

## ***Hyblaea meifenga* sp. n., a new Hyblaeidae species from the high mountains of Taiwan (Insecta: Lepidoptera)**

### **Studies of Hyblaeidae 5<sup>1</sup>: Contribution to the moths of Taiwan 17<sup>2</sup>**

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#### **Abstract**

The Hyblaeidae species *Hyblaea meifenga* sp. n. is described from the high mountains of Taiwan. The species is compared with the similar *Hyblaea fortissima* BUTLER, 1881. It differs significantly in the wing pattern of the upperside and underside as well as in the male and female genital structures. Its habitat is the highest place ever where a Hyblaeid species was collected (over 2,000 m above sea level). Together with the new species *H. meifenga* sp. n. the *Hyblaea fortissima* species group is erected.

#### **Introduction**

With the DAAD – Project (No.: ID D/0039914 PPP-Taiwan), the research on the Insect fauna of and in Taiwan started in 2001 as a cooperation with the National Chung Hsing University (CHU) and with further more excursions in cooperation with the Meifeng Highland Experimental Farm (National Taiwan University) (NTU) and the Da-Yeh University.

In Taiwan, about two thirds are mountains above 1500 m a. s. l., with more than 200 peaks above 3000 m a. s. l., the highest summit reaching 3952 m a. s. l. With about 36.179 km<sup>2</sup>, Taiwan is a small Island east of mainland China, south of Japan and north to The Philippines. Because of the zoogeographical situation, Taiwan has a high biodiversity from Palaearctic elements to tropical elements. In the southeast parts of Taiwan flora and fauna are tropical and in the high mountains also Palaearctic elements occur (e. g. BROOKS et al. 2000, MITTERMEIER et al. 1998, MYERS et al. 2000, OLSEN & DIERENSTEIN 2002, REICHHOLF 2003, SCHINTLMEISTER 2003). A lot of publications are available (e. g. BUCHSBAUM & MILLER 2002, BUCHSBAUM et al. 2006, CHEN 2009, BUCHSBAUM & CHEN 2013, CHEN et al. 2013, BUCHSBAUM et al. 2018, BUCHSBAUM et al. 2018, BUCHSBAUM & GREHAN 2019, BUCHSBAUM & CHEN 2019) produced during now nearly 20 years of entomological research on Taiwan.

**Hyblacidae** are poorly represented in Lepidoptera collections. Species of the Hyblaeidae are dayflying and rarely come to the light at night. In addition, they have a hidden way of life and a fast and unsteady flight. Only once, the second author could observe a mass occurrence on Bali Island (Indonesia), as well as *Vitessa* MOORE, [1860] species (Pyralidae) on Sumatra (Indonesia) (BUCHSBAUM 2002).

Inexperienced entomologists who do not know this family, often classify the Hyblaeidae species as Noctuidae where they are placed as unidentified species. NISHIO (2000) describes the mating behavior of *H. fortissima* BUTLER, 1881 in Japan.

From Taiwan, three species are known: *Hyblaea puera* (CRAMER, 1777), *H. constellata* GUENÉE, 1852 and *H. fortissima* BUTLER, 1881. The taxonomic status of some of these species is unclear. The species *H. puera* is a species complex in reality and the actual species *H. puera* is described from South America. (CRAMER 1777).

In the genus *Hyblaea* FABRICIUS, 1793, about 20 species are included (SCOBLE 1992, DE FREINA & BUCHSBAUM 2012, BUCHSBAUM et al. 2012, 2019) and some more undescribed species exist. BERIO (1967) synonymised some species without any reason and without exact explanation. BUCHSBAUM et al. (2019) discussed the taxonomic situation and the distribution of the different species complexes. Only few specimens were collected in Taiwan; in the collections of the Taiwan Museums and / or Institutes or University collections are hardly any specimens.

<sup>1</sup> Studies of Hyblaeidae 4: BUCHSBAUM, U. & M.-Y. CHEN 2020: A new Hyblaeidae species from Solomon Islands (Lepidoptera, Hyblaeidae). – SHILAP Revista lepidopterología (in press).

