R. p. eudoxia* by paler colour on the upperside, plus better-defined hindwing subterminal black spot in space M_1 and narrower forewing subterminal band (Monastyrskii 2019). Monastyrskii (2019) treated the Vietnamese specimens as *R. p. birmana*. However, Inayoshi (2021) regarded all populations in Indochina and West Malaysia as *R. p. eudoxia*, due to insufficient

morphological differences. In this study, as we only examined one specimen, it is impossible to further analyse its subspecies status with such limited material. Hence, the subspecies identity of *R. polynice* in Yunnan still requires future study.



Figure 4. [doi](#)

The distribution records of *Rhinopala polynice* (Cramer, [1779]) from Yuanjiang-Red River Valley. Red circle: the new record in China; Blue circle: the records from Vietnam (Monarstyrskii 2019, Inayoshi 2021).

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