



<http://dx.doi.org/10.11646/zootaxa.3856.1.3>

<http://zoobank.org/urn:lsid:zoobank.org:pub:2A61774A-7D31-46CE-8311-683DCC8BE43F>

## A review of *Luxiaria* Walker and its allied genus *Calletaera* Warren (Lepidoptera, Geometridae, Ennominae) from China

NAN JIANG<sup>1</sup>, DAYONG XUE<sup>1</sup> & HONGXIANG HAN<sup>1,2</sup>

<sup>1</sup>Key Laboratory of Zoological Systematics and Evolution, Institute of Zoology, Chinese Academy of Sciences, Beijing 100101.

E-mail: [jiangn@ioz.ac.cn](mailto:jiangn@ioz.ac.cn); [xuedy@ioz.ac.cn](mailto:xuedy@ioz.ac.cn)

<sup>2</sup>Corresponding author. E-mail: [hanhx@ioz.ac.cn](mailto:hanhx@ioz.ac.cn)

### Abstract

The genus *Luxiaria* Walker and its allied genus *Calletaera* Warren in China, including 16 species in all, are reviewed. Five new species are described: *C. obvia* sp. nov., *C. acuticornuta* sp. nov., *C. rotundicornuta* sp. nov., *C. dentata* sp. nov., *C. trigonoprocessus* sp. nov. The species *L. acutaria* (Snellen, 1877) and *L. tephrosaria* (Moore, 1868) are newly recorded for China. Two new combinations are established: *C. obliquata* (Moore, 1888) comb. nov. and *C. consimilaria* (Leech, 1897) comb. nov. Four new synonyms are established: *Eutoea* Walker, 1860 (= *Bithiodes* Warren, 1894 syn. nov.); *Calletaera* Warren, 1895 (= *Bithiodes* Warren, 1899 syn. nov.), based on the fixation of nominal type *Acidalia inexactata* Walker, 1861, for the genus name *Bithiodes* Warren, 1894; *L. emphatica* Prout, 1925 (= *L. costinota* Inoue, 1978 syn. nov.); *C. subexpressa* (Walker, 1861) (= *C. digrammata* Wehrli, 1925 syn. nov.). Diagnoses for all Chinese species are provided. Illustrations of external features and genitalia are presented.

**Key words:** taxonomy, morphology, new species, new synonyms, new combinations

### Introduction

*Luxiaria* Walker and *Calletaera* Warren are both assigned to the tribe Eutoeini within the subfamily Ennominae. Members of these two genera have the following features: an elliptical fovea with transverse ridges is present at the base of the male forewing; the postmedial lines of both wings are thin and indistinct, often represented by a row of dots; dark bands are present outside the postmedial lines of both wings.

The genus *Luxiaria* was described as a monotypic genus by Walker (1860), based on *L. alfenusaria* Walker, 1860, which was later listed as a junior synonym of *Drepanodes? phyllosaria* Walker, 1860 by Swinhoe (1894). Species of *Luxiaria* are widely distributed in the Palaearctic, Oriental, Australian and Ethiopian regions. Up to the present, 41 species have been recognized in *Luxiaria* (Parsons *et al.* 1999), with seven species recorded in China (Leech 1897; Prout 1915; Wehrli 1940; Inoue 1978; Xue 1992a, 1992b; Zhu & Xue 1992; Xue 1993; Yazaki 1994; Wang 1998; Xue & Han 2005; Fang & Wu 2001; Han & Xue 2002; Han & Xue 2004; Sato & Fan 2011).

*Calletaera* Warren was described by Warren (1895) on the basis of *Macaria ruptaria* Walker, 1861, which was later considered to be a junior synonym of *Acidalia subexpressa* Walker, 1861 by Holloway (1994). Nine species have been recognized in *Calletaera* before the present work (Parsons *et al.* 1999), with four species recorded in China (Wileman 1916; Wehrli 1925; Wang 1998; Ades & Kendrick 2004).

