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ORIGINAL ARTICLE

Two new species of the genus *Tylostega* Meyrick, 1894 (Lepidoptera: Crambidae) from China, with a list of all the known species in the world

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Abstract The genus *Tylostega* Meyrick, 1894 from China is studied here. Two new species are described: *T. longicornuta* **sp. nov.** and *T. vittiformis* **sp. nov.**; the female of *T. serrata* Du & Li, 2008 is reported for the first time. A key to *Tylostega* species in China and a checklist of all the known species in the world are given. Photographs of adults and genitalia of the new species are provided.

Key words Microlepidoptera, Pyraloidea, Spilomelinae, taxonomy.

1 Introduction

The genus *Tylostega* was established by Meyrick with *T. chrysanthes* Meyrick as the type species. It currently consists of nine species worldwide, distributed in the Oriental and Palaearctic Regions. This genus is diagnostic by the antenna in male ciliate ventrally, and the labial palp with the third segment exposed; the forewing with a diffused fuscous or blackish brown patch at base, in male having a depression in the cell with a flat scale tuft on dorsal surface and dense scale-like pecten on ventral surface, and in female having an orbicular stigma in the cell; the uncus triangular, the valva with a projection medially and the juxta often protruding lateromedially or posterolaterally in the male genitalia; and the corpus bursae without a signum in the female genitalia.

Figures 1–2. *Tylostega* spp., adult. 1. *T. longicornuta* **sp. nov.**, male, holotype. 2. *T. vittiformis* **sp. nov.**, male, holotype. Scale bars = 2.5 mm.

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The aim of the present paper is to describe two new *Tylostega* species, firstly report the female of *T. serrata* Du & Li, 2008, and to provide a checklist of all described *Tylostega* species.

2 Materials and methods

Specimens used in this study were collected by light-trapping from Mainland China. Adults were examined with an Olympus SZ11 stereomicroscope. Images of adults were taken by using a Leica M205A stereomicroscope, and genitalia were captured by using a Leica DM750 microscope. Dissection and slide mounting of genitalia followed the methods introduced by Li (2002).

All the studied specimens are deposited in the Insect Collection of Nankai University, Tianjin, China (NKU).

3 Taxonomy

Genus *Tylostega* Meyrick, 1894

Tylostega Meyrick, 1894. Type species: *Tylostega chrysanthes* Meyrick, 1894, by original designation.

Key to Chinese species of *Tylostega* based on male genitalia.

1. Posterior margin of juxta concave, protruding posterolaterally 2
   Posterior margin of juxta not concave 4
2. Phallus with two cornuti (Du & Li, 2008: fig. 12) ..... ***T. serrata***
   Phallus with three cornuti 3
3. Phallus with two short and one longer spine-like cornuti (Du & Li, 2008: fig. 8) ..... ***T. tylostegalis***
   Phallus with two Y-shaped and one spine-like cornuti (Fig. 5) ..... ***T. vittiformis* sp. nov.**
4. Juxta with strong hornlike or fingerlike process 5
   Juxta without above mentioned process (Fig. 3) ..... ***T. longicornuta* sp. nov.**
5. Juxta with strong hornlike process lateromedially (Du & Li, 2008: fig. 10) ..... ***T. luniformis***
   Juxta with strong fingerlike process posterolaterally, phallus with two spine-like cornuti 6
6. Phallus with one more pectinate cornutus (Du & Li, 2008: fig. 9) ..... ***T. pectinata***
   Phallus with one more broadly boardlike cornuti (Du & Li, 2008: fig. 11) ..... ***T. lata***

***Tylostega longicornuta* sp. nov.** (Figs 1, 3–4)

Diagnosis. This species is similar to *T. tylostegalis* Du & Li, 2008 superficially, but it can be separated by the valva with a sub-rectangular projection medially and the dorsal margin of the sacculus without denticles; in *T. tylostegalis*, the valva has a small triangular projection medially and the dorsal margin of the sacculus bears denticles (Du & Li, 2008: fig. 8). This species is also similar to *T. serrata* Du & Li, 2008 in the shape of the valva, but it can be separated by the phallus with one cornutus and the hindwing with a black spot at apex and at distal 1/3 of dorsum respectively; in *T. serrata,* the phallus has two cornuti, and the hindwing lacks a black spot at apex and dorsum (Du & Li, 2008: fig. 12).

