

An Annotated Catalog of the Lanternfly Specimens (Hemiptera: Fulgoridae) Deposited in the Natural History Museum of the National Science Museum, Thailand

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Abstract

A catalog of the lanternfly specimens housed in the Natural History Museum of the National Science Museum, Thailand (THNHM) is presented. A total of 157 specimens of 33 species in ten genera are deposited in THNHM. Seven species of Fulgoridae are new records for Thailand: *Polydicta tricolor* (Westwood, 1845), *Pyrops ducalis* (Stål, 1863), *Pyrops karenius* (Distant, 1891), *Pyrops oculatus* (Westwood, 1838), *Pyrops pyrorhynchus* (Donovan, 1800), *Saiva bullata* (Distant, 1891) and *Saiva cardinalis* (Butler, 1874). Most specimens of the family were collected in the past 20 years. High-resolution images of the named species are provided.

Keywords

Specimens, Natural History Museum, National Science Museum, lanternfly, Thailand

Introduction

The family Fulgoridae is comprised of 142 genera and 774 species worldwide and currently 27 species have been recorded in Thailand (Nagai and Porion, 1996; Bourgoïn, 2021; Jiaranaisakul and Constant, 2021). Recently, the curators of Natural History Museum of the National Science Museum in Thailand have started cataloging the type materials in the museum to provide the data for the taxonomic community (Chan-ard and Makchai, 2011; Jeenthong *et al.*, 2013; 2021).

This paper lists the specimens of Fulgoridae which were deposited in the museum and documents the new records in Thailand.

Materials and Methods

The specimens of Fulgoridae deposited in the Natural History Museum of the National Science Museum, Thailand (THNHM) were examined (Figure 1). The specimens' localities were corrected if they were originally misspelled. The nomenclature was determined following Nagai and Porion (1996) and Bourgoin (2021).

The list of the specimens is arranged alphabetically by genus and species, following the format:



Figure 1. Fulgorid specimens deposited in THNHM.

Specific name author, publication date

Material Examined. *REGION*: Number of specimens and sex (THNHM code), locality, collection date (months in Roman numerals), collector (leg.), field number (if available).

Distribution. Province of Thailand.

References. If available.

Results

Lanternfly specimens totaling 33 species of ten genera are deposited in THNHM (Table 1). Seven species are new records in Thailand: *Polydicta tricolor* (Westwood, 1845), *Pyrops ducalis* (Stål, 1863), *Pyrops karenius* (Distant, 1891), *Pyrops oculatus* (Westwood, 1838), *Pyrops pyrorhynchus* (Donovan, 1800), *Saiva bullata* (Distant, 1891) and *Saiva cardinalis* (Butler, 1874) with nine species so far having been classified to the genus level. Most specimens examined in this paper were collected from Northern and Northeastern Thailand.

Table 1. Number of genera, species and specimens of Fulgoridae deposited in THNHM.

Genera	Number of species	Number of specimens
<i>Aphaena</i>	3	14
<i>Dichoptera</i>	5	10
<i>Gebenna</i>	1	1
<i>Kalidasa</i>	1	4
<i>Penthicodes</i>	5	41
<i>Polydictya</i>	2	3
<i>Pyrops</i>	10	63
<i>Saiva</i>	3	10
<i>Scamandra</i>	1	1
<i>Zanna</i>	2	10
Total	33	157

Genus *Aphaena* Guérin-Méneville, 1834

Aphaena aurantia (Hope, 1840) (Figure 2A–C)

Material Examined. **WESTERN:** 1♂ (THNHM-I-25762), Ratchaburi Prov., Suan Phueng Dist., 28.XII.2019, K. Jiaranaisakul leg., KJ02-00063. **NORTHERN:** 1♀ (THNHM-I-25763), Chiang Rai Prov., Khun Korn Waterfall, 31.X.2020, W. Pathomwattananurak leg.

Distribution. Chiang Rai and Ratchaburi Provinces.

References. Nagai and Porion (1996); Jiaranaisakul and Constant (2021).

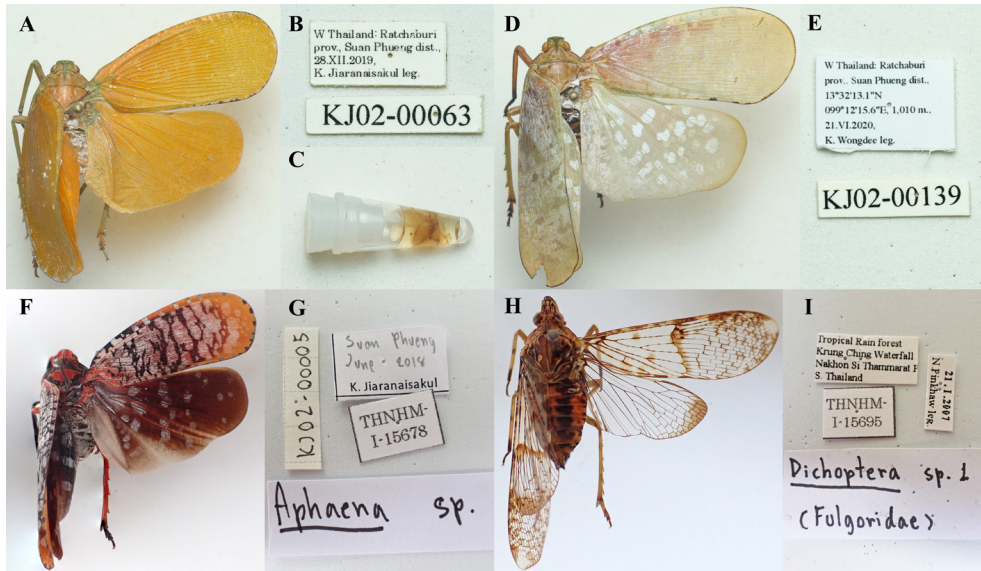


Figure 2. *Aphaena aurantia*, ♂. A. habitus; B. label and field number; C. male genitalia. *Aphaena najas*, ♀. D. habitus; E. label and field number. *Aphaena* sp. 1, ♀. F. habitus; G. label, catalog number and field number. *Dichoptera* sp. 1, ♀. H. habitus; I. labels and catalog number.

Aphaena najas Schmidt, 1906 (Figure 2D–E)

Material Examined. WESTERN: 1 ♀ (THNHM-I-15679), Ratchaburi Prov., Suan Phueng Dist., 4.VI.2018, K. Jiaranaisakul leg., KJ02-00012; 1 ♀ (THNHM-I-25722), Ratchaburi Prov., Suan Phueng Dist., 13°32'13.1"N, 99°12'15.6"E, 1,010 m., 3.VI.2018, K. Jiaranaisakul leg., KJ02-00011; 1 ♀ (THNHM-I-25764), same locality, 21.VI.2020, K. Wongdee leg., KJ02-00139.

Distribution. Ratchaburi Province.

References. Nagai and Porion (1996); Jiaranaisakul and Constant (2021).