However, following study of material obtained during recent expeditions and re-examination of the collection in IZCAS, it has become apparent that new species need to be described, and taxonomy of the genera needs to be revised.

The aims of this paper are to provide a survey of Chinese *Luxiaria* and *Calletaera* species, to provide diagnostic characters for each genus and species, to describe five new species of *Calletaera* and two newly recorded species of *Luxiaria* for the fauna of China, to establish two new combinations and four new synonyms, and to provide illustrations of external features and genitalia of Chinese species. This results in six species of

(NSFC-J1210002) and a grant from the Key Laboratory of the Zoological Systematics and Evolution of the Chinese Academy of Sciences (No. O529YX5105).

## References

- Ades, G.W.J. & Kendrick, R.C. (2004) *Hong Kong Fauna: A Checklist of Selected Taxa. 2<sup>nd</sup> Edition*. Fauna Conservation Department, Kadoorie Farm & Botanic Garden Corporation, Hong Kong, 84 pp.
- Bastelberger, S.R. (1909) Beiträge zur Kenntnis der Geometriden-Fauna der Insel Formosa. *Deutsche Entomologische Zeitschrift Iris*, 22, 166–192.
- Butler, A.G. (1878) Descriptions of new species of Heterocera from Japan. Part III. *Geometridae. Annals and Magazine of Natural History*, Series 5, 1, 392–407, 440–452.  
<http://dx.doi.org/10.1080/00222937808682362>
- Comstock, J.H. (1918) *The Wings of Insects*. Comstock Publishing Company, Ithaca, New York, 430 pp.
- Debauche, H. (1941) Geometridae de Celebes (Lepidoptera Heterocera). *Mémoires du Musée Royal d'Histoire Naturelle de Belgique*, Series 2, 22, 1–46.
- Fang, Z.G. & Wu, H. (2001) *A checklist of Insects from Zhejiang*. China Forestry Publishing House, Beijing, 452 pp.
- Felder, R. & Rogenhofer, A.F. (1875) Lepidoptera. Heft V. Atlas der Heterocera, Geometridae Pterophorida. *Reise der österreichischen Fregatte Novara um die Erde*, Zoologischer Theil, 2 (2. Abt), pls. 121–140.
- Fletcher, D.S. (1979) Geometroidea. In: Nye, I.W.B. (Ed.), *The generic names of moths of the World*, 3, pp. 1–243, 18 figs.
- Hampson, G.F. (1895) *The Fauna of British India including Ceylon and Burma (Moths). Vol. 3*. Taylor and Francis, London, xxviii + 546 pp.
- Han, H.X. & Xue, D.Y. (2002) Lepidoptera: Geometridae. In: Huang, F.S. (Ed.), *Forest insects of Hainan*. Science Press, Beijing, pp. 543–561.
- Han, H.X. & Xue, D.Y. (2004) Lepidoptera: Geometridae. In: Yang, X.K. (Ed.), *Insects from Mt. Shiwandashan Area of Guangxi*. China Forestry Publishing House, Beijing, pp. 467–482.
- Hausmann, A. (2001) Introduction. Archiearinae, Orthostixinae, Desmobathrinae, Alsophilinae, Geometrinae. In: Hausmann, A. (Ed.), *The Geometrid Moths of Europe. Vol. 1*. Apollo Books, Stenstrup, pp. 1–282.
