Journal of Threatened Taxa

Building evidence for conservation globally

www.threatenedtaxa.org

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

Monograph

Communication

A preliminary report on butterfly fauna (Insecta: Lepidoptera) of Tengchong Section of Gaoligongshan National Nature Reserve, China

Yik Fui Philip Lo & Zheng Bi

12 September 2019 | Vol. 11 | No. 11 | Pages: 14452–14470
DOI: 10.11609/jott.4443.11.11.14452-14470

COMMUNICATION

Journal of Threatened Taxa | www.threatenedtaxa.org | 12 September 2019 | 11(11): 14452–14470

ISSN 0974-7907 (Online)
ISSN 0974-7893 (Print)

PLATINUM
OPEN ACCESS

A preliminary report on butterfly fauna (Insecta: Lepidoptera) of Tengchong Section of Gaoligongshan National Nature Reserve, China

Yik Fui Philip Lo [1] & **Zheng Bi** [2]

[1] Kadoorie Conservation China, Kadoorie Farm & Botanic Garden, Lam Kam Road, Tai Po, Hong Kong SAR, China.
[2] Yunnan Gaoligongshan National Nature Reserve (Tengchong Bureau), 157 Laifeng Avenue, Tengchong, Yunnan Province, China.
[1] philiplo@kfbg.org (corresponding author), [2] bhqbz_9@163.com

Abstract: The butterfly fauna of Tengchong Section of Gaoligongshan National Nature Reserve, western Yunnan, China was investigated during a series of field surveys conducted between April 2014 and May 2018. A total of 216 butterfly species were recorded (Hesperiidae 41, Papilionidae 20, Pieridae 21, Lycaenidae 45, and Nymphalidae 89), of which 179 represent new records for Tengchong. Significant findings include paratype materials of a recently described genus and a subspecies, respectively, as well as three national and five provincial new records. Several obscure species were rediscovered during the survey, including two taxa that have not been recorded since their descriptions, *Celaenorrhinus morena* Evans, 1949 and *Thoressa pedla pedla* (Evans, 1956). The result of the survey is presented herein with notes on some little-known species. Additionally, past records on Tengchong butterfly fauna were reviewed and a name is treated as *nomen nudum*.

Keywords: Eastern Himalaya, Hengduan Mountains, Kachin, Myanmar, national new records, western Yunnan.

Chinese 摘要： 在 2014 年 4 月至 2018 年 5 月期间，对中国云南西部高黎贡山国家级自然保护区腾冲片区的蝶类进行了一系列调查，共记录蝶类 216 种（弄蝶科 41 种；凤蝶科 20 种；粉蝶科 21 种；灰蝶科 45 种；蛱蝶科 89 种），其中包括腾冲市新记录 179 种。本调查其他重要发现包括采集到 1 个新近被描述的属和亚种的副模式标本，以及 3 个中国和 5 个云南省新记录种 / 亚种。在调查中还重新发现了一些鲜为人知的物种，包括 2 个自正式描述以来未再被记录的分类单元，即摩星弄蝶 *Celaenorrhinus morena* Evans, 1949 和侏儒陀弄蝶指名亚种 *Thoressa pedla pedla* (Evans, 1956)。本报告列出了详细的调查结果，并对其中一些重要物种进行深入探讨。此外，本报告还回顾了腾冲蝴蝶的历史纪录，并将 1 个学名处理为裸名（*nomen nudum*）。

DOI: https://doi.org/10.11609/jott.4443.11.11.14452-14470 | **ZooBank:** urn:lsid:zoobank.org:pub:6140D363-33DC-43B9-AC6C-A39D2E343214

Editors: Adam Cotton & Shao-ji Hu (Pierce), Yunnan University, Kunming, China. **Date of publication:** 12 September 2019 (online & print)

Manuscript details: #4443 | Received 27 July 2018 | Final received 09 July 2019 | Finally accepted 16 July 2019

Citation: Lo, Y.F.P. & Z. Bi (2019). A preliminary report on butterfly fauna (Insecta: Lepidoptera) of Tengchong Section of Gaoligongshan National Nature Reserve, China. *Journal of Threatened Taxa* 11(11): 14452–14470. https://doi.org/10.11609/jott.4443.11.11.14452-14470

Funding: This study is funded by Kadoorie Farm and Botanic Garden.

Competing interests: The authors declare no competing interests.

Author details: Yik Fui Philip Lo: Senior Conservation Officer, Kadoorie Farm and Botanic Garden; Fellow, Royal Entomological Society. Zheng Bi: Director, Gaoligongshan National Nature Reserve (Tengchong Bureau)

Author contribution: YFLP conceived, designed and performed the analysis, and wrote the paper. Both authors collected and contributed data.

Acknowledgements: We thank Yu-Feng Hsu (National Taiwan Normal University, Taipei), Li-Wei Wu (National Taiwan University, Nantou) and Zhihua Zhang (Dongfang Forestry Department, Hainan) for taking part in some surveys. Xiang-Yuan Huang, Xing-Chao Zhang (TC-GLGS), Fei Li, Gang Lu, Chi Fung Mak and Bosco Chan (KFBG) provided their photo records. Motoki Saito (The Butterfly Society of Japan, Tokyo) provided reprints of Kachin survey reports. We are also grateful to the management of Gaoligongshan National Nature Reserve for granting permission to conduct the survey and providing essential assistance on our field works.

INTRODUCTION

Gaoligongshan (hereafter GLGS) is a mountain range that runs north-south along the border between Kachin State (Myanmar) and western Yunnan (China). GLGS part of the Hengduan Mountains of southwestern China, and is well known for rich and unique biodiversity. The southern part of GLGS was designated a nature reserve in 1986 and recognized as a biosphere reserve in 2000 (UNESCO 2007), and the Tengchong section is located on the western slope of the reserve. For administrative and geographic details see Chan et al. (2019, this issue).

Tengchong was the first area in GLGS to be explored by western zoologists, when British zoologist John Anderson made a collecting expedition in Daying River and Tengchong of western Yunnan in 1868. One-hundred-and-eighteen butterfly species were collected during the expedition, including three new species described by Atkinson (1871) (Anderson 1878). Since detailed locality information was not provided in Anderson's report, it is not possible to distinguish Tengchong material from the rest of his collection. Following Anderson's exploration, a number of naturalists visited GLGS in the early 20th Century, but their works contributed little to the knowledge of butterfly fauna of the region.

Starting from the 1970s, GLGS has been frequently visited by Chinese and Japanese entomologists. The exceptionally high species richness of butterflies was gradually revealed with the description of a number of new taxa (e.g., Yoshino 1995, 1997, 1999, 2008; Huang 2001, 2002, 2003). Most efforts were focused on the Nujiang (Salween River) Valley on the eastern slope of the mountain range, and the butterfly fauna of Tengchong on the western slope of GLGS received less attention and was not comprehensively documented. It was only briefly investigated during the Yunnan forest pest survey from 1979 to 1982 organized by the Yunnan Provincial Department of Forestry, which listed 482 butterfly species for Yunnan Province, of which 32 were recorded from Tengchong (Lee & Cao 1987). The discovery of *Neorina neosinica* Lee, 1985, an astonishing satyrid butterfly, was perhaps the most notable finding in Tengchong from that study. Lee (1995) & Xue (1995) basically adopted the information in Lee & Cao (1987).

Since 2000, several more butterfly species were added to the Tengchong list following taxonomic works on particular groups. Three skipper species of the genus *Thoressa* were reported in Tengchong in a study of the tribe Aeromachini from China (Huang 2009). Meanwhile, Xue (2009) listed four additional skipper species from the same area in a study of Chinese Hesperiidae. Lang & Duan (2016) described a new *Lethe* species from Tengchong. A further seven satyrid butterfly species from the subtribe Lethina were reported in Tengchong by Lang (2017). By 2017, 51 species of butterfly were documented for Tengchong, which likely underestimated the rich biodiversity of this area. To update this information, a series of joint biodiversity surveys were organized by Kadoorie Farm and Botanic Garden (KFBG) and the Tengchong Bureau of Gaoligongshan National Nature Reserve during 2014–2018. The survey results for butterfly fauna are presented herein, with a checklist and notes on selected species of special interest.