<sup>2</sup> Contribution to the moths of Taiwan 16: BUCHSBAUM, U., CHEN, M.-Y. & D.-J. CHEN 2020: *Pteropteryx taoa* sp. n. from Lanyu Island, Taiwan (Lepidoptera, Alucitidae). – Spixiana 43 (1): 137 – 145.

## Material, Methods and Locality

Specimens of the present new species were collected in Meifeng. One specimen was collected at night on a window of a laboratory room. A second one was collected during day-time in the forest around the Meifeng Highland Experimental Farm (National Taiwan University) (Fig. 8 & 9). The genitalia preparation follows ROBINSON et al. (1976), mounted with Euparal, scanned by Nikon supercoolscan 3000 and later prepared by Photoshop 7.0.1 (private licence) for publication. The maps were created by MapCreator 3.0 (ditto).

DNA: The DNA barcode (658 bp of the 5' end of the mitochondrial cytochrome oxidase I gene; HEBERT et al. 2003) was made at the CCDB (Canadian Centre for DNA Barcoding, Guelph, Canada) from the holotype and paratype. The two sequences (BC ZSM Lep 15435 and 15436) and the other data are publicly available from database BOLD (RATNASINGHAM & HEBERT 2007). The mtDNA data (COI, 5') for the neighbour joining trees were taken with Kimura 2 Parameter as distance model (Fig. 10) from BOLD Systems (<http://v4.boldsystems.org/>).

## Description and differential diagnosis

### *Hyblaea meifenga* sp. n. (Fig. 1 – 6)

Holotype (HT): ♂ Taiwan, Nantou Co., Meifeng, ca. 2100 m NN, 24°05'19" N / 121°10'26" E, August, 06 2004, leg. M.-Y. Chen. BOLD No.: BC ZSM Lep 15435, Holotype in Collection Taichung Museum.

Paratype (PT): ♀ Taiwan, Nantou Co., Meifeng, ca. 2100 m NN, 24°05'19" N / 121°10'26" E, October, 05 2004, leg. M.-Y. Chen. BOLD No.: BC ZSM Lep 15436, Paratype in Collection Zoologische Staatssammlung München (ZSM).

HT (♂) Wingspan: 32 mm, Forewing length: 13,5 mm. PT (♀) Wingspan: 32 mm, Forewing length: 15 mm. Smaller than *H. constellata* and larger than *H. fortissima*.

Ground colour of body, wings, head, palps and antenna greyish dark brown. Abdomen black. Posterior ends of the segments yellowish ringed. Abdominal end with brownish hairs. Forewings from base to medial area greyish brown. Postmedial region brown. Subterminal area greyish brown. Terminal area brown. Hindwings dark brown with 4 orange spots at mid-dorsum and at tornal angle. In *H. fortissima*, forewings paler greyish and without dark brown scales on terminal and sub-terminal area (or fascia?) and with black discal spot. Orange spots on the hindwings larger and wing-margin with yellow orange cilia.

Underside of forewings with dark brown "w", orange at costa, on dorsum greyish yellow. Termen brown. Cilia brown. Hindwings orange with brown spots, discal spot brown. From base to anal angle a discal dark brown stripe with yellow spots. In *H. fortissima*, the forewing underside has no such "w" mark and is provided with a brown discal spot, hindwings with less brown coloration and with larger discal spot.

Female with large yellow banded and large yellow terminal shade and on underside no brown colouration with only small brown terminal shade.

Male genitalia (HT) (Fig. 5): Uncus long, thick, with some long setae on top. Valvae slim, rounded on top, hairy, less sclerotized. Sacculus and clasper sclerotized, wide and strong. In *H. fortissima* slim and shorter. Vinculum v-shaped. Less sclerotized. In *H. fortissima* short and narrow.

Female genitalia (PT) (Fig. 6): Papillae anales weakly hairy, short, small. Apophyses posteriores short, strongly sclerotized. Ductus bursae slim, long, less sclerotized. Corpus bursae long, weakly sclerotized with short, wide strongly sclerotized signum. In *H. fortissima*, smaller and corpus bursae round and stronger sclerotized.