Description. Adult (Fig. 1) wingspan 18.0–20.0 mm. Head yellowish brown. Antenna yellow or yellowish white, male ventral cilia approximately as long as diameter of flagellomere. Labial palp with 1st segment yellowish white; 2nd segment with basal 2/3 yellowish white except fuscous on dorsal surface, distal 1/3 fuscous; 3rd segment fuscous. Maxillary palp with basal half yellowish white, distal half fuscous. Proboscis with scales at base yellowish white. Patagium, tegula and thorax yellow mixed with fuscous. Forewing ground color yellow, with diffused blackish brown scales, with blackish brown patch at base; antemedial line black, extending from basal 1/4 of costa excurved to middle of lower margin of cell, then incurved to basal 1/3 of dorsum; depression before discoidal stigma, covered with a small yellow flat scale-tuft mixed with black and gray on dorsal surface, with dense grey and black scale-like pecten on ventral surface in male; orbicular stigma in female black, at distal 1/3; discoidal stigma blackish brown; postmedial line black, extending from distal 1/3 of costa oblique outward to near middle of R_{3+4}, then oblique inward to near middle of M_2, thereafter arched outward to basal 1/3 of CuA_2, finally extending to distal 1/3 of dorsum; terminal domain blackish brown; black spots along terminal margin; cilia yellowish brown, slightly darker at base. Hindwing yellow, blackish brown at apex, with a black spot at base; discoidal stigma black; postmedial line black, extending from distal 1/3 of costa oblique inward to middle of M_2, thereafter arched inward to near

basal 1/3 of CuA_2, finally excurved to above 1/3 of dorsum, connecting with black spot at distal 1/3 of dorsum; black spots along terminal margin; cilia yellowish brown, slightly darker at base. Abdomen yellow mixed with brown and blackish brown scales. Legs yellowish white except black at apices of femora, tibiae and each tarsomere.

Male genitalia (Fig. 3). Uncus gradually narrowed from base to rounded apex, with height greater than basal width, setose along lateral margin of distal 4/5 and on dorsal surface of distal 1/5. Valva subparallel from base to basal 3/5, narrowed from basal 3/5 to rounded apex; median projection sub-rectangular, bearing dense denticles anteriorly, bifurcate distally; costa band-like, uniform from base to basal 3/4, gradually narrowed from distal 1/4 to apex, terminating before apex; sacculus concave at basal 1/4 dorsally, arched medially, slightly concave at distal 2/5, gradually narrowed from distal 1/4 to apex, terminating at distal 2/5 of valva on ventral margin. Saccus triangular. Juxta sub-trapezoidal, arched outward. Phallus about 4/5 length of valva, with one long, curved spine-like cornutus, slightly shorter than phallus.

Female genitalia (Fig. 4). Apophyses anteriores approximately 2 times length of apophyses posteriores. Lamella antevaginalis U-shaped, posterior margin concave deeply to above anterior margin, anterior margin obtuse. Ductus burse curved outward at basal 1/3, distal half with small granules forming a longitudinal stripe. Corpus bursae oblong, widened anteriorly, not well divided from ductus bursae.