METHODS

Study areas

Surveys were conducted primarily in the Tengchong Section of Gaoligongshan National Nature Reserve (hereafter TC-GLGS) including all six management sections (from south to north: Zhengding, Dahaoping, Qushi, Jietou, Datang and Zizhi). In addition, lower-elevation forests of Laifengshan National Forest Park and the protected riparian forest along Longchuan River were also surveyed. Fieldwork covered elevations between 1,300m and 2,800m and was conducted during March to October, which is expected to cover the flight periods of most butterfly species in the region. A total of 57.5 man-days were spent from April 2014 to May 2018; survey details are shown in Table 1. For detail information on geography, vegetation and habitat of the study area, please refer to Chan et al. (2019, this issue).

Survey methods

Daytime surveys were conducted in a variety of habitats when weather conditions were favourable for butterfly activity (non-rainy, temperature >20°C) along roads and major forest trails throughout the study areas, using standard 42cm diameter insect nets to collect adult butterflies (superfamily Papilionoidea), particular attention was paid at mud-puddling sites and spots of nectar source. Some individuals were retained as voucher materials or for identification purpose. Duplicate material that could be readily identified in the field was released immediately after recording. Larvae were also recorded opportunistically by examination of potential host plants. Verified photo records of important species taken by other members of KFBG and TC-GLGS were also included in the list.

Table 1. Survey sites and dates of this study (southern Tengchong includes Zhengding, Dahaoping and Qushi sections of TC-GLGS; northern Tengchong includes Jietou, Datang and Zizhi sections of TC-GLGS).

Date	Survey sites	Man-day
April 2014	Southern Tengchong, northern Tengchong, Laifengshan	4.5
September 2014	Southern Tengchong, northern Tengchong	6.0
May 2015	Southern Tengchong, northern Tengchong	10.0
July–August 2015	Southern Tengchong, northern Tengchong, Laifengshan	18.0
March 2016	Northern Tengchong	1.0
May 2016	Northern Tengchong, Longchuan River	4.0
June 2017	Southern Tengchong, northern Tengchong, Laifengshan, Longchuan River	11.0
May 2018	Northern Tengchong	3.0

Identification

Voucher materials were pinned and mounted in laboratory and a temporary catalogue number was assigned for each pinned specimen. A variety of references were used for identification (e.g., Evans 1949; Eliot & Kawazoe 1983; Chiba & Tsukiyama 1996; Koiwaya 2007; Huang 2009; Lang 2012, 2017; Wu & Hsu 2017). Higher classification arrangement follows Hsu et al. (2017). For species groups that are difficult to identify superficially, such as members of the family Hesperiidae and the genus *Ypthima*, male genitalia were also examined by dissection following the protocol of Hsu (2015).

RESULTS

Butterfly species richness

A total of 216 butterfly species were recorded in the survey, and these species belong to five families: Hesperiidae (41 species); Papilionidae (20 species); Pieridae (21 species); Lycaenidae (45 species); and Nymphalidae (89 species). Of the recorded species, 179 species were hitherto undocumented for Tengchong County. Some of the materials collected from the present study have been illustrated in Wu & Hsu (2017), and live adult photographs of selected species are illustrated by Lo (2016). A list of the butterfly species collected in the present survey is provided in Appendix 1. For reference purpose, a list of butterflies that were recorded in Tengchong in earlier studies but absent in the present survey is listed in Appendix 2.

Regarding species richness at genus level, the most speciose genus was *Lethe* (Nymphalidae) with 16 species recorded in the study area. *Papilio* (Papilionidae) and *Neptis* (Nymphalidae) were the second and third richest genera represented by nine and eight species, respectively. In addition, 10 genera in which at least four species each were recorded in the present survey (Table 2).

Conservation status

Two species, *Troides aeacus* and *Bhutanitis lidderdalii* (Papilionidae), are listed on Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), meaning that international trade is regulated. The global conservation status of most Tengchong species have not been evaluated by the IUCN Red List of Threatened Species (2017) except *Troides aeacus* (Papilionidae), *Ancema ctesia*, and *Dodona eugenes* (Lycaenidae), which are listed as Near Threatened (NT). Meanwhile, seven and 20 species have been evaluated as Vulnerable (VU) and Near Threatened (NT), respectively, by the China Species Red List (Wang & Xie 2005). None of the butterfly species from Tengchong are included in the Lists of Wildlife under Special State Protection (conventionally known as China State Key Protected Animal List in literature, e.g., Smith & Xie 2008), which is in need of revision.

Notable findings

One-hundred-and-seventy-nine species are new records for Tengchong. Many of these species are known from adjacent areas and their occurrence in Tengchong was expected. Nevertheless, substantial range extensions of some taxa were observed, including three national and six provincial new records, and several rare and obscure species were rediscovered. Detailed information of these, and notes on other species of special interest, are provided in the following species accounts.

Selected species accounts

Celaenorrhinus morena Evans, 1949 (Image 1)

New species record for China

This is an obscure species that has not been recorded since its original description. The records in Igarashi & Fukuda (2000) and Gogoi (2013) were misidentifications of other species, probably *C. leucocera* (Kollar, [1844]). The male genital structure of the Tengchong materials agrees with the description and illustration in Evans (1949). This species was previously only known from India's Naga Hills, Manipur, and Sikkim (Evans 1949);

Table 2. The 13 most speciose butterfly genera and their associated habitat preference in Tengchong, Yunnan Province, China.

Higher classification	Genus	Number of species	% of total recorded species	Habitat association
Nymphalidae: Satyrinae	*Lethe*	16	7.41%	Forest
Papilionidae: Papilioninae	*Papilio*	9	4.17%	Forest
Nymphalidae: Limenitidinae	*Neptis*	8	3.70%	Forest
Nymphalidae: Satyrinae	*Ypthima*	7	3.24%	Forest
Lycaenidae: Riodininae	*Dodona*	6	2.78%	Forest
Nymphalidae: Satyrinae	*Neope*	5	2.31%	Forest
Pieridae: Pierinae	*Pieris*	5	2.31%	Open
Hesperiidae: Hesperiinae	*Thoressa*	5	2.31%	Forest
Lycaenidae: Lycaeninae	*Chrysozephyrus*	4	1.85%	Forest
Nymphalidae: Satyrinae	*Mycalesis*	4	1.85%	Forest
Nymphalidae: Limenitidinae	*Euthalia*	4	1.85%	Forest
Lycaenidae: Lycaeninae	*Heliophorus*	4	1.85%	Open
Papilionidae: Papilioninae	*Byasa*	4	1.85%	Forest

the present discovery suggests that *C. morena* may also occur in similar habitat of northern Myanmar. A univoltine species was recorded only in July and August. Adults have typical behavior of the genus and often occur concurrently with *C. ratna nujiangensis* Huang, 2001.

***Ochlodes brahma* (Moore, 1878) (Image 2)**

New species record for China

This is primarily a Himalayan species with a disjunct population in northern Thailand (Chiba & Tsukiyama 1996). The present discovery fills the distribution gap of the species.

***Thoressa pedla pedla* (Evans, 1956) (Image 3)**

This taxon was described based on a unique male collected in Yunnan by well-known British botanist George Forrest in 1918 without detailed locality information (Evans 1956). This mysterious skipper was rediscovered recently in Tengchong by two different groups (Huang & Wang 2016; Lo 2016). A univoltine species which only occurs in May. Males are swift flyers and often gather at puddles with other congeneric species.