Distribution: The new species is only known from Meifeng, Nantou County from high altitudes (ca. 2,100 m a.s.l.).

Etymology: The new species is called *H. meifenga* after the locality where this species was collected, the Highland Experimental Farm Meifeng (National Taiwan University).

## Discussion

The new species is similar to the known species *H. fortissima*, but the DNA Barcode as well as the genitalia structures shows that the new species is different from all other known *Hyblaea* species.

*H. fortissima* was recorded from Korea by KIM & SOHN (2003). These authors recorded the host plant in this locality as *Callicarpa* spec. (Verbenaceae). NISHIO (2000) and (2003) informed about the mating behaviour and life history of *H. fortissima*.

The biotope where the new species was collected is a mountain forest with e. g. *Cyclobalanopsis* spec., *Pittosporum* spec., *Pasania* spec., *Schima* spec. and *Machilus* spec. trees. At same place, also *Thyrididae*, *Amphipyra meifengensis* CHEN, SPEIDEL, BUCHSBAUM & BEHOUNEK 2013 (Noctuidae) and *Endocliada meifenga* BUCHSBAUM & GREHAN, 2019 (Hepialidae) were collected. This new species occurs at highest altitudes ever recorded for *Hyblaea*. All the other known *Hyblaea* species occur at lower elevation, normally lower than 1000 m a.s.l as far as known.



Fig. 1: Holotype (♂).



Fig. 2: Paratype (♀).



Fig. 3: Holotype, underside.



Fig. 4: Paratype, underside.



Fig. 5: Holotype, male genitalia.



Fig. 6: Paratype, female genitalia.

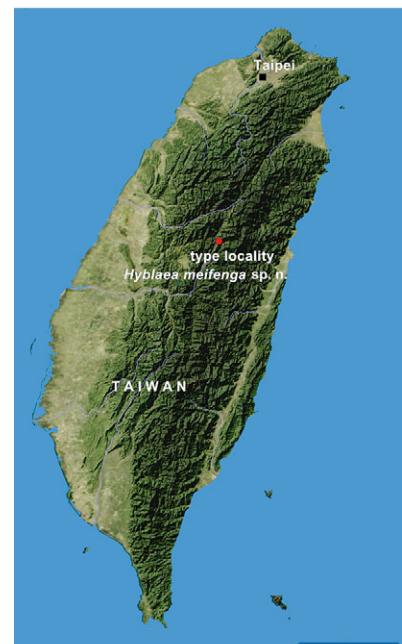
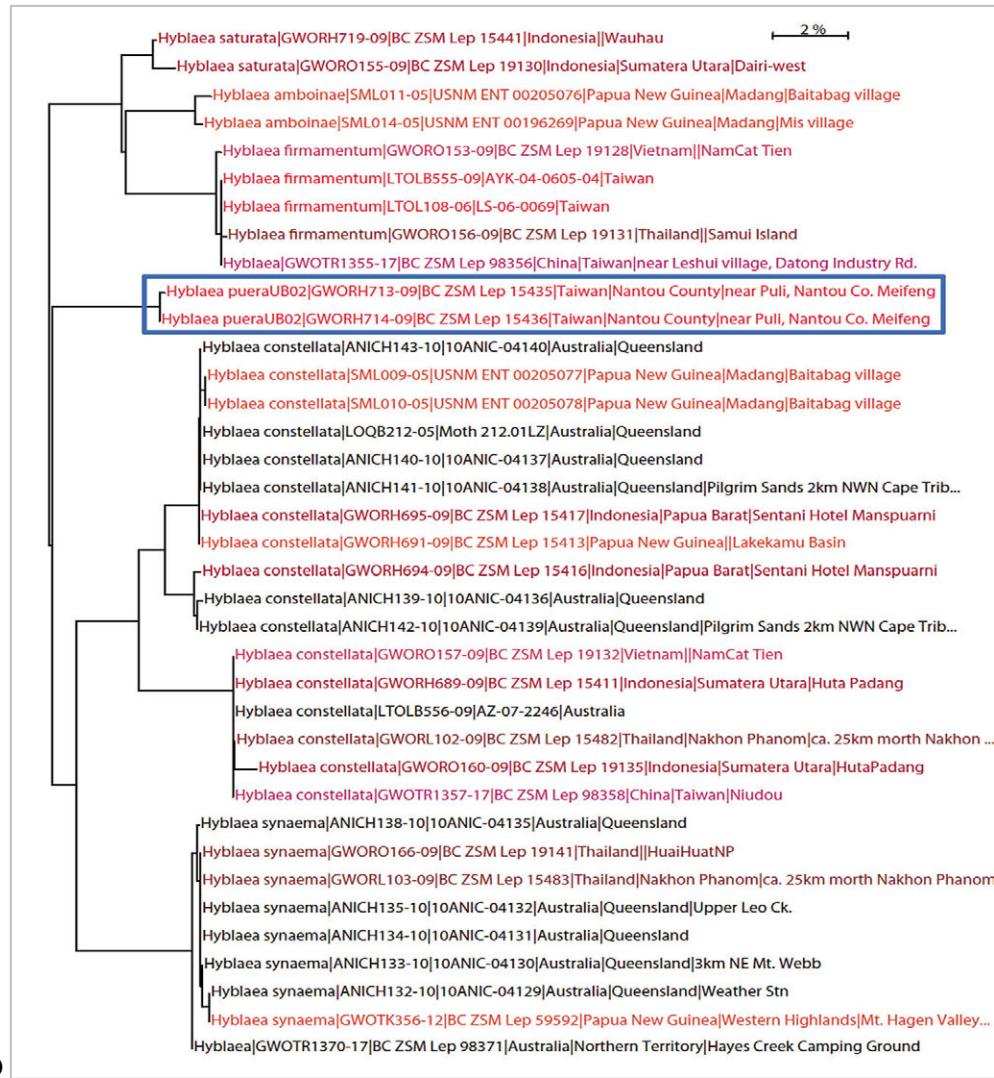