- Holloway, J.D. (1976) *Moths of Borneo with special reference to Mount Kinabalu*. Malayan Nature Society, Kuala Lumpur, 264 pp.
- Holloway, J.D. (1994) The Moths of Borneo: Family Geometridae, Subfamily Ennominae. *Malayan Nature Journal*, 47, 1–309.
- Inoue, H. (1978) New and unrecorded species of the Geometridae from Taiwan with some synonymic notes (Lepidoptera). *Bulletin of Faculty of Domestic Sciences, Otsuma Woman's University*, 14, 203–254, 129 figs.
- International Commission on Zoological Nomenclature (1999) *International Code of Zoological Nomenclature. 4<sup>th</sup> Edition*. The International Trust for Zoological Nomenclature, 306 pp.
- Klots, A.B. (1970) Lepidoptera. In: Tuxen, S.L. (Ed.), *Taxonomist's Glossary of Genitalia in Insects*. Munksgaard, Copenhagen, pp. 115–130.
- Leech, J.H. (1897) On Lepidoptera Heterocera from China, Japan, and Corea. *Annals and Magazine of Natural History*, Series 6, 19, 180–235, 297–349, 414–463, 543–573, 640–679, pls 6, 7.
- Meyrick, E. (1886) Descriptions of Lepidoptera from the South Pacific. *Transactions of the Royal Entomological Society of London*, 1886, 189–296.  
<http://dx.doi.org/10.1111/j.1365-2311.1886.tb01626.x>
- Moore, F. (1868) On the Lepidopterous Insects of Bengal. *Proceedings of the Zoological Society of London*, 1867 (3), 612–686, pls 32–33.
- Moore, F. (1888) Heterocera (continued). In: Hewitson, W.C. & Moore, F. (Eds.), *Descriptions of new India Lepidopterous Insects from the Collections of the late Mr. W. S. Atkinson*. Part 3. Asiatic Society of Bengal, Calcutta, pp. 199–299, pls. 7–8.
- Nichols, S.W. (1989) *The Torre-Bueno Glossary of Entomology*. New York Entomological Society in cooperation with the American Museum of Natural History, New York, xvii + 840 pp.
- Pagenstecher, A. (1888) Beiträge zur Lepidopterenfauna des Malayinschen Archipels. V. Verzeichniss der Schmetterlinge von Amboina. *Jahrbücher des Nassauischen Vereins für Naturkunde*, 41, 85–217.
- Parsons, M.S., Scoble, M.J., Honey, M.R., Pitkin, L.M. & Pitkin, B.R. (1999) The catalogue. In: Scoble, M.J. (Ed.), *Geometrid Moths of the World: A Catalogue (Lepidoptera, Geometridae). Vol. 1. & 2*. CSIRO Publishing, Collingwood, Australia; Stenstrup, Denmark, pp. 1–1016. (+ 129 pp. of Index).
- Pierce, N. (1914) *The Genitalia of the Group Geometridae of the British Islands*. E.W. Classey Ltd., Middlesex, xxix + 88 pp., 48 pls. [reprint 1976]
- Prout, L.B. (1925) Geometrid descriptions and notes. *Novitates Zoologicae*, 32, 31–69.
- Prout, L.B. (1915 [1912–1916]) The Palaearctic Geometrae. In: Seitz A. (Ed.), *The Macrolepidoptera of the World. Vol. 4*. Verlag A Kernen, Stuttgart, pp. 1–479, pp. 1–25.