***Tsukiyamaia albimacula* Zhu, Chiba & Wu, 2016 (Image 4)**

A species of a recently established monotypic genus, described by materials from northern Myanmar, GLGS and northern Vietnam (Zhu et al. 2016). One of the males collected from the present survey in TC-GLGS was designated as a paratype. Males are active under strong sunlight, often fly swiftly close to the ground and gather at puddles.

***Polytremis gotama* Sugiyama, 1999 (Image 5)**

This is a poorly known skipper species that was thought to be confined to the east of the upper Mekong River (also known as Lancangjiang in China) in northwestern Yunnan (Sugiyama 1999; Fan 2006; Xue 2009; Zhu 2012). The result of this study extends the range of this rare species to the Irrawaddy Basin on the western slopes of GLGS. Males fly close to the ground and frequently perch on blades of tall grasses.

***Graphium mandarinus stilwelli* Cotton & Hu, 2018 (Image 6)**

A recently described taxon from western Yunnan and northern Myanmar (Hu et al. 2018). Two of the males collected in the present survey in Tengchong were designated as part of the paratypes. It is a univoltine species occurring in May.

***Dodona kaolinkon* Yoshino, 1999 (Image 7)**

Another poorly known species confined to GLGS. All previous records were restricted to the Nujiang Valley on the eastern slope (Yoshino 1999) and the materials collected in the present study represent the first record on the western slope of GLGS in the Irrawaddy Basin. It is a bivoltine species with adults being recorded in May and September. Males often fly with congeneric species along forest paths, settling on ground for long periods or puddling on moist surfaces in groups.

Image 1. *Celaenorrhinus morena* Evans, 1949. © Yik Fui Philip Lo.

Image 2. *Ochlodes brahma* (Moore, 1878). © Yik Fui Philip Lo.

Image 3. *Thoressa pedla pedla* (Evans, 1956). © Yik Fui Philip Lo.

Image 4. *Tsukiyamaia albimacula* Zhu, Chiba & Wu, 2016. © Yik Fui Philip Lo.

Image 5. *Polytremis gotama* Sugiyama, 1999. © Yik Fui Philip Lo.

Image 6. *Graphium mandarinus stilwelli* Cotton & Hu, 2018. © Yik Fui Philip Lo.

Image 7. *Dodona kaolinkon* Yoshino, 1999. © Yik Fui Philip Lo.

Image 8. *Oreolyce vardhana nepalica* (Forster, 1980). © Yik Fui Philip Lo.

***Oreolyce vardhana nepalica* (Forster, 1980) (Image 8)**

This taxon was once considered a Nepal endemic (Eliot & Kawazoe 1983) until Huang (2003) reported its presence in China, based on a single female collected on the eastern slope of GLGS. Three males collected in northern Tengchong in this study represent the second record in China and an adult of Chinese material is illustrated here for the first time.

***Heliophorus tamu kala* Tytler, 1912 (Image 9)**

New species record for Yunnan Province

A Himalayan species distributed from Nepal to northern Myanmar (Yago 2002). The presence of this species in China was first reported by Evans (1915) from southeastern Tibet (Motuo area). Three males collected in this study represent the easternmost global distribution and the first record of the species in Yunnan Province of China.

***Chrysozephyrus vittatus phoopan* Koiwaya, 2002 (Image 10)**

New subspecies record for China

The single male from Tengchong agrees well with ssp. *phoopan*, a taxon previously only known from northern Laos (Koiwaya 2007). The other subspecies known to occur in China, originally described as ssp. *yamanakai* Fujioka, 2003 upon materials from Sichuan, was synonymized with *akikoae* Morita, 2002 by Koiwaya (2007).

***Lethe brisanda* de Nicéville, 1886 (Image 11)**

New species record for Yunnan Province

All previous records of this species in China were restricted to the Motuo area of southeastern Tibet (Evans 1915; Huang 2000; Lang 2017; Wu 2017). The male collected in the present survey was the first reliable record of this species in Yunnan. The Yunnan material illustrated in Chou (1994) (as *L. insana brisanda*) was actually a misidentification of another undetermined taxon.

***Lethe tengchongensis* Lang, 2016 (Image 12)**

This is a recently described species endemic to Tengchong (Lang & Duan 2016, present study). A univoltine species which occurs only from August to September. They often fly near understorey bamboo growth and have typical behavior of the genus.

***Neorina neosinica* Lee, 1985 (Image 16)**

With Tengchong as the type locality, this obscure species, apart from its original description (Lee 1985), has only been recorded twice in Laos (D' Abrera 1985: two males) and Vietnam (Monastyrskii 2005: 1 male). No specimen was collected in the present survey and the record is based on an unequivocal photograph taken in southern Tengchong at an elevation of 1,900m in June 2018.

***Neorina hilda* Westwood, [1850] (Image 13)**

New species record for Yunnan Province

An eastern Himalayan species, recorded in southeastern Tibet (Motuo area) by Evans (1915). It was also found in Kachin State of northern Myanmar recently (Shizuya et al. 2005a). The males collected in the present study are the first record of this species in Yunnan Province. A univoltine species which occurs in summer, and is rare throughout its range.

***Symbrenthia doni* Tytler, 1940 (Image 14)**

New species record for Yunnan Province

This Himalayan species was formerly regarded as a subspecies of *S. brabira*, a widespread Oriental species, and all previous Chinese records were confined to southeastern Tibet (Motuo area) (Huang 1998: as *S. dalailama*; Lang, 2012). The material collected in this study represents the first record of this species in Yunnan Province and the easternmost distribution of the species.

***Kallima knyvettii* de Nicéville, 1886 (Image 15)**

New species record for Yunnan Province

There was confusion on the true identity of the *Kallima* with blue bands on wings in China and two names, *knyvettii* de Nicéville, 1886 and *alompra* Moore, 1879 have been adopted in earlier studies (e.g., Huang 2000; Lang 2012) with all records restricted to southeastern Tibet (Motuo area). Küppers (2015) clarified that the "blue" *Kallima* in southeastern Tibet should be called *K. knyvettii*, while *K. alompra* is a junior synonym of *K. horsfieldii* (Kollar, 1844) which has not been recorded in China. The male collected in present study is the first Chinese record outside Tibet.

DISCUSSION

The primary purpose of the present study is to assess the species richness of butterfly fauna in TG-GLGS. Survey effort was uneven at different sites which prevents rigorous comparison of species assemblages or relative species diversity along latitude and altitude. In general, the survey sites along the main ridge of GLGS support

Image 9. *Heliophorus tamu kala* Tytler, 1912. © Yik Fui Philip Lo.

Image 10. *Chrysozephyrus vittatus phoopan* Koiwaya, 2002. © Yik Fui Philip Lo.

Image 11. *Lethe brisanda* de Nicéville, 1886. © Yik Fui Philip Lo.

Image 12. *Lethe tengchongensis* Lang, 2016. © Yik Fui Philip Lo.

Image 13. *Neorina hilda* Westwood, [1850]. © Yik Fui Philip Lo.

Image 14. *Symbrenthia doni* Tytler, 1940. © Yik Fui Philip Lo.

more butterfly species than the enclaves, probably due to differences in habitat quality and altitude range.

Although the results of this survey have expanded the species list of Tengchong butterflies by over three-fold, it should not be treated as a comprehensive inventory of the butterfly fauna of the area. The flight period of adult butterflies in TG-GLGS is characterized by pronounced seasonality which complicates survey efficiency. In fact, more than one-third of the recorded species appear to have univoltine populations in Tengchong that can only be observed in well-defined, usually short, periods of a year. With succession of butterfly assemblages throughout the warmer seasons, many species may have been overlooked in this survey. Such activity pattern increases the difficulty to assess the true species richness of GLGS because considerable survey effort will be needed in order to cover the flight seasons of all butterfly species. Another limitation of the present

Image 15. *Kallima knyvettii* de Nicéville, 1886. © Yu Feng Hsu.

