

[研究文章 Research Article]

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## *Indothemis carnatica* (Fabricius, 1798) (Odonata: Libellulidae): A Newly Recorded Dragonfly from Kinmen Islands and Matsu Islands, Taiwan

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**Abstract:** Herein, we report a new record of the dragonfly *Indothemis carnatica* (Fabricius, 1798) from Kinmen Islands and Matsu Islands based on either collected specimens or observation records, representing the first record of the species in Taiwan and Fujian. Photos of habitus, live specimens and habitats are also provided. Finally, we briefly discussed the current status of the species on both island groups.

**Keywords:** Fujian, fauna, Kinmen County, Lienchiang County, Oriental, Anisoptera

### Introduction

*Indothemis carnatica* (Fabricius, 1798) was originally restricted in a few localities in India, Sri Lanka, and Thailand and hence was treated as a "Near Threatened" species in the IUCN Red List (Dow, 2009). However, this species has likely spread into various countries in recent years. Numerous new country records were reported: Cambodia (Roland et al., 2011), Malaysia (Choong & Cheah, 2013), Vietnam (von Ellenrieder et al., 2015), China (Hong Kong, Yunnan, Guangxi, Guangdong) (Odonata Research, 2016; AFCD, 2018; Zhang, 2019), Singapore (Soh et al., 2019), and Bangladesh (Kalkman et al., 2020). An increase in the number of individuals was also observed in Hong Kong (Wu, 2020). As a result, the IUCN Red List treated *I. carnatica* as a "Least Concern" species after re-evaluating the population's current status (Dow, 2019).

The fauna of Kinmen Islands and Matsu Islands is more similar to the Fujian Province of mainland China compared to Taiwan Island due to geographical proximity. Both island groups are very close to the eastern coast of Fujian Province, People's Republic of China (ca. 10 to 20 km). Insect surveys of both island groups are relatively poorly done (Shih et al. 2004). During a preliminary survey, Lien (1980) reported 16 species of Odonata from Kinmen. Tung & Yang (2008) conducted a systematic survey of the insect fauna and further recorded 15 additional species for the islands. Two new records of damselflies: *Pseudagrion rubriceps* Selys, 1876 and *Prodasineura autumnalis* (Fraser, 1922) were reported in the local field guidebook (Chang, 2011). Both species are only found in the Kinmen within the country, highlighting the unique fauna of the region. Abundant new records from the Kinmen indicated that the fauna there is still largely unknown, especially for the aquatic insects (etc. Liu et al. 2021, 2022). The only source of the Odonata survey in Matsu is Wu (2002) who reported that at least 14 species were found on the islands, but in reality, Wu (2002) only illustrated 12 species.

In the present study, we report *I. carnatica* in Taiwan and Fujian Province for the first time based on the specimens collected from Kinmen and the observation records from both Kinmen and Matsu.

### Materials and methods

The voucher specimens are preserved in the following depositories: CHMc – Chen-Han Ma's private collection, Taipei, Taiwan; FSHc – Fang-Shuo Hu's private collection, Yilan, Taiwan; TFRI – Taiwan Forestry Research Institute, Taipei, Taiwan (W.-C. Yeh). The identity of the specimens was based on comparing the specimens and the descriptions and illustrations of *I. carnatica* in von Ellenrieder et al. (2015), Zhang (2019) and Joshi & Sawant (2020). Specimens were examined by Olympus SZ61 Stereo Microscope. Photos of habitus and morphological characters were photographed by Canon EOS R5 with Canon RF100mm f/2.8L MACRO IS USM lens. Plates were prepared by Adobe Photoshop CS5.

### Results

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*Indothemis carnatica* (Fabricius, 1798)  
(Figs 1, 2A)

**Material examined: TAIWAN: Kinmen County:** 1 female, Maoshan Pagoda (茅山塔), Jincheng Township (金城鎮), 24.4081, 118.2871, 24-IX-2022, leg. K.-T. Lin (FSHc); 1 teneral male and 1 teneral female, same information as the previous one except for the date, 25-IX-2022 (TFRI); 2 females, same locality as previous ones, 02-X-2022, leg. C.-H. Ma (CHMc, FSHc); 1 female, same information as the previous one except for the date, 04-X-2022 (CHMc).