Aphaena sp. 1 (Figure 2F–G)

Material Examined. WESTERN: 1 ♂ (THNHM-I-25765) and 1 ♂ (THNHM-I-25766), Ratchaburi Prov., Suan Phueng Dist., 13°32'13.1"N, 99°12'15.6"E, 1,010 m., 23.V.2018, K. Jiaranaisakul leg., field number KJ02-00001 and KJ02-00002, respectively; 1 ♀ (THNHM-I-15677), 1 ♀ (THNHM-I-25767), and 1 ♀ (THNHM-I-15678), the same locality, 4.VI.2018, K. Jiaranaisakul leg., field number KJ02-000003, KJ02-00004 and KJ02-000005, respectively; 1 ♀ (THNHM-I-25723), the same locality, 23.V.2019, K. Jiaranaisakul leg., KJ02-000103; 1 ♂ (THNHM-I-25725), the same locality, 5.VI.2020, K. Jiaranaisakul leg., KJ02-000133; 1 ♂ (THNHM-I-25768), the same locality, 27.V.2021, K. Jiaranaisakul leg., KJ02-000199. **NORTHEASTERN:** 1 ♀ (THNHM-I-25769), Nakhon Ratchasima Prov., Pak Chong Dist., 15.XI.2020, K.

Jiaranaisakul leg., KJ02-00178.

Distribution. Nakhon Ratchasima and Ratchaburi Provinces.

Genus *Dichoptera* Spinola, 1839

Dichoptera sp. 1 (Figure 2H–I)

Material Examined. SOUTHEAST: 1♀ (THNHM-I-15695), Nakhon Si Thammarat Prov., Noppitam Dist., Krung Ching Waterfall, evergreen forest, 21.I.2007, N. Pinkaew leg.

Distribution. Nakhon Si Thammarat Province.

Dichoptera sp. 2 (Figure 3A–B)

Material Examined. EASTERN: 1♂ (THNHM-I-15696), Trat Prov., Ko Kud Dist., Ban Khlong Chao, 11°37'28.4"N, 102°32'48.6"E, 18.IV.2008, T. Jeenthong leg. **SOUTHEAST:** 1♀ (THNHM-I-15697), Nakhon Si Thammarat Prov., Lan Saka Dist., 20.V.2003, W. Jaitrong leg.

Distribution. Trat and Nakhon Si Thammarat Provinces.

Dichoptera sp. 3 (Figure 3C–D)

Material Examined. SOUTHEAST: 1♂ (THNHM-I-15699) and 1♀ (THNHM-I-15698), Nakhon Si Thammarat Prov., Thung Yai Dist., Ban Prik, 6.V.2003, W. Jaitrong leg.

Distribution. Nakhon Si Thammarat Province.

Dichoptera sp. 4 (Figure 3E–F)

Material Examined. SOUTHEAST: 1♂ (THNHM-I-15937) and 1♀ (THNHM-I-15936), Trang Prov., Na Yong Dist., Khao Chong Botanical Garden, 25.XI.2003, by light, A. Orosz & Gy. Sziráki leg.

Distribution. Trang Province.

Note. The specimens were identified as *D. consepersa* Schmidt, 1911.

Dichoptera sp. 5 (Figure 3G–I)

Material Examined. WESTERN: 1♂ (THNHM-I-25770), Ratchaburi Prov., Suan Phueng Dist., 13°32'17.0"N, 99°11'52.1"E, 1,010 m., 19.V.2020, K. Jiaranaisakul leg., KJ02-00117; 1♀ (THNHM-I-25771), the same locality, 27.VII.2020, K. Jiaranaisakul leg., KJ02-00152; 1♀ (THNHM-I-25772), the same locality, 15.V.2021, K. Jiaranaisakul leg., KJ02-00195.

Distribution. Ratchaburi Province.

Note. The species was mentioned in Jiaranaisakul and Constant (2021) as *Dichoptera* sp. 2.

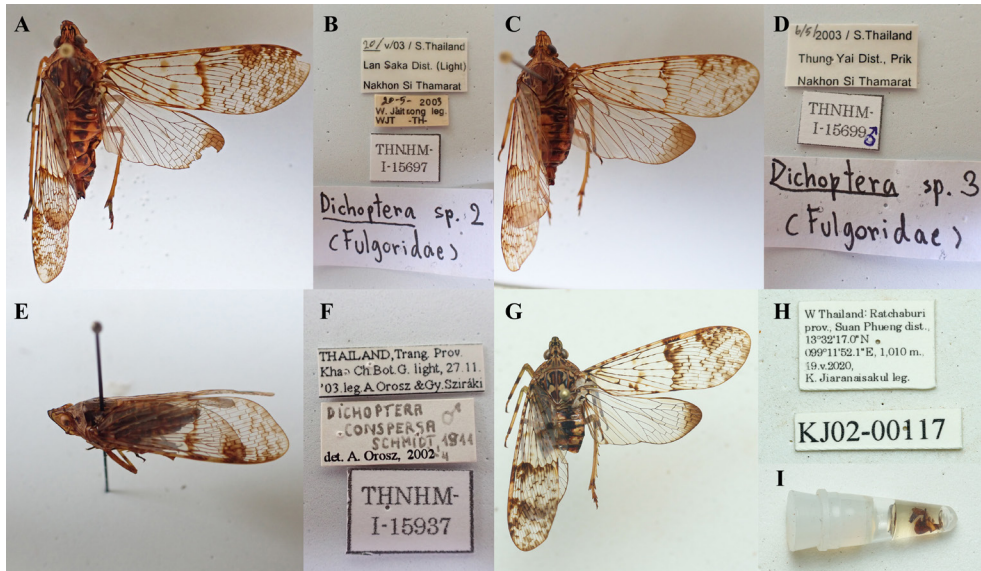


Figure 3. *Dichoptera* sp. 2, ♀. A. habitus; B. labels and catalog number. *Dichoptera* sp. 3, ♂. C. habitus; D. label and catalog number. *Dichoptera* sp. 4, ♂. E. habitus; F. labels and catalog number. *Dichoptera* sp. 5, ♂. G. habitus; H. label and field number; I. male genitalia.

Genus *Gebenna* Stål, 1863

Note. This genus is recorded in Thailand for the first time. Only two species have been known from this genus: *Gebenna multipunctata* Schmidt, 1907 from Sumatra and *G. sylvia* Stål, 1863 from India. To confirm the species of a specimen deposited in THNHM, a study based on male genitalia is needed.

Gebenna sp. 1 (Figure 4A–B)

Material Examined. **NORTHEASTERN:** 1♀ (THNHM-I-15700), Chaiyaphum Prov., unknown locality, 4.XII.1999, W. Jaitrong leg.

Distribution. Chaiyaphum Province.