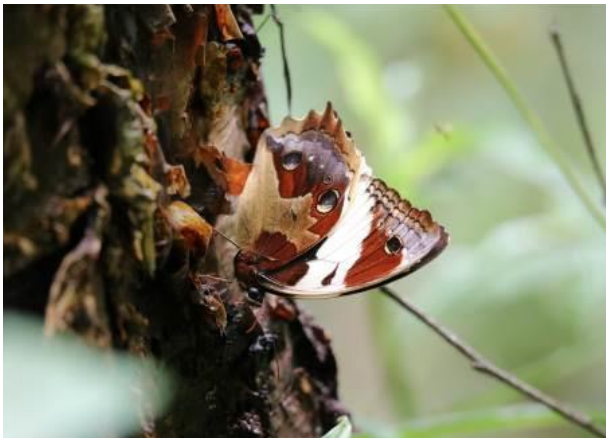

Image 16. *Neorina neosinica* Lee, 1985. © Zheng Bi.

survey was that habitats at higher altitude (>2,800m) were not covered because of accessibility constraints. To improve the completeness of the butterfly inventory, future fieldwork should be conducted during periods not covered by this survey, and sampling of the butterfly communities in sub-alpine habitats is necessary.

Given its high elevation, Tengchong has a more temperate climatic pattern than subtropical lowland at similar latitude. Species assemblage of Tengchong butterflies also show similar tendency as it is dominated by Oriental montane species intermixed with some Palearctic representatives. Meanwhile, a few tropical species also penetrate into the area; they are either restricted to lower elevations at the protected riparian forest along Longchuan River, or are well-known migrants (e.g., *Appias* spp. & *Catopsilia pomona*) which probably stray from the Irrawaddy lowlands.

Geographically, GLGS can be considered as an eastern extension of the Himalaya and its western slope is categorized as part of the Himalayan southern slope region (Zhao 1986). Although majority of Tengchong butterflies are typical northern Indochina-southwestern China fauna, the present study reveals that it supports a number of taxa that are confined to the western slope of GLGS and eastern Himalaya, but absent in the rest of China (Table 3). Tengchong therefore represents the eastern distribution limit for many species of their global ranges.

Table 3. Examples of TC-GLGS butterfly taxa confined to the western slope of GLGS and eastern Himalaya.

Scientific name	Sources
Hesperiidae	
Celaenorrhinus morena Evans, 1949	Evans 1949
Sebastonyma dolopia medoensis Lee, 1979	Huang 2009
Lycaenidae	
Heliophorus tamu (Kollar, 1844)	Huang 2000; Yago 2002
Nymphalidae	
Lethe brisanda de Nicéville, 1886	Lang 2016
Neorina hilda Westwood, [1850]	Huang 2000
Symbrenthia doni Tytler, 1940	Huang 1998; Lang 2012
Kallima knyvettii de Nicéville, 1886	Lang 2012; Küppers 2015

TC-GLGS supports a large number of forest-associated and shade-loving species (Table 2), indicating the area supports intact forest habitat. Many areas with old-growth forest in TC-GLGS have extensive understorey of dwarf bamboo, mainly in the genus *Fargesia* (Xue, 1995). Exceptionally high diversity of the subfamily Satyrinae is noteworthy, especially the genus *Lethe*, which is bamboo-associated and the most speciose genus of the area (16 species, Table 2), including the Tengchong endemic *L. tengchongensis*. A similar pattern was also observed in neighbouring Kachin State of northern Myanmar (Shizuya et al. 2005a,b). The tribe Aeromachini of the Hesperiidae family is another bamboo-associated group that has high species richness in the study areas, comprising five genera and 11 species, including one endemic subspecies (*Thoressa pedla pedla*), which is not unexpected as the Hengduan Mountains is recognized as one of the centers of speciation for the tribe (Huang 2009). Tengchong is also home to many rare and obscure species, some are already mentioned in the species account in the present paper, which further demonstrated the importance of TC-GLGS in conserving the unique biodiversity of the region.

With only 29 of the Tengchong species evaluated, existing international and national conservation assessments (Wang & Xie 2005; The IUCN Red List of Threatened Species 2017) are insufficient to reflect the current conservation status of butterflies in Tengchong. To identify special conservation needs for Tengchong butterflies, especially those with highly restricted distribution range, it is recommended to invest targeted efforts to assess their current status. It should be noted that there have been considerable taxonomic changes on those evaluated species since the last assessment of the China Species Red List in 2005, assessment updates following these taxonomic changes are necessary. Meanwhile, according to the definition proposed by Collins & Morris (1985), *Bhutanitis lidderdalii* and several other members of Papilionidae occurring in Tengchong are potential targets of "low volume/ high value" trade. These large and showy butterflies are popular items among collectors and over-collecting is a potential threat. Although no sign of commercial harvesting was detected in the study areas during the survey, any unauthorized collecting activity should be closely monitored and regulated by the authority.

REFERENCES

Anderson, J. (1878). Anatomical and zoological researches: comprising an account of the zoological results of the two expeditions to western Yunnan in 1868 and 1875; and a monograph of the two cetacean genera, *Platanista* and *Orcella.* B. Quaritch, London. 2 vols., xxv-l-985pp., xi-l-84pp.

Atkinson, W.S. (1871). Description of three new species of diurnal Lepidoptera from western Yunnan collected by Dr. Anderson in 1868. *Proceedings of the Zoological Society of Londo*n 1871: 215–216, pl. 12.

Chan, B.P.L., Z. Bi & S.Z. Duan (2019). Introduction to a four-year biodiversity survey of Tengchong Section of Gaoligongshan National Nature Reserve, in the footsteps of pioneering naturalists in western Yunnan, China. *Journal of Threatened Taxa* 11(11): 14391–14401. https://doi.org/10.11609/jott.4438.11.11.14391-14401

Chiba, H. & H. Tsukiyama (1996). A review of the genus *Ochlodes* Scudder, 1872, with special reference to the Eurasian species (Lepidoptera: Herperiidae). *Butterflies* 14: 3–16.

Chou, I. (ed) (1994). *Monographia Rhopalocerorum Sinensium*. Henan Science and Technology Publishing House, Zhengzhou, 854pp.

Collins, N.M. & M.G. Morris (1985). *Threatened Swallowtail Butterflies of the World, The IUCN Red Data Book*. IUCN, Gland and Cambridge, 403pp.+ 8pl.

D'Abrera, B. (1985). *Butterflies of the Oriental Region, Part II*. Hill House Publishers, Melbourne, 534pp.

Evans, W.H. (1915). A list of butterflies caught by Capt. F.M. Bailey in S.E. Tibet during 1913. *Journal of the Bombay Natural History Society* 23(3): 532–546.

Evans, W.H. (1949). *A catalogue of the Hesperiidae from Europe, Asia and Australia in the British Museum (N.H.)*. British Museum, London. 502pp. + 53pl.

Evans, W.H. (1956). Revisional notes on the Hesperiidae of Europe, Asia and Australia. *Annals and Magazine of Natural History* (series 12) 9: 749–752.

Eliot, J.N. & A. Kawazoe (1983). *Blue butterflies of the Lycaenopsis group*. British Museum (Natural History), London, 309pp.

Fan, X.L. (2006). Taxonomy of Hesperiinae and Molecular Phylogeny of the tribe Gegenini (Lepidoptera: Hesperiidae) from China. PhD Thesis. South China Agricultural University, 213pp.

