A taxonomic study of the subspecies of *Ourapteryx ebuleata* Guenée, 1858 (Lepidoptera: Geometridae)

Rui CHENG, Dayong XUE, Nan JIANG①

Key Laboratory of Zoological Systematics and Evolution, Institute of Zoology, Chinese Academy of Sciences, Beijing 100101, China

Abstract: After examining the types deposited in ZFMK and NHM and specimens deposited in IZCAS, we found that the morphological features of *Ourapteryx ebuleata szechuana* Wehrli, 1939 and *Ourapteryx ebuleata amphidoxa* Wehrli, 1939 are quite different from those of *Ourapteryx ebuleata* Guenée, 1858. The two taxa should be raised to specific status: *O. szechuana* Wehrli, 1939 stat. nov. and *O. amphidoxa* Wehrli, 1939 stat. nov. This will result in two subspecies within *O. ebuleata*: *O. ebuleata ebuleata* Guenée, 1858 and *O. ebuleata deliquescens* Inoue, 1995. In this paper, we compare the diagnostic characteristics of *O. ebuleata ebuleata*, *O. ebuleata deliquescens*, *O. szechuana* and *O. amphidoxa*, and provide photos of the adults and genitalia.

Key words: Ennominae; new status; morphology

平尾尺蛾亚种分类研究（鳞翅目：尺蛾科）

程瑞，薛大勇，姜楠①

中国科学院动物进化与系统学重点实验室，中国科学院动物研究所，北京 100101

摘要：通过检视德国波恩动物学博物馆（ZFMK）和英国自然历史博物馆（NHM）的模式标本以及中国科学院动物研究所（IZCAS）的标本，发现过去作为平尾尺蛾 *Ourapteryx ebuleata* Guenée, 1858 亚种的四川尾尺蛾 *Ourapteryx ebuleata szechuana* Wehrli, 1939 和新川尾尺蛾 *Ourapteryx ebuleata amphidoxa* Wehrli, 1939 的形态特征与平尾尺蛾 *O. ebuleata* 存在显著差异。这 2 个亚种应提升到种级地位：*O. szechuana* Wehrli, 1939 stat. nov. 和 *O. amphidoxa* Wehrli, 1939 stat. nov.。目前平尾尺蛾 *O. ebuleata* 只具有 2 个亚种：指名亚种 *O. ebuleata ebuleata* Guenée, 1858 和尼泊尔亚种 *O. ebuleata deliquescens* Inoue, 1995。文中对平尾尺蛾指名亚种 *O. ebuleata ebuleata*、平尾尺蛾尼泊尔亚种 *O. ebuleata deliquescens*、以及四川尾尺蛾 *O. szechuana* 和新川尾尺蛾 *O. amphidoxa* 的主要特征进行了比较分析，提供了成虫和外生殖器图片。

关键词：灰尺蛾亚科；新地位；形态学

Introduction

The genus *Ourapteryx* Leach, 1814 is mainly distributed in the Palaearctic and Oriental Regions (Skou & Sihvonen 2015), and comprises an important part of a megadiverse assemblage of geometrid moths. At present, 79 species have been described worldwide

Accepted 9 May 2019. Published 25 June 2019. Published online 13 June 2019.

① Corresponding author, E-mail: jiangn@ioz.ac.cn

(Scoble 1999).

Ourapteryx ebuleata Guenée, 1858, considered to be the most abundant and most widespread Asian *Ourapteryx* species, is currently split into four subspecies: *O. ebuleata ebuleata* Guenée, 1858, *O. ebuleata szechuana* Wehrli, 1939, *O. ebuleata amphidoxa* Wehrli, 1939 and *O. ebuleata deliquescens* Inoue, 1995 (Stüning 1994). Among them, *O. ebuleata szechuana* and *O. ebuleata amphidoxa* should be proved to be distinct species (Stüning 1994). During recent study of the material of *O. ebuleata* in IZCAS, ZFMK and NHM, we found the morphological features of *O. ebuleata szechuana* and *O. ebuleata amphidoxa* are quite different from those of *O. ebuleata*. Therefore, we propose raising these two subspecies to specific status: *O. szechuana* Wehrli, 1939 stat. nov. and *O. amphidoxa* Wehrli, 1939 stat. nov. This will result in two subspecies within *O. ebuleata*: *O. ebuleata ebuleata* Guenée, 1858 and *O. ebuleata deliquescens* Inoue, 1995. We compare the diagnostic characteristics of *O. ebuleata ebuleata*, *O. ebuleata deliquescens*, *O. szechuana* and *O. amphidoxa*, and provide photos of the adults and genitalia.