Fig. 7: Type locality on map.



10 a)



10 b)

**Fig. 10: BOLD Taxon ID Tree** (public records) to show the differences from other species available for comparison. Neighbour Joining tree (Kimura 2 parameter) of species from a) Asia and Australia (Colourization: Location, Country) and b) from Taiwan (Colourization: Barcode Cluster BIN). The blue frames enclose the specimens of *Hyblaea meifenga* sp. n.



**Fig. 8:** Type locality Meifeng overview.



**Fig. 9:** Habitat on type locality.

CHANDRASEKHAR et al. (2008) shows, based on the molecular phylogeny of the family Hyblaeidae the derivation of the phylogeographical relationship with DNA barcode and suggests groups of species based on geographical distribution, as well as according to morphological criterias. Follow this basis, the authors propose that the new species *H. meifenga* should form a new species group with *H. fortissima* because of the similarity of the external morphology and the genitalia characters with *H. fortissima*. The sister species groups are *H. constellata* and *H. puera* (CHANDRASEKHAR et al. 2008). All female genitalia of the *H. puera* species group are provided with two signa, the members of the *H. constellata* species group all have only one signum (BUCHSBAUM et al. 2019, BUCHSBAUM & CHEN 2020). No other species have such signa like *H. fortissima* and the similar species *H. meifenga* sp. n. so that it makes sense to combine these two species in the new *Hyblaea fortissima* species group.

### Zusammenfassung

Die Hyblaeide *Hyblaea meifenga* sp. n. wird vom Hochgebirge aus Taiwan beschrieben. Die Art wird mit der ähnlichen *Hyblaea fortissima* BUTLER, 1881 verglichen. Sie unterscheidet sich in der Flügelzeichnung der Ober- und Unterseite sowie in den männlichen und weiblichen Genitalstrukturen deutlich. Der Lebensraum ist der bisher höchste Platz eines Nachweises einer Hyblaeide (über 2000 m NN). Zusammen mit der neuen Art *H. meifenga* sp. n. wird die neue Artengruppe *Hyblaea fortissima* aufgestellt.

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