Gogoi, M.J. (2013). Notes on some skipper butterflies (Lepidoptera: Hesperiidae) from Panbari Forest and its adjoining areas, Kaziranga-Karbi Anglong, upper Assam, India. *Journal of Threatened Taxa* 5(13): 4759–4768. https://doi.org/10.11609/JoTT.o3340.4759-68

Hsu, Y.F. (2015). A new species of *Shaanxiana* (Lepidoptera: Lycaenidae) from southern China. *Zootaxa* 4027(1): 130–134. https://doi.org/10.11646/zootaxa.4027.1.6

Hsu, Y.F., J.Q. Zhu & Y. F.P. Lo (2017). *The Checklist of Chinese Butterflies*. The Straits Publishing House, Fuzhou, 30pp.

Hu, S.H., A.M. Cotton, F.L. Condamine, K. Duan, R.J, Wang, Y.F. Hsu, X. Zhang & J. Cao. (2018). Revision of Pazala Moore, 1888: the *Graphium* (*Pazala*) *mandarinus* (Oberthür, 1879) group, with treatments of known taxa and descriptions of new species and new subspecies (Lepidoptera: Papilionidae). *Zootaxa* 4441(3): 401–446.

Huang, H. (1998). Research on the butterflies of the Namjagbarwa Region, S.E. Tibet. *Neue Entomologische Nachrichten* 41: 207–263.

Huang, H. (2000). A list of butterflies collected from Tibet During 1993–1996 with new descriptions, revisional notes and discussion on zoogeography (Lepidoptera: Rhopalocera) (part 1). *Lambillionea* 100(1): 141–158.

Huang, H. (2001). Report of H. Huang's 2000 Expedition to SE. Tibet for Rhopalocera. *Neue Entomologische Nachrichten* 51: 65–151.

Huang, H. (2002). Some new nymphalids from the valleys of Nujiang and Dulongjiang, China. *Atalanta* 33(3/4): 339–360.

Huang, H. (2003). A list of butterflies collected from Nujiang (Lou Tse Kiang) and Dulongjiang, China with descriptions of new species, new subspecies, and revisional notes. *Neue Entomologische Nachrichten* 55: 3–114.

Huang, H. (2009). Systematic and Taxonomic Study on the Tribe Aeromachini Tutt (Lepidoptera: Hesperiidae) from China. MPhil Thesis. Shanghai Normal University, 175pp.

Huang, H. & C.H. Wang (2016). Rediscovery of *Thoressa pedla* (Evans, 1957) and *Thoressa yingqii* Huang, 2011 (Lepidoptera: Hesperiidae). *Atalanta* 47: 211–215.

Igarashi, S. & H. Fukuda (2000). *The Life Histories of Asian Butterflies. Vol. 2*. Tokai University Press, Tokyo. 711pp.

The IUCN Red List of Threatened Species (2017). *Version 2017-3.* <www.iucnredlist.org>. Downloaded on 19 June 2018.

Koiwaya, S. (2007). *The Zephyrus hairstreaks of the World*. Mushi-Sha, Tokyo, 300pp.

Küppers, K.V. (2015). *The Leaf Butterflies of the Genus Kallima Doubleday, 1849*. Goecke & Evers, Keltern, 27pp.

Lang, S.Y. (2012). *The Nymphalidae of China (Lepidoptera, Rhopalocera) Part I.* Tshikolovets Publication: Pardubice, 456pp.

Lang, S.Y. (2017). *The Nymphalidae of China (Lepidoptera, Rhopalocera) Part II*. Tshikolovets Publication: Pardubice, 200pp.

Lang, S.Y. & S.Z. Duan (2016). Description of a new species of *Lethe* (Lepidoptera, Nymphalidae, Satyrinae) from western Yunnan, China. *Zootaxa* 4179(2): 295–300. https://doi.org/10.11646/zootaxa.4179.2.10

Lee, C.L. (1985). Some New Species of Rhopalocera in China V. *Entomotaxonomia* VII (3): 191–194.

Lee, C.L. (1995). *Yunnan Butterfly*. China Forestry Publishing House, Beijing.

Lee, C.L. & W.C. Cao. (1987). Rhopalocera, pp. 1111–1175. In: Huang, F.S. (eds) *Forestry Insects of Yunnan*. Yunnan Science and Technology Press, Kunming, China, 1622pp.

Lo, Y.F.P. (2016). Butterflies of Tengchong, pp. 116–181. In: Chan, P.L. & Z. Bi (eds) *Biodiversity of Tengchong, Gaoligongshan*. Kadoorie Conservation China, Kadoorie Farm and Botanic Garden, Hong Kong, 443pp.

Monastyrskii, A.L. (2005). *Butterflies of Vietnam, Vol. 1 Nymphalidae: Satyrinae*. Dolphin Media, Hanoi, 162pp. + 35pl.

Shizuya, H., Y. Watanabe, M. Saito & T. Soe (2005a). Basic information

on butterflies of Kachin State, Myanmar (Part 2). *Butterlfies* 39: 29–39.

Shizuya, H., Y. Watanabe, M. Saito & T. Soe (2005b). Basic information on butterflies of Kachin State, Myanmar (Part 3). *Butterlfies* 40: 38–46.

Smith, T. & Y. Xie (2008). *A Guide to the Mammals of China.* Princeton University Press, Princeton and Oxford, 544pp.

Sugiyama, H. (1999). New butterflies from western China (VI). *Pallarge* 7: 1–14.

UNESCO (2007). The MAB Programme, UNESCO – MAB Biosphere Reserves Directory, Biosphere Reserve Information, China, Gaoligong Mountain. Downloaded from http://www.unesco.org/mabdb/br/brdir/directory/biores.asp?code=CPR+18&mode=all on 19 June 2018.

Wang, S. & Y. Xie (eds) (2005). *China Species Red List, Vol. III Invertebrates*. Higher Education Press, Beijing, 891pp.

Wu, C.H. & Y.F. Hsu (eds) (2017). *Butterflies of China*. The Straits Publishing House, Fuzhou, 2036pp.

Wu, Z.J. (2017). Lethe, pp. 441–493. In: Wu, C.H. & Y.F. Hsu (eds), *Butterflies of China*. The Straits Publishing House, Fuzhou, 2036pp.

Xue, G.X. (2009). Taxonomy and Phylogeny of Hesperiidae (Lepidoptera: Hesperioidae) from China. PhD Thesis. Northwest Agriculture and Forestry University, 529pp.

Xue, J.R. (1995). *Gaoligong Mountain National Natural Reserve*. China Forestry Publishing House, Beijing.

Yago, M. (2002). Comparative morphology and identification of the subgenus *Kulua*, with description of a new species from Vietnam (Lepidoptera, Lycaenidae, *Heliophorus*). *Tijdschrift Voor Entomologie* 145: 145–171.

Yoshino, K. (1995). New Butterflies from China. *Neo Lepidoptera* 1: 1–4.

Yoshino, K. (1997). New Butterflies from China 2. *Neo Lepidoptera* 2: 1–8.

Yoshino, K. (1999). New Butterflies from China 5. *Neo Lepidoptera* 4: 1–10.

Yoshino, K. (2008). New species and new subspecies of *Lethe* from Myanmar, China and Vietnam. *Futao* 54: 9–14.

Zhao, S.Q. (1986). *Physical Geography of China*. Science Press and John Wiley, Beijing and New York, 221pp.

Zhu, J.Q. (2012). A Taxonomy Study on the tribe Baorini Doherty, 1886 (Lepidoptera: Hesperiidae: Hesperiinae) of China. MPhil Thesis. Shanghai Normal University, 132pp.

Zhu, J.Q., H. Chiba & L.W. Wu (2016). *Tsukiyamaia*, a new genus of the tribe Baorini (Lepidoptera, Hesperiidae, Hesperiinae). *Zookeys* 555: 37–55. https://doi.org/10.3897/zookeys.555.6144

Appendix 1. Butterflies recorded during the present survey in Tengchong Section of Gaoligongshan National Nature Reserve.