Type material. CHINA, Hainan: Holotype, ♂, Jianfengling (18.75°N, 108.87°E; elev. 810 m), Ledong County, 14 June 2018, leg. Ping Liu, Xia Bai & Shuai Yu, slide No. LP18045. Paratypes. 1♂1♀, 11 August 2017, leg. Xia Bai, Ping Liu & Shuai Yu, slide No. LP17934, same locality as holotype; 2♂, Mingfenggu, Jianfengling, 8–9 August 2017, others same as holotype; 1♂, Tianchi, Jianfengling, 9 March 2016, leg. Qingyun Wang, Suran Li & Shengnan Zhao; 1♀, Tianchi, Jianfengling, 7 August 2016, leg. Xia Bai, Shuonan Qian & Wanding Qi, slide No. LP18008; 1♂, Tianchi, Jianfengling, 17 July 2015, leg. Qingyun Wang, Suran Li & Mengting Chen; 1♂1♀, Tianchi, Jianfengling, 15 Januarry 2016, leg. Kaijian Teng, Xia Bai & Mengting Chen; 1♂, Jianfengling, 27 April 2014, leg. Tengteng Liu, Wei Guan & Xuemei Hu; 3♀, Mt. Limu, 25 July 2014, leg. Peixin Cong, Linjie Liu & Sha Hu; 3♂, Mt. Limu, 5 Januarry 2016, leg. Kaijian Teng, Xia Bai & Mengting Chen, slide Nos. LP17930, L917931; 1♀, Bawangling, 23 April 2009, leg. Qing Jin; 1♀, Bawangling, 6 April 2008, leg. Bingbing Hu & Haiyan Bai; 1♀, Nankai Town, Yinggeling, 16 August 2016, leg. Xia Bai, Shuonan Qian & Wanding Qi; 1♀, Hongkan, Yinggeling, 14 March 2016, leg. Qingyun Wang, Suran Li & Shengnan Zhao; 1♀, Hongxin Village, Yuanmen Township, Baisha, 18 April 2014, leg. Tengteng Liu, Wei Guan & Xuemei Hu, slide No. LP17935; 1♂, Beida Town, Jianling Village, Wanning, 28 July 2008, leg. Bingbing Hu & Li Zhang, slide No. LP17932; 1♂3♀, Mt. Wuzhi, 23–28 July 2016, leg. Xia Bai, Shuonan Qian & Wanding Qi, slide Nos. LP17933♂, LP18044♀; 1♀, Mt. Wuzhi, 6 July 2014, leg. Peixin Cong, Linjie Liu & Sha Hu; 1♀, Shuiman Town, Mt. Wuzhi, 2 August 2016, leg. Xia Bai, Shuonan Qian & Wanding Qi; 1♂, Chongtoumen, Shuiman Town, Mt. Wuzhi, 30 July 2013, leg. Haili Yu & Kaili Liu, slide No. LP18041.