Genus *Kalidasa* Kirkaldy, 1900

Kalidasa nigromaculata (Gray, 1832) (Figure 4C–D)

Material Examined. **WESTERN:** 1♀ (THNHM-I-25724), Phetchaburi Prov., Kang Krachan Dist., 23.V.2018, K. Jiaranaisakul leg., KJ02-000014; 1♂ (THNHM-I-25773) and 1♀ (THNHM-I-25774), Ratchaburi Prov., Rabbit in the Moon Foundation, 200 m., 7.VI.2021, K. Jiaranaisakul leg., field number KJ02-00203 and KJ02-00204, respectively. **EASTERN:** 1♀ (THNHM-I-12106), Sa Kaeo Prov., Khao Ang Reu Nai W.S., Khao Takrub Station, 28.VI.2003, W. Jaitrong leg.

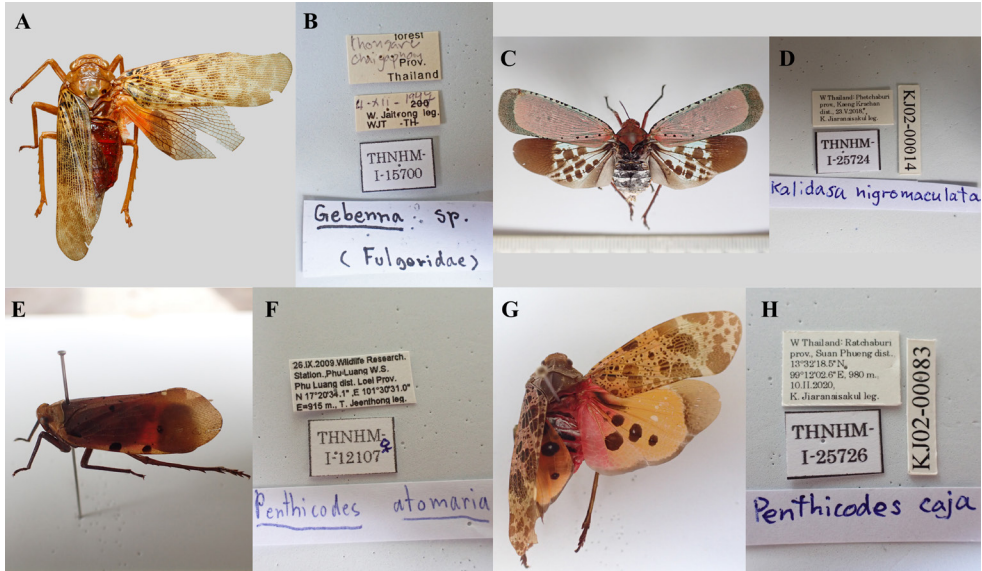


Figure 4. *Gebenna* sp. 1, ♀. A. habitus; B. labels and catalog number. *Kalidasa nigromaculata*, ♀. C. habitus; D. label, catalog number and field number. *Penthicides atomaria*, ♀. E. habitus; F. label, and catalog number. *Penthicides caja*, ♀. G. habitus; H. label, catalog number and field number.

Distribution. Phetchaburi, Ratchaburi, and Sa Kaeo Provinces.

References. Nagai and Porion (1996); Jaranaisakul and Constant (2021).

Genus *Penthicides* Blanchard, 1845

Penthicides atomaria (Weber, 1801) (Figure 4E–F)

Material Examined. **NORTHERN:** 1♂ (THNHM-I-15934) and 1♀ (THNHM-I-15935), Chiang Mai Prov., Fang Dist., Doi Pha Hom Pok N.P., 22–23.XI.2003, UV light, L. Peregovits, M. Foldván, Á. Szappanos, A. Körösi, B. Maklari-Kis leg. **NORTHEASTERN:** 1♀ (THNHM-I-12107), Loei Prov., Phu Ruea Dist., Phu Luang Wildlife Research Station, 17°20'34.1"N, 101°30'31"E, 916 m a.s.l., 26.IX.2009, T. Jeenthong leg.; 1♀ (THNHM-I-12108), Loei Prov., Phu Ruea Dist., Phu Luang W.S., Kok Nokkraba, 17°16'52.3"N, 101°31'23.5"E, 1485 m a.s.l., 26.IX.2009, T. Jeenthong leg. **EASTERN:** 1♂ (THNHM-I-12109), Chachoengsao Prov., Tha Takiap Dist., near a stream, 120 m a.s.l., 25.XI.2004, W. Jaitrong leg.; 1♀ (THNHM-I-25775), Chanthaburi Prov., Phluang Subdist., 10.VIII.2012, N. Makbun leg., KJ02-00179. **SOUTHERN:** 1♂ (THNHM-I-25776) and 1♀ (THNHM-I-25777), Surat Thani Prov., Khlong Sok, 9–11.I.2020, K. Jaranaisakul leg., field number KJ02-00073 and KJ02-00074, respectively. **WESTERN:** 1♀ (THNHM-I-25778), Ratchaburi Prov., Suan Phueng Dist., X.2019, K. Jaranaisakul leg., KJ02-00056.

Distribution. Chiang Mai, Ratchaburi, Loei, Chachoengsao, Chanthaburi, and Surat Thani Provinces.

References. Constant (2010); Jiaranaisakul *et al.* (2018).

***Penthicodes caja* (Walker, 1851)** (Figure 4G–H)

Material Examined. WESTERN: 1♀ (THNHM-I-25726), 1♂ (THNHM-I-25727) and 1♂ (THNHM-I-25779), Ratchaburi Prov., Suan Phueng Dist., 13°32'18.5"N, 99°12'02.6"E, 980 m, 10.II.2020, K. Jiaranaisakul leg., field number KJ02-00083, KJ02-00081 and KJ02-00080, respectively; 1♀ (THNHM-I-25780), the same locality, 9.II.2021, K. Jiaranaisakul leg., KJ02-00182.

Distribution. Ratchaburi Province.

References. Constant (2010); Jiaranaisakul and Constant (2021).

***Penthicodes pulchella* (Guérin-Méneville, 1838)** (Figure 5A–B)

Material Examined. NORTHERN: 3♀ (THNHM-I-12114 to THNHM-I-12116) and 2♂ (THNHM-I-12117 and THNHM-I-12118), Mae Hong Son Prov., Pang Mapha Dist., Tam Lod, 9.XI.2007, W. Jaitrong leg. **EASTERN:** 2♀ (THNHM-I-12110 and THNHM-I-12113) and 2♂ (THNHM-I-12111 and THNHM-I-12112), Chachoengsao Prov., Tha Takiap Dist., near a stream, 120 m a.s.l., X.2005, J. Nabhitabhata leg.

Distribution. Mae Hong Son and Chachoengsao Provinces.

References. Constant (2010); Jiaranaisakul *et al.* (2018).