Locations: STC = Zhengding, Dahaoping and Qushi sections of TC-GLGS; NTC = Jietou, Datang and Zizhi sections of TC-GLGS; LFS = Laifengshan National Forest Park; RPF = Protected riparian forest along Longchuan River; OS = Other sites.

Notes: Historical records: 1 = Lee & Cao 1987, 2 = Lee 1995, 3 = Xue 1995, 4 = Huang 2009, 5 = Xue 2009, 6 = Lang, 2017; Conservation status: cLC = Least Concern in China Species Red List, cVU = Vulnerable in China Species Red List; LC = Least Concern in IUCN Red List; CITES II = The Convention on International Trade in Endangered Species of Wild Fauna and Flora, Appendix II.

Scientific name and higher classification	Location						Flight period (Month)							Notes	Illustrations in Wu & Hsu (2017)
	STC	NTC	LFS	RPF	OS		III	IV	V	VI	VII VIII	IX	X		
HESPERIIDAE															
Coeliadinae															
Hasora vitta indica Evans, 1932	√	√						√		√					
Hasora taminatus bhavara Fruhstorfer, 1911	√	√						√			√				
Hasora anura anura de Nicéville, 1889		√					√		√	√	√	√			
Choaspes benjaminii japonicus (Murray, 1875)	√	√									√	√			
Pyrginae															
Coladenia maeniata Oberthür, 1896		√							√						p.1309, fig.18
Capila pieridoides pieridoides Moore, 1878		√									√				
Gerosis sinica narada (Moore, 1884)		√									√				p.1318, fig.15
Gerosis phisara rex Evans, 1949		√							√		√				p.1318, fig.14
Pyrgus maculatus thibetanus (Oberthur, 1891)	√							√							
Celaenorrhinus ratna nujiangensis Huang, 2001	√	√									√	√		cNT	
Celaenorrhinus morena Evans, 1949		√							√		√			New to China	
Celaenorrhinus tibetana (Mabille, 1876)		√								√					
Satarupa zulla ouvrardi Oberthur, 1921		√									√				p.1327, fig.05
Pseudocoladenia dan fabia (Evans,1949)			√								√				
Pseudocoladenia festa (Evans, 1949)	√	√									√	√			
Heteropterinae															
Barca bicolor (Oberthür, 1896)	√	√							√						
Carterocephalus alcinoides Lee, 1962	√	√								√		√			
Hesperiinae															
Ochlodes brahma (Moore, 1878)	√							√						New to China	
Ochlodes thibetana (Oberthür, 1886)		√								√	√				p.1401, fig.11-12
Ochlodes bouddha (Mabille, 1876)		√								√					
Notocrypta feisthamelii alysos (Moore, 1865)	√	√						√	√			√			
Notocrypta curvifascia curvifascia Felder 1862			√							√					

Scientific name and higher classification	Location						Flight period (Month)							Notes	Illustrations in Wu & Hsu (2017)
	STC	NTC	LFS	RPF	OS		III	IV	V	VI	VII VIII	IX	X		
Erionota torus Evans, 1941			√								√				
Halpe sp. 1		√									√				
Halpe sp. 2		√									√				
Sovia separata magna (Evans, 1932)		√									√				p.1358, fig.13
Sovia grahami miliaohuae Huang, 2003		√									√				p.1358, fig.09
Aeromachus catocyanea amplifascia Huang, 2003		√									√				p.1354, fig.03
Thoressa pedla pedla (Evans, 1956)		√							√						p.1365, fig.03
Thoressa gupta nujiangensis Huang, 2003	√	√		√					√					4	
Thoressa pandita (de Niceville, 1885)	√	√							√		√			4	p.1361, fig.15
Thoressa serena (Evans, 1937)	√	√							√					4 5	
Thoressa baileyi (South, 1914)		√							√						
Sebastonyma dolopia medoensis Lee, 1979		√									√				p.1356, fig.59
Tsukiyamaia albimacula Zhu, Chiba & Wu, 2016	√	√						√	√						p.1428, fig.05
Polytremis cf. *micropunctata* Huang, 2003		√									√				
Polytremis gotama Sugiyama, 1999		√									√				p.1433, fig.12
Polytremis eltola eltola (Hewitson, 1869)		√	√								√			5	
Parnara batta Evans, 1949		√								√					
Parnara bada (Moore, 1878)			√								√				
Potanthus trachala tytleri (Evans, 1914)			√	√					√		√				
PAPILIONIDAE															
Parnassiinae															
Bhutanitis lidderdalii spinosa Stichel, 1907	√	√										√		cVU, CITES II	
Papilioninae															
Troides aeacus aeacus (C. & R. Felder, 1860)		√									√			cNT, LC ,CITES II	
Byasa plutonius tytleri Evans, 1923	√							√	√					cVU	p.54, fig.07
Byasa polyeuctes polyeuctes (Doubleday, 1842)	√	√							√		√	√			p.60, fig.20
Byasa dasarada ouvrardi (Oberthur, 1920)		√							√						p.66, fig.05
Byasa latreillei ticona (Tytler, 1939)	√	√							√	√				cVU	p.69, fig.12
Papilio agestor agestor Gray, 1831	√	√						√	√						p.80, fig.07
Papilio bootes mindoni Tytler, 1939	√	√							√	√					p.125, fig.22; p.126, fig.23-24
Papilio helenus helenus Linnaeus, 1758		√		√				√	√						

Scientific name and higher classification	Location						Flight period (Month)							Notes	Illustrations in Wu & Hsu (2017)
	STC	NTC	LFS	RPF	OS		III	IV	V	VI	VII VIII	IX	X		
Papilio protenor protenor Cramer, 1775				√					√						
Papilio xuthus Linnaeus, 1767		√					√					√		1 2 3	
Papilio arcturus arcturus Westwood, 1842	√	√							√		√	√		cNT	p.161, fig.05
Papilio bianor gladiator Fruhstorfer, [1902]	√	√						√	√		√	√		1 2 3	p.136, fig.09-10; p.137, fig.11
Papilio krishna thawgawa Tytler, 1939		√							√	√	√				p.163, fig.09
Papilio machaon verityi Fruhstorfer, 1907		√							√						
Lamproptera meges indistincta (Tytler, 1912)				√						√				cNT	
Graphium cloanthus cloanthus Westwood, 1841		√						√	√		√				p.185, fig.09
Graphium sarpedon sarpedon Linnaeus, 1758		√									√				
Graphium mandarinus stilwelli Cotton & Hu, 2018		√							√						p.212, fig.03
Meandrusa lachinus aribbas (Fruhstorfer, 1909)		√									√				p.230, fig.12
PIERIDAE															
Pierinae															
Delias belladonna hedybia Jordan, 1925	√	√		√	√			√	√	√		√	√		p.343, fig.15-16
Delias berinda cooperi Tytler, 1939				√					√						
Delias sanaca perspicua Fruhstorfer, 1910	√	√		√					√	√	√				
Aporia agathon bifurcata Tytler, 1939	√	√						√	√	√				1 2 3	p.395, fig.09-10
Aporia harrietae paracraea (de Nicéville, 1900)	√	√						√	√	√					p.390, fig.11
Aporia goutellei (Oberthur, 1886)		√							√						
Prioneris thestylis thestylis (Doubleday, 1842)	√		√					√						cNT	p.362, fig.08
Pieris brassicae nepalensis Gray, 1846	√	√						√	√	√				1 2 3	
Pieris rapae yunnana Mell, 1943	√	√						√	√	√	√			1 2 3	
Pieris canidia indica Evans, 1926	√	√		√				√	√		√	√			
Pieris extansa bhutya Talbot, 1939	√	√							√	√	√				
Pieris melete melete Ménétriés, 1857	√	√	√	√			√	√	√	√	√				
Pontina edusa praeclara Fruhstorfer, 1910					√				√						
Appias pandione lagela (Moore, [1879])		√									√				
Appias galba (Wallace, 1867)			√								√				
Coliadinae															
Catopsilia pomona pomona (Fabricius, 1775)	√	√						√	√					1 2 3	
Eurema blanda silhetana (Wallace, 1867)		√							√			√			

