

## First Record of the Immature Stage of *Agrotis taiwana* Chang, 1991 (Lepidoptera: Noctuidae: Noctuinae: Noctuini)

SHIPHER WU<sup>1</sup>, TSAN-RAN TSENG<sup>2</sup>

<sup>1</sup>National Taiwan Museum, No. 2, Xiangyang Rd, Zhongzheng District, Taipei City, Taiwan. Email: spwu@ntm.gov.tw

<sup>2</sup>Tianmu Junior High School, No. 120, Tianmu E. Rd., Shilin Dist., Taipei City, Taiwan

**Abstract:** The larval and pupal morphology of the Taiwanese endemic species *Agrotis taiwana* Chang, 1991 is first described in the present study.

**Keywords:** Cloud forest, endemic species, East Asia island arcs

According to Fu et al. (2022), three species of the large Noctuidae genus *Agrotis* Ochsenheimer, 1816 are found in Taiwan. Among them, two species, i.e., *Agrotis ipsilon* (Hufnagel, 1766) and *A. segetum* (Denis & Schiffermuller, 1775) are cosmopolitan to the Old World, and the last species, *Agrotis taiwana* Chang, 1991 is endemic to Taiwan and restricted in mid- to high montane regions. The species *A. luzonensis* Wileman & South, 1920, which is endemic to Luzon, the Philippines, was proposed to be closely related to *A. taiwana* (Ronkay et al., 2013). The immature stage, bionomics and phylogenetic relationships of both species are hitherto unknown but may potentially be important for understanding the biogeography of East Asia island arcs. The present study first describes the immature stage of this Taiwanese endemic species.

The larva was kept in plastic rectangle case (65\*65\*35 mm) under ambient temperature in Xindian, Taipei (ca. 20 m a.s.l.), subsequently the individual pupated and emerged therein. The single specimen of an emerged adult moth was deposited in: NTM – National Taiwan Museum, Taipei. The individual was photographed using a Nikon Z7 digital camera and AF-S Micro Nikkor 60mm F2.8G ED lens with SB5000 flash covering SMDV Speedbox-Flip diffuser. The images were edited in Adobe Photoshop 2023 (Adobe Inc.).

*Agrotis taiwana* Chang, 1991 臺灣地老虎

(Figs 1–5)

*Agrotis taiwana* Chang, 1991, *Illustrations of Moths in Taiwan* 5: 61, fig. 39; Fu et al., 2013: 510, pl. 44: 19; Ronkay et al., 2013: 20. pl. 2, figs 3–4; pl. 22, figs 12–19; gen. figs 11–12; Wu et al., 2020: 53.

Material examined. TAIWAN. 1 male, Taichung, Xueshanshenmu, ca. 2500 m, 12. XII. 2022, m, emgd. 10. I. 2023, leg. S. Wu & T.-R. Tseng, SWUBR2022-225, TMIN3833 (NTM)

Description. Final instar (Figs 1–3): body length about 32 mm (n= 1), body shape cylindrical; head red-brown with a pair of wide black stripes on frons closing to clypeus; ground coloration of last two thoracic segments and abdomen indistinguishable, dark ochreous brown, dorsal part of prothorax plate slightly sclerotized and much darker, spiracles black, tubercles dark brown. Pupa (Fig. 5): body length about 22 mm, ground coloration pale red-brown, smooth in appearance; epicranium blunt; antennae extending towards apex of forewing; spiracles black; cremaster bifurcate, straight, apex acute.

The larva in the present study was taken from the concrete wall on a slope covered with two types of mosses (Bryopsida). According to Fu-Chun Yang (pers. comm.), one of them could not be identified and the other belongs to the family Pottiaceae. Since the larva subsequently did not feed on the two plant species and to our best knowledge there is no moss-feeding record in *Agrotis* species, the larva may have been searching on the place for pupation or occurred there accidentally. According to 46 Citizen Science life-photo records and 82 specimen data deposited in Taiwan Moth Information Center (<https://twmoth.tesri.gov.tw/>, accessed 11 January, 2023), this endemic species is distributed between 1,002 and 3,413 m in altitude, the potential host plants may also be restricted to the mid-altitude area. The main vegetation of larval habitat is mixture of deciduous and evergreen trees, plant species common to the locality are *Acer insulare* var. *caudatifolium*, *Photinia niitakayamensis* (Rosaceae) and *Quercus salicina* (Fagaceae), etc., Further attention is needed to elucidate the corresponding host plant.



Figures 1–5. The individual of *Agrotis taiwana* Chang, 1991 collected from Xueshanshenmu 2500 m, Taichung. 1. Life photo of final instar in the field; 2. lateral side of the final star; 3. dorsal side of the final instar; 4. emerged male adult; 5. pupa. Photo by Shipher Wu. Scale for figure 2-5= 10 mm.

#### Acknowledgments

We would like to express our sincere thanks to Fu-Chun Yang (NTM) for moss identification, to Hsiu-Hsiu Liu (Taipei) for arranging the schedule around the study area, to Shiu-Shiou Wu (Taipei) for rearing the studied material.

#### References

- Chang, B.-S. 1991. Illustrations of Moths in Taiwan. Vol. 5. Taiwan Museum, Taipei, Taiwan. 366 pp. (in Chinese)
- Fu, C.-M., Wu, S., Ronkay, L. & Ronkay, G. 2013. Noctuidae: Noctuinae. pp. 509–531. In: Fu, C.-M., Ronkay, L., Lin, H.-H. (eds). Moths of Hehuanshan. Endemic Species Research Institute, Nantou.
- Ronkay, G., Ronkay, L., László, G. M., Fu, C.-M. & Wu, S. 2013. The Atlas of the Noctuidae (s. l.). Fauna of Taiwan (Lepidoptera, Noctuoidea). Part I. Noctuidae: Noctuinae and Plusiinae. Fibigeriana Supplement. *Book series of Taxonomy and Faunistics* 1: 9–122.
- Wu, S., Fu, C.-M., Tzuoo, H.-R., Shih, L.-C., Chang, W.-C. & Lin, H.-H. 2020. An annotated checklist of macro moths of mid- to high-mountain ranges of Taiwan (Lepidoptera: Macroheterocera). *Formosan Entomologist* 40: 10–83.

## 臺灣地老虎首次幼生期紀錄（鱗翅目：夜蛾科：夜蛾亞科：夜蛾族）

吳士緯<sup>1</sup>、曾燦然<sup>2</sup>

<sup>1</sup> 國立臺灣博物館 臺北市襄陽路 2 號 Email: spwu@ntm.gov.tw

<sup>2</sup> 天母國中 臺北市天母東路 120 號

**摘要:** 本研究首次描述了臺灣特有物種臺灣地老虎 (*Agrotis taiwana* Chang, 1991) 的幼蟲和蛹的形態特徵。

**關鍵詞:** 霧林帶、特有種、東亞島弧