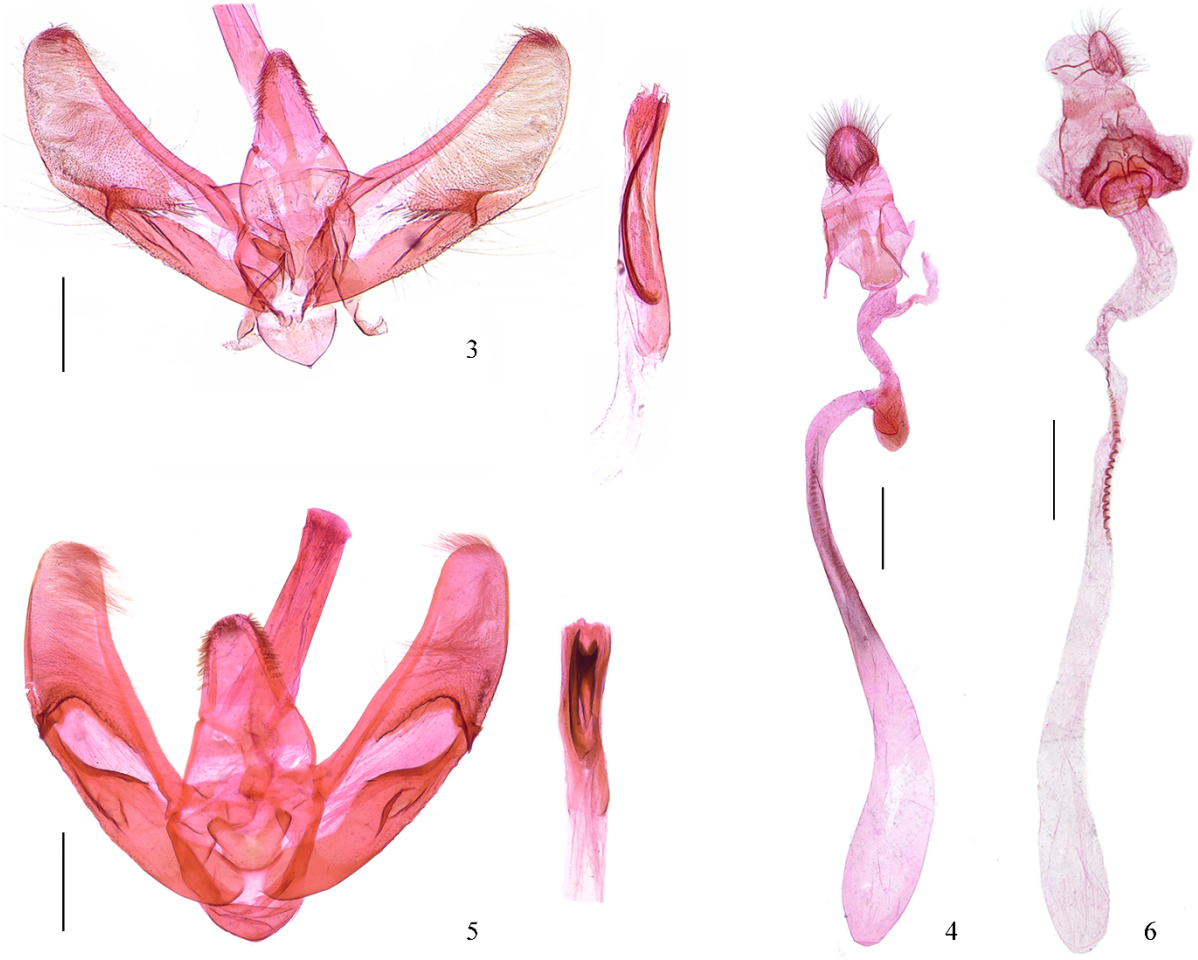
Distribution. China (Hainan).

Etymology. The specific name is derived from the Latin *longi-* and *cornutus*, referring to the rather long cornutus of phallus in male genitalia.

***Tylostega vittiformis* sp. nov.** (Figs 2, 5)

Diagnosis. This species is characterized by the wings with obviously diffused blackish brown scales. It is similar to *T. tylostegalis* (Hampson, 1900) in the male genitalia, but it can be separated by the valva with a curved, bandlike median projection, the phallus with one spine-like and two Y-shaped cornuti, and the dorsal margin of the sacculus without denticles. In *T. tylostegalis*, the valva has a small triangular median projection, the phallus has two shorter and one longer spine-like cornuti, and the dorsal margin of the sacculus bears denticles (Du & Li, 2008: fig. 8).

Description. Adult (Fig. 2) wingspan 20.0 mm. Head yellowish white. Antenna yellowish brown, male antenna with ventral cilia shorter than diameter of flagellomere. Labial palp with 1st and 2nd segments yellowish white except 2nd segment with distal 2/5 and dorsal surface fuscous; 3rd segment yellowish brown. Maxillary palp yellowish brown, tipped with fuscous. Proboscis with yellowish brown scales at base. Patagium, tegula and thorax yellow, mixed with blackish brown scales. Forewing ground color yellow, with diffused blackish brown scales, with blackish brown spots at base; antemedial line blackish brown, extending from basal 1/4 of costa to middle of upper margin of cell, then excurved to basal 1/3 of dorsum; depression before discoidal stigma, covered with a small yellow flat scale-tuft mixed with black on dorsal surface, with dense yellowish white mixed with brown scale-like pecten on ventral surface in male; discoidal stigma blackish brown, bar-like; postmedial line blackish brown, extending from distal 1/3 of costa to M_2, thereafter arched outward to near base of CuA_2, finally excurved to distal 1/3 of dorsum; terminal domain blackish brown; black spots along terminal margin; cilia yellowish brown. Hindwing yellow with diffused blackish brown scales; discoidal stigma blackish brown; black spots along terminal margin; cilia yellowish brown. Legs yellowish white, black at apices of each tarsomere and of all tibiae, and on outer surface of basal 1/3 of middle tibia.