Scientific name and higher classification	Location						Flight period (Month)							Notes	Illustrations in Wu & Hsu (2017)
	STC	NTC	LFS	RPF	OS		III	IV	V	VI	VII VIII	IX	X		
Eurema laeta sikkima (Moore, 1906)	√	√	√							√	√	√		3	
Eurema hecabe (Linnaeus, 1758)				√	√				√				√	1 2 3	
Dercas lycorias lycorias Doubleday, 1842		√							√		√				
Calias fieldii fieldii Ménétriés, 1855	√	√			√			√	√		√	√			p.301, fig.15
LYCAENIDAE															
Riodininae															
Zemeros flegyas flegyas (Cramer, [1780])			√	√				√	√						
Dodona ouida ouida Moore, 1865	√	√						√	√	√	√	√			
Dodona eugenes Bates, 1867	√	√							√	√	√	√		LC	
Dodona egeon egeon Westwood, 1851	√	√						√	√					cNT	
Dodona dipoea Hewitson, 1866	√	√						√	√	√		√		1 2 3	p.1034, fig.19-20
Dodona adonira ssp.	√	√	√						√		√	√		cNT	
Dodona kaolinkon Yoshino, 1999		√							√			√			p.1033, fig.12-13
Stiboges nymphidia nymphidia Butler, 1876	√								√						
Abisara freda daliensis Sugiyama, 1992	√							√	√					cNT	p.1024, fig.02-03
Abisara fylla (Westwood, 1851)		√		√					√		√				
Abisara neophron Hewitson, 1861		√							√						
Curetinae															
Curetis acuta naga Evans, 1954		√									√			1 2 3 (as *bulis*)	
Lycaeninae															
Zizina emelina thibetensis (Poujade, 1885)		√	√						√	√	√				
Zizeeria maha maha (Kollar,[1844])		√									√				
Everes huegelii dipora (Moore,1865)	√	√						√				√			
Lampides boeticus (Linnaeus, 1767)	√		√	√			√	√	√	√				1 2 3	
Udara dilectus dilectus (Moore, 1879)	√	√		√				√	√	√	√	√			
Udara albocaerulea albocaerulea (Moore, 1879)	√	√							√	√	√	√			
Celatoxia marginata marginata (de Nicéville, [1884])	√	√		√				√		√	√	√			p.1244, fig.11
Monodontides musina musinoides (Swinhoe, 1910)	√	√							√		√	√			
Celastrina argiolus iynteana (de Nicéville, 1884)	√	√						√							
Celastrina lavendularis (Moore, 1877)		√									√				
Celastrina oreas yunnana Eliot & Kawazoé, 1983		√							√	√	√	√			p.1250, fig.03-04

Scientific name and higher classification	Location						Flight period (Month)							Notes	Illustrations in Wu & Hsu (2017)
	STC	NTC	LFS	RPF	OS		III	IV	V	VI	VII VIII	IX	X		
Oreolyce vardhana nepalica (Forster, 1980)		√							√						
Orthomiella pontis rovorea (Fruhstorfer, 1918)		√					√		√						
Catochrysops strabo strabo (Fabricius, 1793)		√		√				√	√						
Acytolepis puspa gisca (Fruhstorfer, 1910)	√	√		√					√	√		√			
Jamides bochus bochus (Stoll, [1782])	√	√						√		√					
Prosotas sp.		√									√				
Prosotas dubiosa indica (Evans, [1925])				√					√						
Heliophorus eventa Fruhstorfer, 1918	√	√	√					√	√	√	√	√			
Heliophorus brahma mogoka Evans, 1932	√	√	√					√	√	√	√	√			
Heliophorus ila pseudonexus Eliot, 1963			√								√				
Heliophorus tamu kala Tytler, 1912		√							√					New to Yunnan	p.1213, fig.30
Chrysozephyrus kirbariensis machimurai (Koiwaya, 2002)		√							√			√			p.1119, fig.50
Chrysozephyrus paona paona (Tytler, 1915)		√								√					
Chrysozephyrus vittatus phoopan Koiwaya, 2002		√								√				New to China	
Chrysozephyrus duma (Hewitson, 1869)		√								√					
Cheritrella truncipennis de Nicéville, 1887	√							√							
Sinthusa virgo (Elwes, 1887)		√							√	√					p.1182, fig. 14-15
Sinthusa rayata Riley, 1939		√							√						
Chliaria kina kina (Hewitson, 1869)		√							√	√	√	√			
Rapala sp.		√										√			
Ancema ctesia ctesia (Hewitson, 1865)		√							√					LC	
Maneca bhotea bhotea (Moore, 1884)	√											√			
NYMPHALIDAE															
Danainae															
Parantica sita sita (Kollar, [1844])	√	√						√	√	√	√	√			
Parantica aglea melanoides Moore, 1883	√											√			
Euploea mulciber mulciber (Cramer, [1777])	√	√		√					√		√	√		3	
Satyrinae															
Melanitis leda leda (Linnaeus, 1758)			√									√			p.434, fig.04
Lethe sura (Doubleday, [1849])	√								√	√		√		2, cNT	p.443, fig.11
Lethe goalpara gana Talbot, 1947	√	√										√		6	p.456, fig.20

Scientific name and higher classification	Location						Flight period (Month)							Notes	Illustrations in Wu & Hsu (2017)
	STC	NTC	LFS	RPF	OS		III	IV	V	VI	VII VIII	IX	X		
Lethe ocellata ocellata (Poujade, 1885)	√											√		cNT	
Lethe neofaciata Lee, 1985	√								√						
Lethe sidonis (Hewitson, 1863)	√	√								√		√		6, cVU	
Lethe maitrya thawgawa Tytler, 1939		√									√			2, cNT	p.493, fig.08
Lethe kanjupkula burmana Tytler, 1939	√								√			√			
Lethe nicetas Hewitson, 1863		√							√						
Lethe verma sintica Fruhstorfer, 1911	√								√						
Lethe hyrania dinarbas (Hewitson, 1863)	√	√						√	√			√		6	
Lethe brisanda de Nicéville, 1886		√								√				New to Yunnan	
Lethe oculatissima (Poujade, 1885)		√								√				cNT	
Lethe serbonis pallida Tytler, 1939		√									√	√		6, cVU	
Lethe tengchongensis Lang, 2016		√									√	√		6	p.489, fig.05-06
Lethe luteofasciata (Poujade, 1884)		√							√					1 2 3, cNT	
Lethe andersoni (Atkinson, 1871)		√							√		√	√		cNT	
Chonala praeusta burmana Tytler, 1939		√									√	√		cNT	
Neope muirheadii muirheadii (C. & R. Felder, 1862)					√				√					1 2 3	
Neope armandii khasiana Moore, 1881	√	√						√	√					6	
Neope yama kinpingensis Lee, 1962	√	√							√	√	√			1 2 3	
Neope oberthueri qiqia Huang, 2002	√	√							√	√	√				
Neope ramosa Leech, 1890	√	√							√		√				
Neorina neosinica Lee, 1985	√									√				1 2 3	
Neorina hilda Westwood, [1850]		√									√			New to Yunnan	
Callerebia polyphemus annadina Watkins, 1927	√	√									√				
Orinoma damaris damaris Gray, 1846	√											√			p.517, fig.01
Rhaphicera satrica kabrua (Tytler, 1939)		√									√			cVU	p.515, fig.05
Mycalesis francisca sanatana Moore, 1857		√	√					√			√				
Mycalesis gotama charaka Moore, 1874				√						√					
Mycalesis misenus serica Leech, [1892]	√	√	√							√	√	√			p.541, fig.05
Mycalesis suaveolens konglua Tytler, 1939			√							√	√				
Ypthima conjuncta monticola Uemura & Koiwaya, 2000	√	√								√		√			
Ypthima sakra austeni (Moore, 1893)	√		√						√	√				cNT	