- Prout, L.B. (1932) On the Geometridae of Mount Kinabalu. *Journal of the Federated Malay States Museums*, 17 (1), 39–111.
- Sato, R. & Fan, X.L. (2011) Geometridae (2). In: Wang, M. & Kishida, Y. (Eds.), *Moths of Guangdong Nanling National Nature Reserve*. Goecke & Evers, Keltern, Germany, pp. 72–124.
- Scoble, M.J. (1992) *The Lepidoptera, Form, Function and Diversity*. Oxford University Press, Oxford, xi + 404 pp.
- Snellen, P.C.T. (1877) Lepidoptera op Sumatra verzameld, voornamelijk in Atchin, door J.J. Korndörffer, Kapitein 1ste Klasse, oud-Kommandant van het detachment mariniers in Atchin, met beschrijving van eeniger nieuwe soorten. *Tijdschrift voor Entomologie*, 20 (2), 65–79.
- Swinhoe, C. (1894) A list of the Lepidoptera of the Khasia Hills. Part II. *Transactions of The Royal Entomological Society of London*, 42 (1), 145–223.  
<http://dx.doi.org/10.1111/j.1365-2311.1894.tb02349.x>
- Swinhoe, C. (1900) New species of Eastern and Australian moths. *Annals and Magazine of Natural History*, Series 7, 6 (33), 305–313.  
<http://dx.doi.org/10.1080/00222930008678380>
- Turner, A.J. (1919) Revision of the Australian Lepidoptera, part vi (continued). *Proceedings of the Linnean Society of New South Wales*, 44, 258–310, 383–413.
- Turner, A.J. (1947) New Australian species of Boarmiidae (Lepidoptera). *Proceedings of the Royal Society of Queensland*, 58, 71–112.
- Walker, F. (1860–1861) *List of Specimens of Lepidopterous Insects in the Collection of the British Museum*. Printed by order of the Trustees, London, 1533 pp. [pt. 20, pp. 1–276; pt 23, pp. 757–1020]
- Wang, H.Y. (1998) *Geometer Moths of Taiwan. Vol. 2*. Taiwan Museum, Taipei, 399 pp.
- Warren, W. (1894) New genera and species of Geometridae. *Novitates Zoologicae*, 1, 366–466.
- Warren, W. (1895) New species and genera of Geometridae in the Tring Museum. *Novitates Zoologicae*, 2, 82–159.
- Warren, W. (1896) New Geometridae in the Tring Museum. *Novitates Zoologicae*, 3, 99–148.
- Warren, W. (1899) New species and genera of the families Drepanulidae, Thyrididae, Uraniidae, Epiplemidae, and Geometridae from the Old-World Regions. *Novitates Zoologicae*, 6, 1–66.
- Wehrli, E. (1925) Neue und wenig bekannte palaarktische und sudchinesische Geometriden-Arten und Formen. iii. *Mitteilungen der Münchner Entomologischen Gesellschaft*, 15 (1–5), 48–60.
- Wehrli, E. (1940 [1938–1954]) Subfamilie: Geometrinae. In: Seitz, A. (Ed.), *Die Grossschmetterlinge der Erde. Vol. 4 (Supplement)*. Verlag A Kernen, Stuttgart, pp. 254–766, taf. 19–53.
- Wileman, A.E. (1916) New species of Geometridae from Formosa. (Continuation.). *Entomologist*, 49, 34–37.
- Xue, D.Y. (1992a) Lepidoptera: Geometridae. In: Liu, Y.Q. (Ed.), *Iconography of Forest Insects in Hunan China*. Hunan Science and Technology Publishing House, Changsha, pp. 807–904.
- Xue, D.Y. (1992b) Lepidoptera: Geometridae. In: Huang, F.S. (Ed.), *Insects of Wuling Mountains area, Southwestern China*. Science Press, Beijing, pp. 463–477.
- Xue, D.Y. (1993) Lepidoptera: Geometridae. In: Huang C.M. (Ed.), *Animals of Longqi Mountain*. China Forestry Publishing House, Beijing, pp. 556–583.
- Xue, D.Y. & Han, H.X. (2005) Lepidoptera: Geometridae. In: Yang X.K. (Ed.), *Insect fauna of Middle-West Qinling Range and South Mountains of Gansu Province*, Science Press, Beijing, pp. 588–627.
- Yazaki, K. (1994) Geometridae. In: Haruta, T. (Ed.), *Moths of Nepal. Part 3. Tinea*, 14 (Supplement 1), pp. 5–40, figs. 331–383, pls. 66–72.
- Zhu, H.F. & Xue, D.Y. (1992) Lepidoptera: Geometridae. In: Cheng, S.X. (Ed.), *Insects of the Hengduan Mountains Region. Vol. 2*. Science Press, Beijing, pp. 927–948.