***Penthicodes variegata* (Guérin-Méneville, 1829)** (Figure 5C–D)

Material Examined. WESTERN: 1♂ (THNHM-I-25728), Ratchaburi Prov., Suan Phueng Dist., 13°32'18.5"N, 99°12'02.6"E, 980 m a.s.l., 22.III.2021, K. Jiaranaisakul leg., KJ02-000109; 1♂ (THNHM-I-12127), Ratchaburi Prov., Suan Phueng Dist., 13°32'44.9"N, 99°12'13.3"E, 700 m., VI.2019, K. Jiaranaisakul leg., KJ02-00028 **NORTHEASTERN:** 1♀ (THNHM-I-12099), Nakhon Ratchasima Prov., Wang Nam Khieo Dist., Sakaerat Environmental Research Station, 14°30'28"N, 101°55'39"E, 16.V.2007, T. Jeenthong leg. **CENTRAL:** 1♂ (THNHM-I-12092), Uthai Thani Prov., Ban Rai Dist., Huai Kha Kang W.S., 1.VI.2002, W. Jaitrong leg. **EASTERN:** 3♀ (THNHM-I-12093 to THNHM-I-12095), Chachoengsao Prov., Tha Takiap Dist., 90 m a.s.l., 23.IV.2005, W. Jaitrong leg.; 1♀ (THNHM-I-12096), the same locality and collector, natural forest, 94 m a.s.l., 24.IV.2005; 1♀ (THNHM-I-12097), the same locality, natural forest, 90 m a.s.l., 25.V.2005, T. Jeenthong leg.; 2♀ (THNHM-I-12098 and THNHM-I-12101), the same locality, near stream, 120 m a.s.l., 25.IV.2005, T. Jeenthong leg.; 1♀ (THNHM-I-12103), Chanthaburi Prov., Soi Dao Dist., Khao Soi

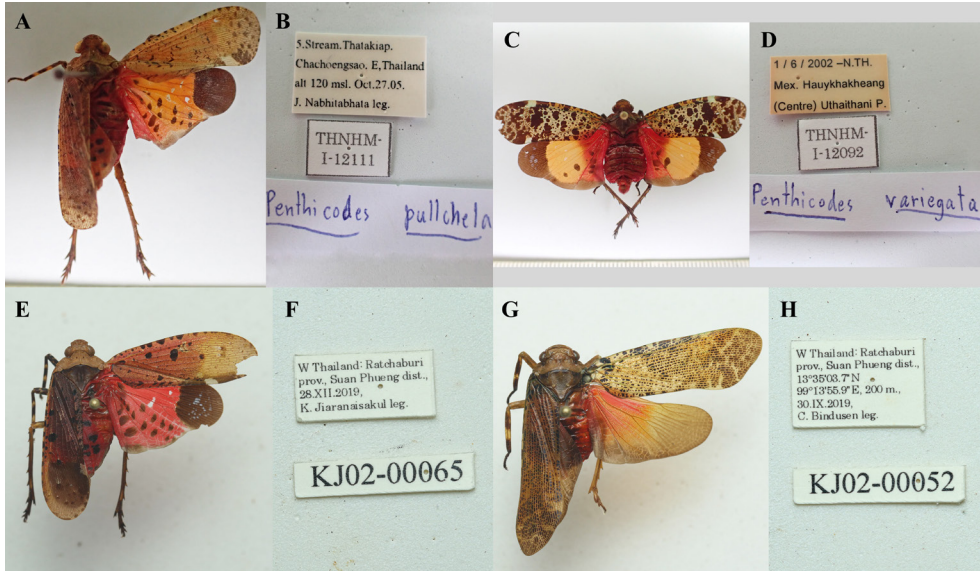


Figure 5. *Penthicides pulchella*, ♂. A. habitus; B. label and catalog number. *Penthicides variegata*, ♂. C. habitus; D. label and catalog number. *Penthicides warleti*, ♀. E. habitus; F. label and field number. *Polydictya thompsoni*, ♀. G. habitus; H. label and field number.

Dao W.S., Pa Tong, 13°06'10.7"N, 102°11'29.7"E, 15.V.2008, T. Jeenthong leg.; 1♀ (THNHM-I-12105), Chachoengsao Prov., Tha Takiap Dist., 90 m a.s.l., 26.V.2005, W. Jaitrong leg. **SOUTHEAST:** 1♀ (THNHM-I-12100), Nakhon Si Thammarat Prov., Sichon Dist., Khao Nan N.P., Yod Nam Waterfall, 5°45'32.6"N, 99°43'56.3"E, 26.VIII.2008, T. Jeenthong leg. **SOUTHERN:** 1♂ (THNHM-I-12104), Nakhon Si Thammarat Prov., Thung Yai Dist., Ban Prik, 6.V.2003, W. Jaitrong leg.; 1♂ (THNHM-I-12102), Nakhon Si Thammarat Prov., Khao Nan N.P., Papra Station, 25.I.2005, T. Jeenthong leg.

Distribution. Chachoengsao, Chanthaburi, Nakhon Ratchasima, Nakhon Si Thammarat, Ratchaburi, and Uthai Thani Provinces.

References. Constant (2010); Jiaranaisakul and Constant (2021).

***Penthicides warleti* Constant, 2010** (Figure 5E–F)

Material Examined. **NORTHEASTERN:** 1♀ (THNHM-I-25781), Nakhon Ratchasima Prov., Pak Chong Dist., 24.IX.2019, K. Jiaranaisakul leg., KJ02-00057. **WESTERN:** 1♂ (THNHM-I-25782), 1♀ (THNHM-I-25783) and 1♀ (THNHM-I-25784), Ratchaburi Prov., Suan Phueng Dist., 28.XII.2019, K. Jiaranaisakul leg., field number KJ02-00064, KJ02-00065 and KJ02-00066, respectively.

Distribution. Nakhon Ratchasima and Ratchaburi Provinces.

References. Constant (2010); Jiaranaisakul and Constant (2021).

Genus *Polydictya* Guérin-Méneville, 1844***Polydicta thompsoni* Constant and Pham, 2019** (Figure 5G–H)

Material Examined. *WESTERN*: 1♀ (THNHM-I-25785), Ratchaburi Prov., Suan Phueng Dist., 13°35'03.7"N 99°13'55.9"E, 200 m., 19.X.2019, K. Jiaranaisakul leg. KJ02-00051; 1♀ (THNHM-I-25786), the same locality, 30.IX.2019, C. Bindusen leg., KJ02-00052.

Distribution. Ratchaburi Province.

Reference. Constant and Pham (2019).

***Polydicta tricolor* (Westwood, 1845)** (Figure 6A–B)

Material Examined. *WESTERN*: 1♀ (THNHM-I-25787), Phetchaburi Prov., Huai Mae Phriang Subdist., 320 m., 10.VI.2021, K. Jiaranaisakul leg.

Diagnosis. Tegmina bicolour with 1/2 pale yellowish and dark brown; base of tegmina pale blue with transverse dark brown band; 3–4 dark brown marking on costal margin and posterior margin; posterior wings with red on basal area extending to 1/2 and remaining part opaque.

Distribution. Phetchaburi Province (**new record from Thailand**).