Figures 3–6. *Tylostega* spp., genitalia. 3. *T. longicornuta* **sp. nov.**, male genitalia, holotype, slide No. LP18045. 4. Ditto, female genitalia, paratype, slide No. LP18044. 5. *T. vittiformis* **sp. nov.**, male genitalia, slide No. LP18007. 6. *T. serrata* Du & Li, 2008, female genitalia, slide No. LP17985. Scale bars: 3, 5 = 0.5 mm; 4, 6 = 1.0 mm.

Male genitalia (Fig. 5). Uncus slightly narrowed from broad base to rounded apex, with height greater than basal width slightly, setose along lateral margin of distal 2/3 and distally. Valva subparallel from base to basal 2/3, gradually narrowed from distal 1/3 to rounded apex; median projection bandlike, curved outward, bifurcate distally; costa gradually narrowed from base to before apex; sacculus concave at basal 1/3 on dorsal margin, arched in middle, subparalle from distal 1/3 to apex, terminating beyond ventral half of valva. Saccus sub-semicircular, obtusely rounded on anterior margin. Juxta heart-shaped, rounded on anterior margin, concave on posterior margin, produced posterolaterally. Phallus about half length of valva, with one spine-like and two Y-shaped cornuti.

Female. Unknown.

Type material. CHINA, Yunnan: Holotype ♂, Yexianggu (22.17°N, 100.87°E; elev. 762 m), Xishuangbanna, 17 July 2014, leg. Kaijian Teng, Wei Guan, Xiuchun Wang & Shurong Liu, slide No. LP18007. Paratype. 1♂, Lvshilin, Xishuangbanna Nature Reserves, 21 May 2015, leg. Zhenguo Zhang, slide No. LP18033.

Distribution. China (Yunnan).

Etymology. The specific name is derived from the Latin *vittiformis*, referring to the bandlike median projection of the valva.

***Tylostega serrata* Du & Li, 2008** (Fig. 6)

Tylostega serrata Du & Li, 2008, *Zootaxa*, 1681: 60. TL: China (Henan). TD: NKU.

Diagnosis. This species is similar to *T. tylostegalis* (Hampson, 1900) externally, but can be separated in the male genitalia by the valva with one large elliptical projection medially, the dorsal margin of the sacculus not having denticles but

inflated triangularly at middle, and the phallus with two cornuti; in the female genitalia by the presence of the lamella postvaginalis. In *T. tylostegalis* the valva has a small triangular projection medially, the dorsal margin of the sacculus bears denticles but not inflated triangularly at middle, and the phallus has three cornuti; and the lamella postvaginalis is absent (Du & Li, 2008: fig. 8).

Description. Adult wingspan 18.0–24.0 mm.

Female genitalia (Fig. 6). Apophyses anteriores about 2 times length of apophyses posteriores. Ostium bursae sclerotized peripherally. Lamella postvaginalis large, trapezoidal, with fine spines posteriorly and laterally; lamella antevaginalis being two triangular lobes, rounded posteriorly, sclerotized along edges. Ductus burse with a narrow longitudinal coiled stripe of small granules. Corpus bursae elongate, slightly broader than ductus bursae, slightly broadened anteriorly, not distinctly separated from ductus bursae.