**Observation records: TAIWAN: Lienchiang County (=Matsu Islands):** 1 male, Zhongxing Reservoir (中興水庫), Beigan Township (北竿鄉), 26.2206, 119.9928, 14-VI-2020, obs. S.-L. Chen; 9 males and 1 female, Dongju Island (東莒島), Fuzheng Reservoir (福正水庫), Juguang Township (莒光鄉), 25.9633, 119.9825, 16-VI-2020, obs. S.-L. Chen; 1 male, 01-VII-2020; 1 female, 02-VII-2020; 2 males, 03-VII-2020, obs. H.-I. Chiou; 5 males, same information as the previous one except for the date, 05-VII-2020; 2 males, Jinsha Reservoir (津沙水庫), Nangan Township (南竿鄉), 26.1447, 119.9157, 17-VI-2020, obs. S.-L. Chen; 1 male, same information as the previous one except for the date, 04-VII-2020; 2 males, Jinsha No. 1 Dam (津沙一號壩), Nangan Township (南竿鄉), 26.1485, 119.9150, 17-VI-2020, obs. S.-L. Chen; 1 male, Zhiqing Power Plant (志清發電廠), Nangan Township (南竿鄉), 26.1497, 119.9288, 17-VI-2020, obs. S.-L. Chen. **Kinmen County:** 1 male, Caicuo Historical Trail (蔡厝古道), Jinsha Township (金沙鎮), 24.4708, 118.4192, obs. S.-C. Huang; 1 female, Maoshan Pagoda (茅山塔), Jincheng Township (金城鎮), 24.4081, 118.2871, 24-IX-2022, obs. K.-T. Lin; 1 male and 1 female, same locality as previous one, 11-IX-2022, obs. J.-G. Ho; 1 female, same information as the previous one except for date, 12-IX-2022; 1 female, same locality as previous one, 04-X-2022, obs. C.-H. Ma.

**Diagnosis.**

The fore wings are entirely hyaline; the base of the hind wings with small brown spots. Both fore wings and hind wings are without brown spots on the tips of wings (with small spots on the tips of wings in *I. limbata* (Selys, 1891)). Synthorax humeral stripe thick, trident at the end; antehumeral stripe present, sometimes connect with humeral stripe. Interpleural stripe and metapleural stripe distinct, interpleural stripe truncate on the top; metapleural stripe complete, both stripes connected by a thin black stripe in the position of metastigma. Mature male compound eyes brownish and dark blue, thorax and abdomen black, covered by blue pruinosity, teneral male similar to female in general habitus. Female compound eyes brownish and yellowish green, thorax yellow, abdomen black with yellowish markings.