Genus *Pyrops* Spinola, 1839***Pyrops candelaria* (Linnaeus, 1758)** (Figure 6C–D)

Material Examined. *NORTHERN*: 1♂ (THNHM-I-26184), Chiang Mai Prov., Omkoi Dist., Ban Mae Tuen, 20.I.2018, T. Jeenthong leg. *NORTHEASTERN*: 4♀ (THNHM-I-12147, THNHM-I-12149, THNHM-I-12150, THNHM-I-12151) and 1♂ (THNHM-I-12148), Ubon Ratchathani Prov., Khong Chiam Dist., Ban Huai Phai, on a stem of a tree, 140 m as.l., 15°24'25.53"N, 105°28'36.31"E, 10.II.2016, T. Jeenthong leg.; 1♀ (THNHM-I-12146), Mukdahan Prov. [mistyping as Kalasin Prov.], Cham Cha-E Dist., Ban Kang Chang Niem, 8.VI.2007, P. Kosonpanyapiwat leg.; 18♀ (THNHM-I-12130 to THNHM-I-12145, THNHM-I-12152, and THNHM-I-12153) and 2♂ (THNHM-I-12129 and THNHM-I-12154), Nakhon Ratchasima Prov., Wang Nam Khieo Dist., Sakaerat Environmental Research Station, dry evergreen forest, 17.II.2002, W. Jaitrong leg.

Distribution. Ubon Ratchathani, Mukdahan, Chiang Mai, and Nakhon Ratchasima Provinces.

References. Nagai and Porion (1996); Constant *et al.* (2016); Jiaranaisakul and Constant (2021).

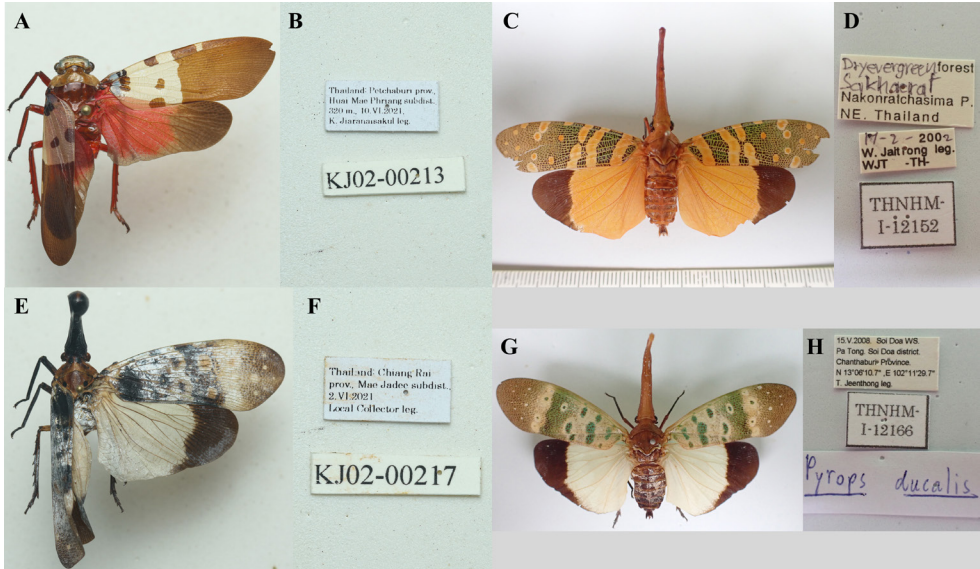


Figure 6. *Polydictya tricolor*, ♀. A. habitus; B. label and field number. *Pyrops candelaria*, ♀. C. habitus; D. labels and catalog number. *Pyrops clavatus*, ♂. E. habitus; F. label and field number. *Pyrops ducalis*, ♀. G. habitus; H. label and catalog number.

***Pyrops clavatus* (Westwood, 1839) (Figure 6E–F)**

Material Examined. **NORTHERN:** 1♂ (THNHM-I-25788), 1♀ (THNHM-I-25789) and 1♀ (THNHM-I-25790), Chiang Rai Prov., Mae Chedi Subdist., 2.VI.2021, Local collector leg., field number KJ02-00217, KJ02-00219 and KJ02-002200, respectively.

Distribution. Chiang Rai Province.

Reference. Constant and Pham (2017).

***Pyrops ducalis* (Stål, 1863) (Figure 6G–H)**

Material Examined. **EASTERN:** 1♀ (THNHM-I-12166), Chanthaburi Prov., Soi Dao Dist., Khao Soi Dao W.S., 13°06'10.7"N, 102°11'29.7"E, 15.V.2008, T. Jeenthong leg.

Diagnosis. Cephalic process orange red; tegmina with bluish green veins at basal 2/3; basal half cover by wax with round gaps aligned transversally; membrane brown with transverse pale brown band and small spots; posterior wings pale blue with dark brown on apex.

Distribution. Chanthaburi Province (new record from Thailand).

***Pyrops itoi* (Satô and Nagai, 1994) (Figure 7A–B)**

Material Examined. **WESTERN:** 1♀ (THNHM-I-25791), Ratchaburi Prov., Khao Laem, 13°32'18.5"N, 99°12'02.6"E, 1,010 m., 24.IV.2021, K. Wongdee leg., KJ02-00192.

Distribution. Ratchaburi Province.

Reference. Constant and Jiaranaisakul (2021).

***Pyrops karenius* (Distant, 1891)** (Figure 7C–D)

Material Examined. WESTERN: 1♀ (THNHM-I-25792), Phetchaburi Prov., Kaeng Krachan Dist., 23.V.2018, K. Jiaranaisakul leg., KJ02-00040; 1♂ (THNHM-I-25793) and 1♀ (THNHM-I-25794), Phetchaburi Prov., Huai Mae Phriang Subdist., 320 m., 10.VI.2021, K. Jiaranaisakul leg., field number KJ02-00208 and KJ02-00209, respectively.

Diagnosis. Cephalic process red; tegmina with three yellow transverse bands; nodal line with pale brown transverse line; membrane brown; posterior wings blue at basal 1/2 and remaining area dark brown.

Distribution. Phetchaburi Province (new record from Thailand).

***Pyrops lathburii* (Kirby, 1818)** (Figure 7E–F)

Material Examined. NORTHERN: 1♂ (THNHM-I-26187) and 2♀♀ (THNHM-I-26185 and THNHM-I-26186), Chiang Mai Prov., Omkoi Dist., Omkoi Subdist., Omkoi National Forest, 28.IX.2020, T. Jeenthong & W. Jaitrong leg.; 1♀ (THNHM-I-25795) and 1♀ (THNHM-I-25796), Chiang Rai Prov., Mae Chedi Subdist., 2.VI.2021, Local Collector leg., field number KJ02-00226 and KJ02-00228, respectively.