Material and methods

Most specimens belong to the Institute of Zoology, Chinese Academy of Sciences, Beijing, China (IZCAS), the Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany (ZFMK), and the Natural History Museum, London, United Kingdom (NHM). Terminology for wing venation follows the Comstock-Needham System (Comstock 1918), and that for the genitalia is based on Pierce (1914, reprint 1976), Klots (1970) and Nichols (1989). Photographs of the adult moth and its genitalia were taken using digital cameras. Composite images were generated using Auto-Montage software version 5.03.0061 (Synoptics Ltd). The plate was compiled using Adobe Photoshop software.

Taxonomy

Ourapteryx ebuleata Guenée, 1858

Urapteryx ebuleata Guenée, 1858: 32. Holotype, ♀, India: Bengal, Kashmir (ZFMK).

Ourapteryx ebuleata: Prout, 1915: 335.

Ourapteryx ebuleata ebuleata Guenée, 1858 (Figs. 1, 7, 11)

Diagnosis. This species can be distinguished from *O. szechuana* and *O. amphidoxa* by the following characters: the greyish brown part of the frons is often larger in *O. szechuana* than in *O. ebuleata* and *O. amphidoxa*; in the male genitalia, the furca is long and the distal half first bent dorsally, then recurved towards the base in *O. ebuleata*, while the incurved apical part of the furca is longer in *O. ebuleata* than in *O. szechuana* and *O. amphidoxa*; in the female genitalia, the colliculum of the female genitalia is triangularly prolonged towards the ostium in *O. ebuleata*, while *O. szechuana* and *O. amphidoxa* do not have this character; the corpus bursae and the signum of *O. amphidoxa* is smaller than in *O. ebuleata* and *O. szechuana*.

Specimens examined. India, holotype, ♀, Inde nord (ZFMK). **India,** 5♂3♀, northwestern India, 2500 m, July (ZFMK). **Pakistan,** 3♀, northern Pakistan, 1100–1800 m, July (ZFMK).

Distribution. NW India; Kashmir; N Pakistan.

***Ourapteryx ebuleata deliquescens* Inoue, 1995** (Figs. 2, 8, 12)

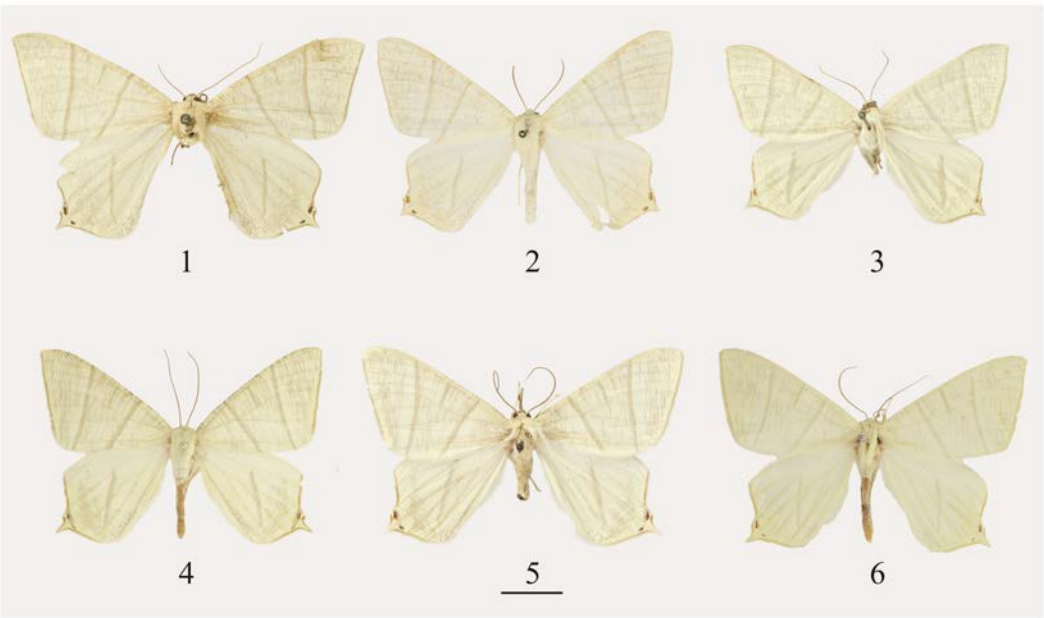
Ourapteryx ebuleata deliquescens Inoue, 1995: 128, pl. 122, fig. 10; text-figs. 807, 821. Holotype, ♂, Nepal: Janakpur, Dolakha, Jiri, 2350 m (BMNH).