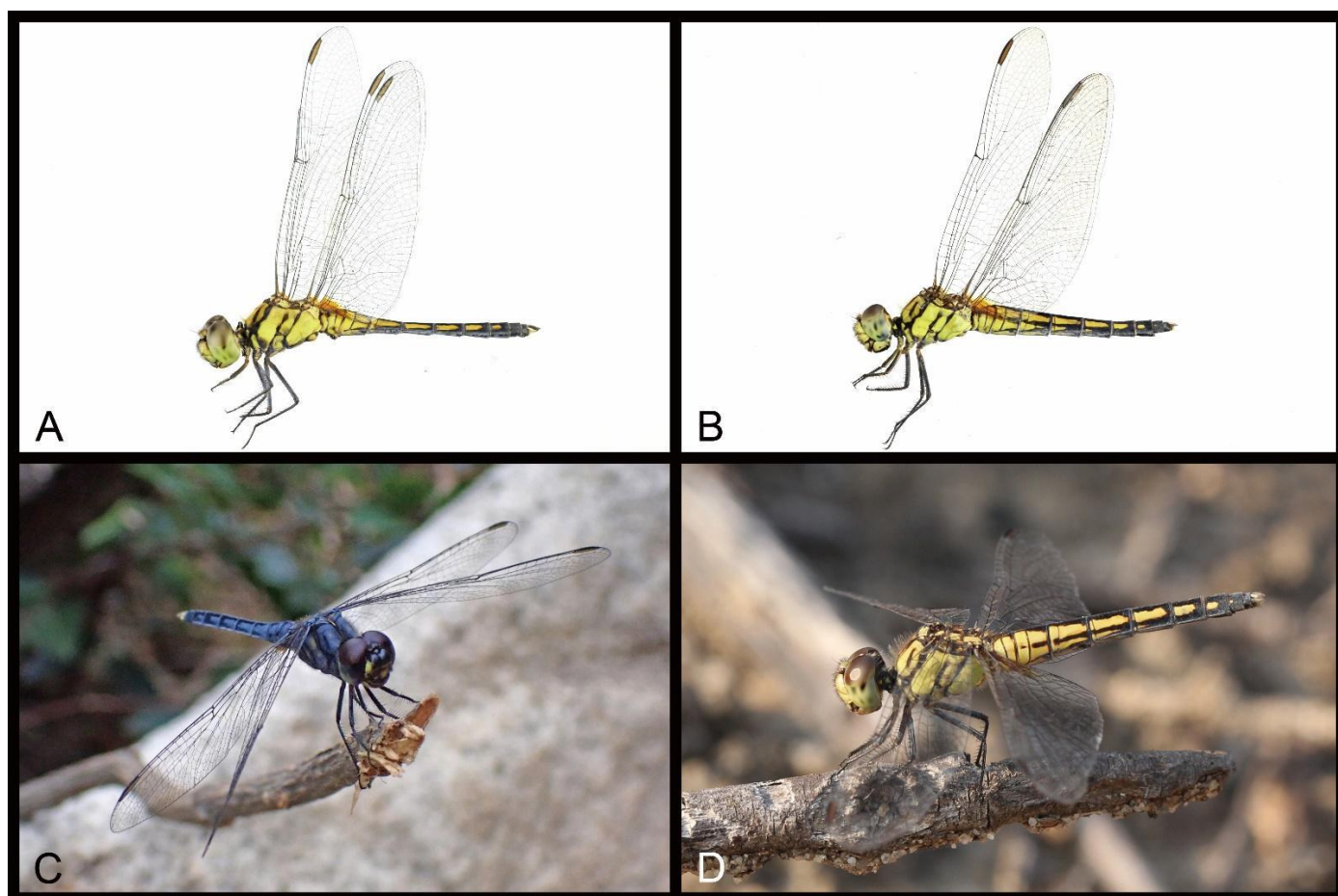


Figure 1. Specimens and live photos of *Indothemis carnatica* (Fabricius, 1798): A – teneral male (photo by I.-L. Lee); B – mature female (photo by I.-L. Lee); C – mature male (photo by S.-C. Huang); D – mature female (photo by C.-H. Ma).



**Distribution.**

*Indothemis carnatica* is widely distributed in the Oriental Region, including Bangladesh, Cambodia, China (Yunnan, Guangxi, Guangdong, Hong Kong), India, Malaysia, Singapore, Sri Lanka, Thailand and Vietnam (AFCD, 2018; Zhang, 2019; Soh et al., 2019; Kalkman et al., 2020). In addition, the species is newly recorded in Taiwan (Kinmen County and Lienchiang County). There is also a record of the species from Sanya, Hainan, China (18.221525, 109.432068) on iNaturalist (<https://www.inaturalist.org/observations/12236973>), we report it as a new province record herein.

**Bionomics.**

All individuals observed in Matsu inhabited the open ponds with some weeds on the waterside (Figs 2C–F). A mating pair of *I. carnatica* were observed by the second author in Fuzheng Reservoir (福正水庫), and oviposition was also observed at the same time. The collecting locality Maoshan Pagoda (茅山塔) in Kinmen is near the seashore, with strong winds but without fresh water nearby, the dragonflies observed were perching on the twigs or ground (Fig 2A–B).