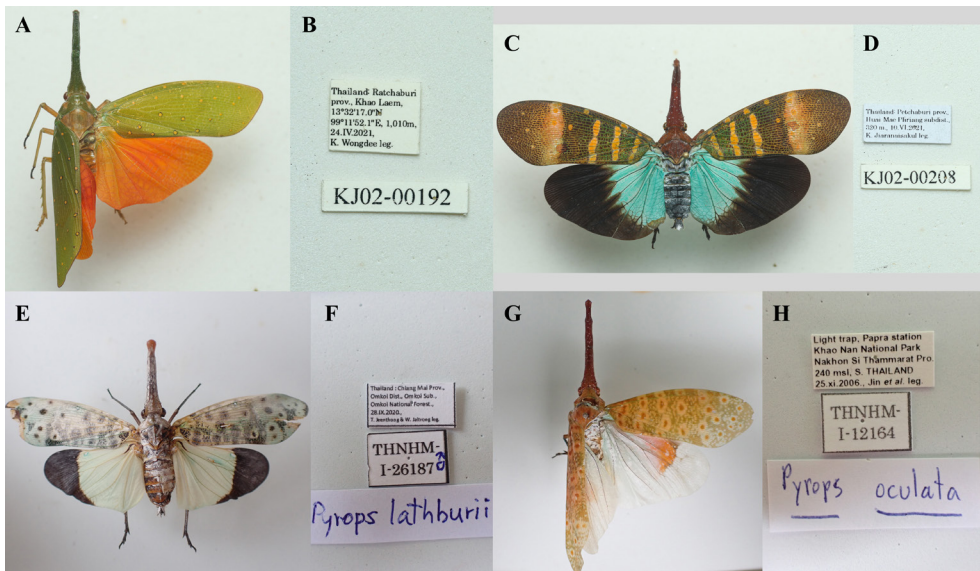


Figure 7. *Pyrops itoi*, ♀. A. habitus; B. label and field number. *Pyrops karenius*, ♀. C. habitus; D. label and field number. *Pyrops lathburii*, ♂. E. habitus; F. label and catalog number. *Pyrops oculatus*, ♀. G. habitus; H. label and catalog number.

Distribution. Chiang Mai and Chiang Rai Provinces.

References. Nagai and Porion (1996); Constant (2015).

***Pyrops oculatus* (Westwood, 1838)** (Figure 7G–H)

Material Examined. SOUTHERN: 2♂ (THNHM-I-12163 and THNHM-I-12165) and 2♀ (THNHM-I-12162 and THNHM-I-12164), Nakhon Si Thammarat Prov., Khao Nan N.P., Papra Station, 25.XI.2006, Jin [Jarujin Nabhitabhata] *et al.* leg.

Diagnosis. Cephalic process reddish brown; tegmina greenish brown with transverse rows of centrally yellowish orange spots; posterior wings white with orange or red marking near apex on the costal margin.

Distribution. Nakhon Si Thammarat Province (**new record from Thailand**).

***Pyrops pyrorhynchus* (Donovan, 1800)** (Figure 8A–B)

Material Examined. SOUTHERN: 1♀ (THNHM-I-25721), Satun Prov., Wang Prachan, 29.VI.2018, K. Jiaranaisakul leg., KJ02-00035.

Diagnosis. Cephalic process slightly robust with red apex; tegmina with irregular yellow spots; nodal line with white transverse line and 4-5 yellow spots; posterior wings blue with dark brown at apex and area along sutural margin.

Distribution. Satun Province (**new record from Thailand**).

***Pyrops spinolae* (Westwood, 1842)** (Figure 8C–D)

Material Examined. NORTHERN: 1♂ (THNHM-I-25797) and 4 ♀ (THNHM-I-26191 to THNHM-I-26194), Chiang Rai Prov., Mae Chedi Sub-dist., 2.VI.2021, Local Collector leg., field number KJ02-00230 to KJ02-00234.

WESTERN: 1♂ (THNHM-I-25798), Ratchaburi Prov., Suan Phueng Dist., 13°32'18.5"N, 99°12'02.6"E, 980 m., VI.2019, K. Jiaranaisakul leg., KJ02-00037; 1♂ (THNHM-I-25799), the same locality, 19.V.2020, B. Wongdee leg., KJ02-00123.

EASTERN: 1♀ (THNHM-I-25800), Chanthaburi Prov., Soi Dao Dist., 20.VII.2020, K. Jiaranaisakul leg., KJ02-00144. **SOUTHERN:** 1♂ (THNHM-I-12157), Nakhon Si Thammarat Prov., Sichon Dist., Khao Nan N.P., Yod Nam Waterfall, 8°54'32"N, 99°43'55.3"E, 26.VI.2008, W. Jaitrong leg.; 1♂ (THNHM-I-12158) and 2♀♀ (THNHM-I-12159 and THNHM-I-12160), Nakhon Si Thammarat Prov., Khao Nan N.P., Hin Tor Waterfall, 115 m a.s.l., 23.XI.2006, Jin [Jarujin Nabhitabhata] *et al.* leg.; 1♀ (THNHM-I-12161), Nakhon Si Thammarat Prov., Sichon Dist., Khao Nan N.P., Huai Kaew Waterfall, 8°5'09.2"N, 99°40'34.8"E, T. Jeenthong leg.

Distribution. Chiang Rai, Ratchaburi, Chanthaburi, and Nakhon Si Thammarat Provinces.

Reference. Jiaranaisakul and Constant (2021).

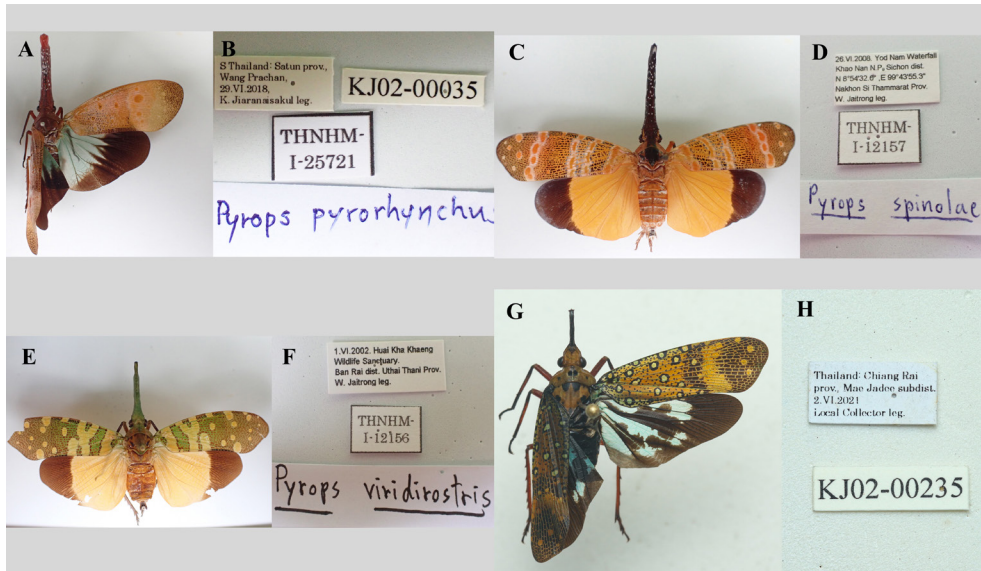


Figure 8. *Pyrops pyrorhynchus*, ♂. A. habitus; B. label, catalog number and field number. *Pyrops spinolae*, ♂. C. habitus; D. label and catalog number. *Pyrops viridirostris*, ♀. E. habitus; F. label and catalog number. *Saiva bullata*, ♀. G. habitus; H. label and field number.