Material examined. CHINA, Guangxi: 1♂, Hekou Protection Station, Mt. Dayao, Jinxiu County, 18 July 2015, leg. Mujie Qi & Shengnan Zhao, slide No. LP17983; 2♂, Mt. Daming, 5–6 August 2011, leg. Shulian Hao & Yinghui Sun, slide Nos. LP18507, LP18508; 1♂1♀, Mt. Daming, 20–25 May 2011, leg. Linlin Yang & Yinghui Mou, slide Nos. LP18037♀, LP18038♂; Guizhou: 3♂, Heiwan River, Mt. Fanjing, 17–18 July 2018, leg. Meiling Zheng, Jiaqi Deng & Xiaoju Zhu, slide No. LP17970; Yunnan: 1♂, Bingzhongluo Town, Gongshan County, Nujiang, 16 June 2017, leg. Kaijian Teng *et al*., slide No. LP17991; 1♂, Xiajinchang, Malipo County, Wenshan City, 29 July 2016, leg. Kaijian Teng, Jiaen Li & Tao Wang, slide No. LP18031; 1♀, Mojiang, Puer City, 20 October 2010, leg. Bingbing Hu, Jing Zhang & Yanpeng Cai, slide No. LP17985; 1♂, Taiyanghe Nature Reserves, Puer City, 14 August 2016, leg. Kaijian Teng, Jiaen Li & Tao Wang, slide No. LP18015; Zhejiang: 2♂, Laofoyan Village, Shuangxikou Town, Jiangshan City, 7 August 2016, leg. Qingyun Wang, Meiqing Yang & Ping Liu, slide No. LP17975.

Distribution. China (Gansu, Guangxi, Guizhou, Henan, Yunnan, Zhejiang).

Remarks. The female of *Tylostega serrata* Du & Li, 2008 is reported for the first time here.

Checklist of *Tylostega* Meyrick, 1894

Tylostega chrysanthes Meyrick, 1894
Tylostega chrysanthes Meyrick, 1894: 458. TL: Borneo.

Distribution. Borneo.

Tylostega lata Du & Li, 2008
Tylostega lata Du & Li, 2008: 58. TL: China (Xizang). TD: NKU.

Distribution. China (Xizang, Zhejiang).

Tylostega longicornuta Liu & Wang, **sp. nov.**

Distribution. China (Hainan).

Tylostega luniformis Du & Li, 2008
Tylostega luniformis Du & Li, 2008: 56. TL: China (Sichuan). TD: NKU.

Distribution. China (Sichuan, Yunnan, Xizang).

Tylostega mesodora Meyrick, 1894
Tylostega mesodora Meyrick, 1894: 458. TL: Borneo.

Distribution. Borneo.

Tylostega pectinata Du & Li, 2008
Tylostega pectinata Du & Li, 2008: 53. TL: China (Shanxi). TD: NKU.

Distribution. China (Anhui, Chongqing, Fujian, Gansu, Guangxi, Guizhou, Henan, Hubei, Shanxi, Sichuan, Yunnan, Zhejiang).

Tylostega photias Meyrick, 1894
Tylostega photias Meyrick, 1894: 458. TL: Borneo.
Nacoleia photias (Meyrick): Hampson, 1898: 696.
Pelena photias (Meyrick): Shibuya, 1928: 158.

Distribution. China (Taiwan), Borneo, India.

Tylostega serrata Du & Li, 2008
Tylostega serrata Du & Li, 2008: 60. TL: China (Henan). TD: NKU.

Distribution. China (Gansu, Guangxi, Henan).

Tylostega tylostegalis (Hampson, 1900)
Entephria tylostegalis Hampson, 1900: 385. TL: Russia (Amur), West China.
Pycnarmon tylostegalis: Caradja, 1925: 337.
Tylostega tylostegalis (Hampson): Yamanaka & Yoshiyasu, 1992: 83.

Distribution. China (Beijing, Fujian, Guangdong, Guizhou, Hebei, Heilongjiang, Henan, Jiangsu, Jiangxi, Liaoning, Shaanxi, Sichuan, Zhejiang, Taiwan), Korea, Japan, Russia (Amur).

Tylostega valvata Warren, 1896
Tylostega valvata Warren, 1896: 104. TL: India.

Distribution. India.

Tylostega vittiformis Liu & Wang, **sp. nov.**
Distribution. China (Yunnan).

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