Ourapteryx sambucaria Linnaeus sensu Zhu, 1981: 125, pl. 35: 891 (misidentification).

Diagnosis. This subspecies is different from *O. ebuleata ebuleata* by the following characters: the wings are much clearer, creamy yellowish white and the transverse lines are more slender and less brownish.

Specimens examined. Nepal, holotype, ♂, Jiri, Janakpur Dolakha, E. Nepal, 2350 m, 31-V–02-VI-1993, coll. T. Haruta (BMNH); 2♂, paratypes, same data as holotype (BMNH); 2♂, paratypes, Mt. Phulchouki, Kathmandu, 2075 m, 30-V-1992 (BMNH); 9♂2♀, paratypes, Syabrubesi, Ganesh Himal, 1520–2330 m, 12-VI-1993, coll. M. Hreblay & G. Csorba (ZFMK). **China** (IZCAS), Yunnan, 1♀, Yulong Mountain, Lijiang, 22-VII-1962, coll. Shimei SONG. Tibet, 1♀, Zham, 2200 m, 26-VII-1975, coll. Ziqing WANG; 1♂, Gyirong Gongshe, 13-IX-1984, coll. Zhaoxing YAN & Qiongqiong PU.

Distribution. China (Yunnan, Tibet); Nepal.

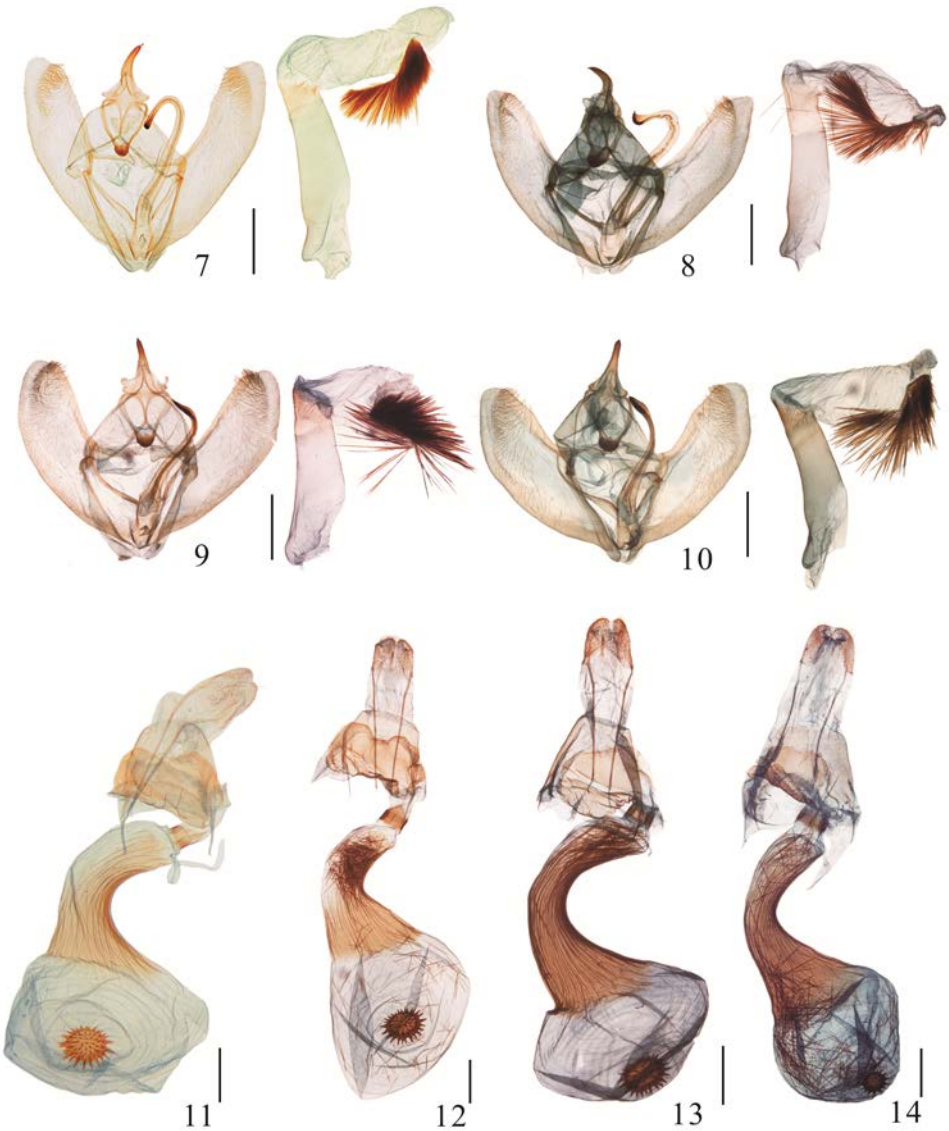


Figures 1–6. Adults of *Ourapteryx* spp. 1, 2. *O. ebuleata*. 1. *O. ebuleata ebuleata*, holotype; 2. *O. ebuleata deliquescens*, holotype. 3, 4. *O. szechuana*. 3. Holotype; 4, Male. 5, 6. *O. amphidoxa*. 5. Holotype; 6. Male. Scale bar = 1 cm.