Pyrops viridirostris (Westwood, 1848) (Figure 8E–F)

Material Examined. **WESTERN:** 1♀ (THNHM-I-25719), Ratchaburi Prov., Suan Phueng Dist., X.2019, K. Jiaranaisakul leg., KJ02-00050; 1♂ (THNHM-I-15694), the same locality and collector, 7.VII.2018, KJ02-00038; 1♂ (THNHM-I-25720), Ratchaburi Prov., Suan Phueng Dist., 13°35'03.7"N, 99°13'55.9"E, 13.VI.2020, K. Jiaranaisakul leg., KJ02-00137. **CENTRAL:** 2♀ (THNHM-I-12155 and THNHM-I-12156), Uthai Thani Prov., Ban Rai Dist., Huai Kha Kang W.S., 1.VI.2002, W. Jaitrong leg.

Distribution. Ratchaburi and Uthai Thani Provinces.

References. Nagai and Porion (1996); Constant *et al.* (2016); Jiaranaisakul and Constant (2021).

Genus *Saiva* Distant, 1906

Saiva bullata (Distant, 1891) (Figure 8G–H)

Material Examined. **NORTHERN:** 1♀ (THNHM-I-26195), 1♀ (THNHM-I-26204) and 1♀ (THNHM-I-26205), Chiang Rai Prov., Mae Chedi Subdist., 2.VI.2021, Local Collector leg., field number KJ02-00235, KJ02-00236 and KJ02-00238, respectively.

Diagnosis. Tegmina brown or ochraceous with irregular centrally yellowish spots; transverse dark brown near nodal line; nodal line with brown or ochraceous trans-

verse marking; posterior wings pale blue at basally and dark brown at apex extending to sutural margin and along the veins.

Distribution. Chiang Rai Province (new record from Thailand).

Saiva cardinalis (Butler, 1874) (Figure 9A–B)

Material Examined. **NORTHERN:** 1♂ (THNHM-I-26196) and 2♀ (THNHM-I-26197 to THNHM-I-26198), Chiang Rai Prov., Mae Chedi Subdist., 2.VI.2021, Local Collector leg., field number KJ02-00241 to KJ02-00243.

Dignosis. Tegmina bright green with yellow spots; apex of membrane brown; disc of posterior wings red with orange basally; apex of posterior wings with brown posterodistally.

Distribution. Chiang Rai Province (new record from Thailand).

Saiva gemmata (Westwood, 1848) (Figure 9C–D)

Material Examined. **CENTRAL:** 1♀ (THNHM-I-12128), Uthai Thani Prov., Ban Rai Dist., Huai Kha Kang W.S., 1.VI.2002, W. Jaitrong leg. **EASTERN:** 1♀ (THNHM-I-12127), Chanthaburi Prov., Soi Dao Dist., Khao Soi Dao W.S., 13°6'10.7"N, 102°11'29.7"E, 15.V.2008, T. Jeenthong leg. **WESTERN:** 1♀ (THNHM-I-26199), Ratchaburi Prov., Khao Krachom, 13°34'07.1"N, 99°11'46.0"E, 920 m., K. Jiaranaisakul leg., KJ02-00198; 1♀ (THNHM-I-26200), Phetchaburi

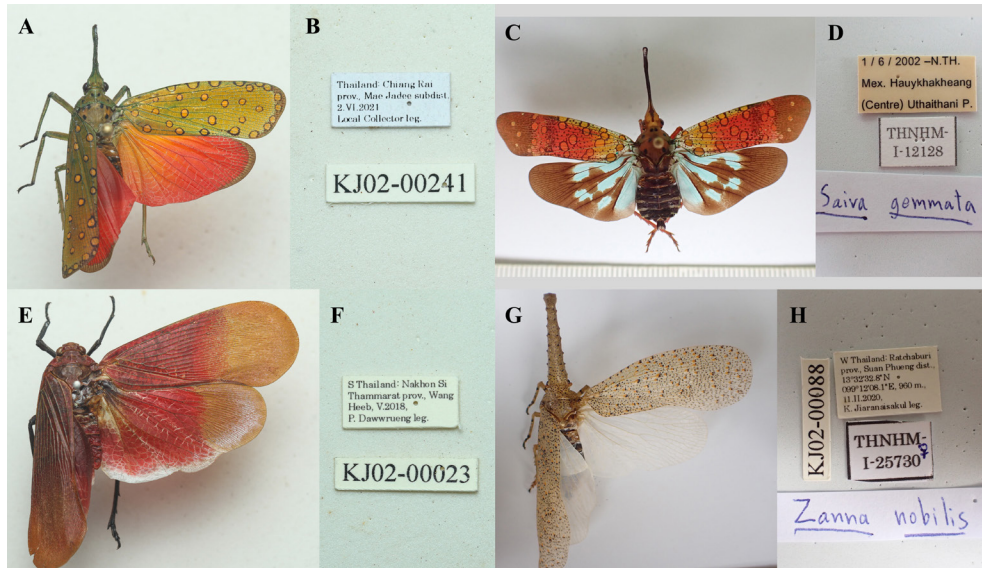


Figure 9. *Saiva cardinalis*, ♂. A. habitus; B. label and field number. *Saiva gemmata*, ♀. C. habitus; D. label and catalog number. *Scamandra* sp. 1, ♀. E. habitus; F. label and field number. *Zanna nobilis*, ♀. G. habitus; H. label, catalog number and field number.

Prov., Huai Mae Phriang Subdist., 320 m., 10.VI.2021, K. Jiaranaisakul leg., KJ02-00212.

Distribution. Ratchaburi, Phetchaburi, and Uthai Thani Chanthaburi Provinces.

References. Nagai and Porion (1996); Constant *et al.* (2016); Jiaranaisakul and Constant (2021).

Genus *Scamandra* Stål, 1863

Note. This genus is recorded in Thailand for the first time. A study based on the male genitalia is necessary to confirm the species.

Scamandra sp. 1 (Figure 9E–F)

Material Examined. SOUTHERN: 1♀ (THNHM-I-26201), Nakhon Si Thammarat Prov., Wang Heep, V.2018, P. Dawwrueng leg., KJ02-00023.

Distribution. Nakhon Si Thammarat Province.

Genus *Zanna* Kirkaldy, 1902

Note. The genus remains doubtful and needed a full taxonomic revision (Constant *et al.* 2016).