Scientific name and higher classification	Location						Flight period (Month)							Notes	Illustrations in Wu & Hsu (2017)
	STC	NTC	LFS	RPF	OS		III	IV	V	VI	VII VIII	IX	X		
Ypthima menpae Huang, 1999		√									√				
Ypthima persimilis Elwes & Edwards, 1893	√							√							
Ypthima confusa Shirôzu & Shima, 1977	√	√	√						√	√		√			
Ypthima frontierii Uémura & Monastyrskii, 2000	√	√	√					√	√	√		√			
Ypthima zodia Butler, 1871		√							√		√				p.591, fig.12
Calinaginae															
Calinaga davidis buphonas Oberthür, 1920		√							√						p.682, fig.08
Charaxinae															
Polyura narcaea thawgawa (Tytler, 1940)		√							√					1 2	
Polyura dolon grandis (Rothschild, 1899)	√	√			√				√						
Polyura athamas athamas (Drury, [1773])					√								√		
Cyrestinae															
Cyrestis thyodamas thyodamas Boisduval, 1846		√		√					√		√				
Heliconiinae															
Acraea issoria sordice (Fruhstorfer, 1914)	√	√							√		√	√		1 2 3	
Cethosia biblis biblis (Drury, [1773])	√	√			√							√	√		
Cirrochroa tyche mithila Moore, 1872	√		√	√				√	√	√					
Childrena childreni (Gray, 1831)		√		√					√			√		1 2 3	
Argyronome laodice rudra (Moore, [1858])		√								√	√	√			
Argyreus hyperbius hyperbius (Linnaeus, 1763)				√	√				√					1 2 3	
Issoria lathonia isaaea (Gray, 1846)		√							√						
Nymphalinae															
Vanessa cardui (Linnaeus, 1758)	√			√				√	√						
Vanessa indica indica (Herbst, 1794)	√	√	√		√			√	√		√	√	√		
Kaniska canace canace (Linnaeus, 1763)	√	√		√			√	√	√	√	√	√		1 2 3	
Symbrenthia doni Tytler, 1940	√	√						√	√		√			New to Yunnan	
Symbrenthia lilaea lilaea (Hewitson, 1864)		√			√							√	√		
Symbrenthia niphanda niphanda Moore, 1872		√							√	√	√	√			p.805, fig.01
Junonia orithya ocyale Hübner, [1819]		√		√	√			√	√			√		1 2 3	
Aglais urticae chinensis (Leech, 1892)	√	√			√				√	√	√	√		1 2 3	
Araschnia prorsoides prorsoides (Blanchard, 1871)	√	√					√	√	√	√	√	√			

Scientific name and higher classification	Location						Flight period (Month)							Notes	Illustrations in Wu & Hsu (2017)
	STC	NTC	LFS	RPF	OS		III	IV	V	VI	VII VIII	IX	X		
Kallima knyvettii de Nicéville, 1886		√									√			New to Yunnan	
Kallima inachus inachus Doyere, 1840	√											√			
Pseudergolis wedah wedah (Kollar, 1848)	√	√			√				√	√	√	√	√		
Stibochiona nicea nicea (Gray, 1846)	√	√							√						p.881, fig.06
Limenitinae															
Athyma opalina opalina (Kollar, [1844])	√	√							√	√	√	√			
Athyma jina jina Moore, [1858]		√			√				√				√		
Auzakia danava danava (Moore, [1858])		√								√	√				p.947, fig.09
Parasarpa zayla (Doubleday, [1848])		√									√				
Parasarpa dudu dudu (Doubleday, [1848])		√			√				√			√	√		
Sumalia daraxa daraxa (Doubleday, [1848])	√										√	√			
Neptis soma shania Evans, 1924	√	√						√	√		√	√			
Neptis ananta ochracea Evans, 1924		√		√					√	√		√			
Neptis cartica cartica Moore, 1872				√					√					cNT	
Neptis sappho astola Moore, 1872		√								√					
Neptis armandia ssp.	√	√							√	√	√				
Neptis dejeani Oberthür, 1894		√								√	√			cNT	
Neptis nemorum nemorum Oberthür, 1906		√								√				cVU	
Neptis themis theodora Oberthür, 1906		√								√					
Euthalia sakota Fruhstorfer, 1913		√									√				
Euthalia dubernardi Oberthür, 1907		√									√				
Euthalia nara nara (Moore, 1859)		√									√			1 2 3	p.919, fig.26
Euthalia franciae raja (C. & R. Felder, 1859)	√											√		cNT	
Apaturinae															
Hestina nama nama Doubleday, 1844					√								√	2	
Hestina persimilis persimilis Westwood, 1850					√								√		
Dilipa morgiana Westwood, 1850					√								√	cNT	
Libytheinae															
Libythea lepita lepita Moore, [1858]				√					√						

Appendix 2. Butterfly fauna of Tengchong County reported by earlier workers that were not found in the present study.

The butterfly fauna of Tengchong County has also been briefly investigated by different researchers and some of the species reported in their works were not detected during the present survey. These species are listed below with reference source and notes on selected taxa.

1. *Potanthus lydius* (Evans, 1934) — Xue 2009.
2. *Parnara guttata guttata* (Bremer & Grey, 1853) — Xue 2009.
3. *Byasa nevilli* (Wood-Mason, 1882) — Lee & Cao 1987; Xue 1995.
4. *Papilio paris paris* Linnaeus, 1758 — Xue 1995.
5. *Delias subnubila* Leech, 1893 — Lee & Cao 1987; Lee 1995; Xue 1995.
6. *Delias patrua* Leech, 1890 — Lee & Cao (1987); Xue (1995).

Delias lepida Lee, 1995, *nomen nudum*

The name *Delias lepida* Lee in Lee (1995) very likely referred to the record of this species because *D. patrua* was the only Tengchong species listed in Lee & Cao (1987) but absent in Lee (1995), and both records had identical field information (Tengchong, 1,780m). Perhaps the author intended to publish *lepida* formally, but no action was taken eventually. Since there was no description, reference nor indication accompanying the name *lepida*, it should be treated as a *nomen nudum*.

7. *Aporia larraldei* (Oberthür, 1876) — Lee & Cao (1987); Lee (1995); Xue (1995)
8. *Lethe siderea* Marshall, 1881 — Lang (2017).
9. *Lethe lanaris* Butler, 1877 — Lee & Cao (1987); Lee (1995); Xue (1995).
10. *Callarge sagitta* (Leech, 1890) — Wu & Hsu (2017)

Although most of the Tengchong records in Wu & Hsu (2017) originated from the present study, this species was an exception.

11. *Ypthima beautei* Oberthür, 1884 — Lee & Cao (1987); Lee (1995); Xue (1995);

It is likely that the records of *Y. beautei* in Tengchong were actually *Y. frontierii* Uémura & Monastyrskii, 2000, a recently described species, which is quite common in Tengchong.

12. *Ypthima chinensis* Leech, 1892 — Xue (1995).
13. *Neptis hylas* (Linnaeus, 1758) — Xue (1995).

Journal of Threatened Taxa

www.threatenedtaxa.org

PLATINUM OPEN ACCESS

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

September 2019 | Vol. 11 | No. 11 | Pages: 14391–14470
Date of Publication: 12 September 2019 (Online & Print)
DOI: 10.11609/jott.2019.11.11.14391-14470

Monograph

Communications

Partner

صندوق محمد بن زايد للمحافظة على الكائنات الحية
The Mohamed bin Zayed Species Conservation Fund

Member

FJN

Publisher & Host

WILD ZOOREACH
Threatened Taxa