***Ourapteryx szechuana* Wehrli, 1939 stat. nov.** (Figs. 3, 4, 9, 13)

Ourapteryx ebuleata szechuana Wehrli, 1939: 353, pl. 28: b. Holotype, ♂, China: Yahothal (ZFMK).

Diagnosis. See *O. ebuleata ebuleata*.



Figures 7–10. Male genitalia of *Ourapteryx* spp. 7, 8. *O. ebuleata*. 7. *O. ebuleata ebuleata*; 8. *O. ebuleata deliquescens*; 9. *O. szechuana*; 10. *O. amphidoxa*. Figures 11–14. Female genitalia of *Ourapteryx* spp. 11, 12. *O. ebuleata*. 11. *O. ebuleata ebuleata*, holotype; 12. *O. ebuleata deliquescens*; 13. *O. szechuana*; 14. *O. amphidoxa*. Scale bars = 1 mm.

Specimens examined. China, Sichuan, holotype, ♂, Yahothal (ZFMK); 1♂1♀, paratype, Wassekou, Sumpanting (BMNH); 1♀, allotype, Kunkala-Schan (ZFMK). **China** (IZCAS), Inner Mongolia, 1♂, Jiwen, 09-VIII-1982. Beijing, 1♂2♀, Liyuanling, Mentougou, 1100 m, 11–13-VIII-2004, coll. Hongmei LI. Shanxi, 1♂1♀, Benhe, Yangcheng, 24-VIII-2009, coll. Chaodong ZHU. Henan, 1♂, Baiyunshan, Songxian, 07–09-VIII-2013, coll. Nan JIANG & Le CUI. Shaanxi, 2♂1♀, Huangbaiyuan, Taibai, 1323 m, 17–18-VI-2012, coll. Shuxian LIU & Jing LI. Ningxia, 2♂2♀, Erlonghe Linchang, Jingyuan, 1984 m, 11-VII-2008, coll. Wenhui