Zanna nobilis (Westwood, 1838) (Figure 9G–H, 10A–B)

Material Examined. WESTERN: 1♂ (THNHM-I-25729), Ratchaburi Prov., Suan Phueng Dist., 13°32'8.17"N, 99°12'08.1"E, 900 m a.s.l., 22.II.2020, K. Jiaranaisakul leg., KJ02-00095; 1♀ (THNHM-I-25730), the same locality and collector, 11.II.2020, KJ02-00088; 1♀ (THNHM-I-26202), Ratchaburi Prov., Suan Phueng Dist., 13°32'18.5"N, 99°12'02.6"E, 980 m a.s.l., 10.IV.2018, K. Jiaranaisakul leg., KJ02-00045; 1♂ (THNHM-I-26203), Ratchaburi Prov., Suan Phueng Dist., 13°32'32.8"N, 99°12'08.1"E, 960 m a.s.l., 11.II.2018, K. Jiaranaisakul leg., KJ02-00084. **SOUTHERN:** 1♀ (THNHM-I-12119), Nakhon Si Thammarat Prov., Son Sa Ka Forest, 26.VII.2003, T. Chan-ard leg.; 4 nymphs (THNHM-I-12121 to THNHM-I-12124, unknown sex), Chumphon Prov., Khlong Yan, 28.XII.2001, W. Jaitrong leg.; 1♀ (THNHM-I-12130), Nakhon Si Thammarat Prov., Khao Nan N.P., Hin Tor Waterfall, 26.I.2007, W. Jaitrong leg.

Distribution. Ratchaburi, Chumphon, and Nakhon Si Thammarat Provinces.

References. Nagai and Porion (1996); Jiaranaisakul and Constant (2021).

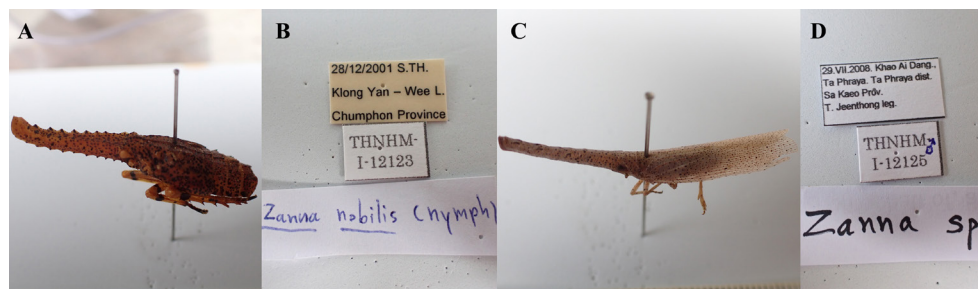


Figure 10. *Zanna nobilis*, nymph. A. habitus; B. label and catalog number. *Zanna* sp. 1, ♂. C. habitus; D. label and catalog number.

Zanna sp. 1 (Figure 10C–D)

Material Examined. EASTERN: 1♀ (THNHM-I-12126) and 1♂ (THNHM-I-12125), Sa Kaeo Prov., Ta Phraya Dist., Khao Vi Dang, 29.VII.2008, T. Jeenthong leg.

WESTERN: 1♀ (THNHM-I-15691), Kanchanaburi Prov., X.2014, K. Jiaranaisakul leg., KJ02-00041; 1♂ (THNHM-I-15692), Kanchanaburi Prov., Thong Pha Phum Dist., 8.IX.2018, W. Pathomwattananurak leg., KJ02-00042.

Distribution. Kanchanaburi, Sa Kaeo Provinces.

Discussion

As a result, seven species were examined and documented for the first time in Thailand, causing the fulgorid fauna in Thailand to expand in number to 34 species. In addition, based on the data gathered from social media or a citizen science database such as iNaturalist, there are many species that have never been recorded in Thailand before, and some are new species. However, the specimens, especially the male genitalia, are necessary to confirm or refute the species. Unfortunately, most observations were made in protected areas or in hard-to-reach areas for scientists. Thus, studying with the cooperation of government, relevant agencies and citizen scientists such as villagers or photographers are necessary to contribute to the enhancement of knowledge and gathering of specimens of the Fulgoromorpha in Thailand.

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References

- Bourgoin, T. 2021. *FLOW (Fulgoromorpha Lists on The Web): a world knowledge base dedicated to Fulgoromorpha*. Version 8. Downloaded from: <http://hemiptera-databases.org/flow/> on 14 September 2021.
- Butler, A.G. 1874. Description of two new species of *Fulgora* from India. *Annals and Magazine of Natural History London* (Ser. 4) 14: 131–132.
- Chan-ard, T. and S. Makchai. 2011. Catalogue of type specimens of amphibians and reptiles in the Natural History Museum, National Science Museum, Thailand. *The Thailand Natural History Museum Journal* 5(2): 113–123.
- Constant, J. 2015. Review of the *effusus* group of the lanternfly genus *Pyrops* Spinola, 1839, with one new species and notes on trophobiosis (Hemiptera: Fulgoromorpha: Fulgoridae). *European Journal of Taxonomy* 128: 1–23.
- Constant, J. and K. Jiaranaisakul. 2021. The Oriental lanternfly *Pyrops itoi* (Satô & Nagai, 1994): New synonymy and distribution records (Hemiptera: Fulgoromorpha: Fulgoridae). *Belgian Journal of Entomology* 110: 1–14.
- Constant, J. and H.T. Pham. 2019. *Polydictya* lanternflies of the Indochinese region: Six new species and identification key (Hemiptera: Fulgoromorpha: Fulgoridae). *Belgian Journal of Entomology* 86: 1–42.
- Constant, J., S. Phauk and T. Bourgoin. 2016. Updating lanternflies biodiversity knowledge in Cambodia (Hemiptera: Fulgoromorpha: Fulgoridae) by optimizing field work surveys with citizen science involvement through Facebook networking and data access in FLOW website. *Belgian Journal of Entomology* 37: 1–16.
- Jeenthong, T., W. Jaitrong and S. Jantra. 2013. *Catalogue of Insect Type Specimens in the Natural History Museum, Thailand*. National Science Museum Press, Pathum Thani. 85 pp. (in Thai)
- Jeenthong T., P. Teawkul, Y. Samung and W. Jaitrong. 2021. An updated checklist of the insect and other arthropods type specimens deposited in the collection of Natural History Museum of the National Science Museum, Thailand. *The Thailand Natural History Museum Journal* 15(2): 73–133.
- Jiaranaisakul, K. and J. Constant. 2021. The lanternflies (Hemiptera: Fulgoromorpha, Fulgoridae) of Khao Krachom Mountain, Thailand. *Far Eastern Entomologist* 435: 7–19.
- Jiaranaisakul, K., N. Makbun and J. Constant. 2018. The lanternflies of the *Penthicodes (Ereosoma) atomaria*+ species group in Thailand: New records and host plants (Hemiptera: Fulgoridae). *Belgian Journal of Entomology* 71: 1–15.
- Nagai, S. and T. Porion. 1996. *Fulgoridae 2: Catalogue illustré des faunes asiatique et australienne*. Sciences Nat, Compiègne. 80 pp.
- Stål, C. 1863. Hemipterorum exoticorum generum et specierum nonnullarum novarum descriptiones. *Transactions of the Entomological Society of London* (Ser. 3) 1: 571–603.