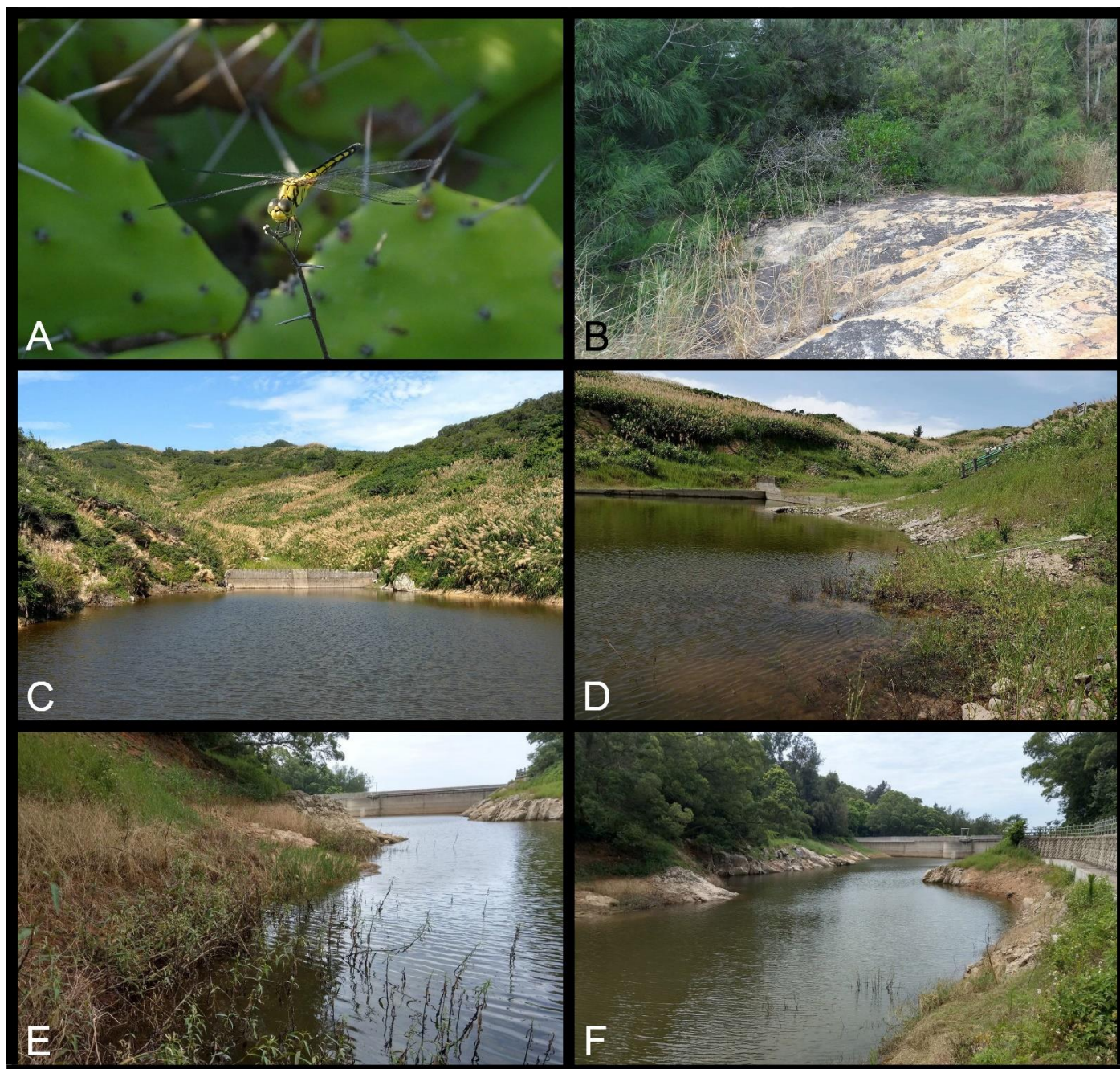


Figure 2. Habitats of *Indothemis carnatica* (Fabricius, 1798) from Kinmen and Matsu: A – mature female perching on the twig; B - Maoshan Pagoda (茅山塔), Kinmen; C, D - Fuzheng Reservoir (福正水庫), Matsu; E, F - Jinsha Reservoir (津沙水庫), Matsu.



## Discussion

It is still unclear whether the *I. carnatica* recorded from Kinmen and Matsu are residents or vagrants, as in some *Sympetrum* spp. on Taiwan Island (Ma et al. 2022). In Matsu, the open ponds where the egg-laying female was observed, with a few weeds on the waterside fit the reported habitats of the species (Choong & Cheah, 2013; Soh et al., 2019). Hence, the individuals found in Matsu probably represent a resident population. There is no fresh water source nearby the locality in Kinmen, where the wind is also strong; The habitat is actually similar to that of the immigrated *S. fonscolombii* (Selys, 1840) in Taiwan (Ma et al., 2022). Additionally, the immigration of *I. limbata* has already been observed in Yunnan, China (Zhang, 2017), a fact that implies *I. carnatica* may also have such behavior. A systematic survey of the Odonata fauna in Kinmen and Matsu in the future, including larvae collecting in proper ponds, may help to clarify the real status of *I. carnatica* in these islands.

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## 藍印蜻蜓（蜻蜓目：蜻蜓科）：臺灣金馬地區新紀錄種蜻蜓

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**摘要:** 金門與馬祖的昆蟲相較為缺乏調查，本文根據標本與觀察紀錄報導來自這兩個島群的臺灣新紀錄種蜻蜓：藍印蜻蜓 (*Indothemis carnatica* (Fabricius, 1798))。本文亦提供標本之整體照、活體照與棲地照片，並簡短討論藍印蜻蜓在兩個島群的定位為固留種或迷蜓。

**關鍵詞:** 福建、動物相、金門縣、連江縣、東方區、差翅下目