SONG; Gansu, 1♂3♀, Tulutou, Yongdeng, 2280–2600 m, 25–29-VII-1991, 08-VIII-2005, coll. Dayong XUE & Hongxiang HAN; 1♂, Liziba, Wenxian, 1971 m, 22–24-VIII-2014, coll. Xinxin LI. Qinghai, 2♂, Langshidang, Huzhu Beishan Linchang, 2600 m, 07-VIII-2005, coll. Dayong XUE. Zhejiang, 1♂, Sanmuping, West Tianmu Mountain, 789 m, 25-VII-2011, coll. Rui CHENG; 1♀, Qianmutian, West Tianmu Mountain, 1330 m, 30-VII-2011, coll. Keji YAN & Rui CHENG. Hubei, 1♀, Yingshan, 900 m, 04-VIII-2013, coll. Nan Jiang & Le Cui; Jiangxi, 1♂, Daqiutian, Liulianshan, 22-VI-2009, coll. Chaodong ZHU; 1♀, Gao'an. Hunan, 1♂, Mangshan, Zhangyi, 512–770 m, 13–15-VII-2008, coll. Fuqiang CHEN; 1♀, Shanmu Linchang, Yongshun, 600 m, 03-VIII-1988, coll. Yixin CHEN. Fujian, 1♂, Sangang, Wuyisan, 10-V-1981, 09-VII-2006, coll. Jiang WANG & Jiashe WANG. Hainan, 1♀, Hongxin, Yinggeling, Baisha, 600 m, 17-XI-2008, coll. Hongliang SHI. Guangxi, 1♂, Antangping, Mao'er Mountain, 1579 m, 17–18-VIII-2012, coll. Chao YANG. Sichuan, 1♂, Sanjiang, Wenchuan, 1349 m, 25-VIII-2013, coll. Rui CHENG; 1♂, Emei Moutain, 1288 m, 31-VII-2013, coll. Rui CHENG; 1♂, Barkam, 2662 m, 16-VIII-2014, coll. Xiaodan PAN; 1♂, Changping, Siguniangshan, Xiaojin, 3264 m, 15–17-VIII-2014, coll. Xiaodan PAN; 1♀, Xiangcheng, 2841 m, 09-VIII-2013, coll. Rui CHENG. Yunnan, 1♂, Houshan, Yunnan Agricultural University, 23-V-2010, coll. Xiushuai YANG & Ke WANG; 1♂, Shidi, Tengchong, 1697 m, 25-VI-2014, coll. Xiaodan PAN; 1♀, Heinitang, Tengchong, 1824 m, 26–27-VI-2014, coll. Xinxin LI. **Nepal** (IZCAS), 2♂, Matathati Village, 15-VII-2014, coll. Rui CHEN.

Distribution. China (Inner Mongolia, Beijing, Shanxi, Henan, Shaanxi, Ningxia, Gansu, Qinghai, Zhejiang, Hubei, Jiangxi, Hunan, Fujian, Hainan, Guangxi, Sichuan, Yunnan); Nepal.

***Ourapteryx amphidoxa* Wehrli, 1939 stat. nov.** (Figs. 5, 6, 10, 14)

Ourapteryx ebuleata amphidoxa Wehrli, 1939: 353, pl. 28: a. Holotype, ♂, China: Ta-tsien-lou (ZFMK).

Ourapteryx ebuleata ebuleata Guenée sensu Zhu & Xue, 1988: 447 (misidentification).

Diagnosis. See *O. ebuleata ebuleata*.

Specimens examined. China, Sichuan, holotype, ♂, Chasseurs indigenes de Ta-tsien-lou, Récolle de 1910, slide no. 5997 (ZFMK). **China** (IZCAS), Yunnan, 2♂, Heinitang, Tengchong, 1930 m, 28–30-V-1992, coll. Dayong XUE. Tibet, 2♂1♀, Nongmu Xueyuan, Bayi, 2900 m, 30-VII-2014, coll. Rui CHENG & Le CUI; 2♂, Bayi, Nyingchi, 3000 m, 01–03-VII-2002, coll. Dayong XUE; 1♂, Sangjiu, Zhowagoin, Zayü, 3580 m, 30-VIII-2014, coll. Hong LIU; 1♀, North 5 km, Goyü, Zayü, 3418 m, 26-VIII-2014, coll. Hong LIU; 1♂, Zhamo, Bomi, 09-IX-1984, coll. Ba JIANG; 1♂, Yi'ong, Bomi, 2300 m, 24-VIII-1983, coll. Yinheng HAN; 2♂, Zham, 2200 m, 24–25-VI-1975, coll. Ziqing WANG.

Distribution. China (Sichuan, Yunnan, Tibet).

Acknowledgements

We sincerely thank Dr. Marianne ESPELANG (ZFMK) for allowing the examination of material under her curation and Dr. Dieter STÜNING (ZFMK) for his great help for our work. We express our sincere thanks to the Trustees and staff of the Natural History Museum, London for allowing the examination of the material under their curation. We also appreciate the work of Ms. Yang CHAO (IZCAS) in preparing specimens and dissection. This work was

supported by the National Natural Science Foundation of China (31572301, 31872966, 31872967) and by the National Special Fund on Basic Research of Sciecne and Technology (2014FY110100).

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