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ORIGINAL ARTICLE

Taxonomic review on Acrocercopinae, Gracillariinae and Ornixolinae from Shandong, China, with new data on distribution and host associations (Lepidoptera: Gracillariidae)

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Abstract Thirteen species of Gracillariidae, belonging to three subfamilies, Acrocercopinae, Gracillariinae and Ornixolinae, are reviewed from Shandong, China. Three species are recorded from China for the first time: *Calybites securinella* (Ermolaev, 1986), *Eteoryctis picrasmae* Kumata & Kuroko, 1988, and *Spulerina parthenocissi* Kumata & Kuroko, 1988. All species are described in detail except *Liocrobyla indigofera* Liu, Wang & Wang, 2018, with the illustrations of adults, male and female genitalia.

Key words Host plants, new record, China, microlepidoptera.

1 Introduction

The family Gracillariidae is the major group of leaf-mining moths, although it is various in feeding types, such as fruit-feeding (*Epicephala* Meyrick, 1880; Li *et al*., 2015), leaf-rolling (*Caloptilia* Hübner, 1825; Kumata, 1982), flower-feeding, stem mining and galling (Kawahara *et al*., 2017). Larvae of Gracillariidae feed on plants of various families (de Prins & de Prins, 2020), some of which are of particularly economic importance (Liu *et al*., 2018a).

Through a continuing investigation on leaf-mining moths in Shandong Peninsula since 2015, several new leaf-mining species from different families were described, such as *Antispila sinensis* Liu & Wang, 2017 and *A. kunyuensis* Liu, 2018 from Heliozelidae (Liu & Wang, 2017; Wang *et al*., 2018), *Bucculatrix crataega* Liu, 2019 (Liu & Wang, 2019) from Bucculatricidae, and *Atemelia fusca* Liu, 2017 from Praydidae (Liu & Yan, 2017). However, the largest leaf-mining group, Gracillariidae, was seldom reported except Liu *et al*. (2018b).

The family Gracillariidae was once divided into eight subfamilies base on molecular work (Kawahara *et al*., 2017), then reduced to five by de Prins *et al*. (2019). The present paper is to review the 13 leaf-mining species in Shandong Province belonging to three subfamilies of Gracillariidae, Gracillariinae, Acrocercopinae and Ornixolinae, and provide new data on their host plants and distributions.

2 Materials and methods

The collected leaves with active mines were placed in small plastic bags for rearing. Vacant leaf mines were dried in a

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plant press. The adult specimens and corresponding leaf-mines were identically coded. A few specimens were collected by light trap. Genitalia and wings were dissected and mounted according to Li (2002), but stained with Eosin Y and/or Chlorazol Black. Illustrations were prepared by using a Leica DM1000 microscope. Adult photographs were taken with a Leica M165C stereo microscope.

Systematics and nomenclature of moths follows de Prins & de Prins (2020). Classification of the host plant is based on APG (2016), and plant scientific names follow The Plant List web server (The Plant List, 2013). All the specimens are deposited in the Zoological Collection of Shandong Normal University (SDNU).

Abbreviations used in the maintext are as following:
BMNH—The Natural History Museum, London, United Kingdom;
HUJ—Hokkaido University Insect Collection, Japan;
ELKU—Entomological Laboratory, Kyushu University, Japan;
NKU—Insect Collection, Nankai University, Tianjin, China;
SDNU—Zoological Collection, Shandong Normal University, China;
TD—Type depository;
TL—Type locality;
ZIN—Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia.

3 Taxonomy

3.1 Subfamily Gracillariinae

***Calybites* Hübner, 1822**
Calybites Hübner, 1822: 66. Type species: *Tinea phasianipennella* Hübner, 1813, by subsequent designation by Bradley, 1967.

***Calybites phasianipennella* (Hübner, 1813)** (Figs 1A, 3A, 5A)
Tinea phasianipnnella Hübner, 1810−13: pl. 47, f. 321. TL: India. TD: BMNH (Lectotype).
Gracilaria quadruplella Zeller, 1839: 209. TL: Czech Republic. TD: not stated.
Gracilaria isograpta Meyrick, 1928: 410.
Euspilapteryx phasianipennella (Hübner): Miyazaki, 1979: 128.
Calybites phasianipnnella (Hübner): Kumata, 1982: 121; Kuznetzov & Baryshnikova, 1998: 18.

Diagnosis. This species resembles *C. securinella* (Ermolaev, 1986) on the forewing pattern, but can be distinguished from the latter by the dark brown forewing ground color and the yellow spots, and by the phallus 2.5 times as long as valva in the male genitalia. In *C. securinella*, the ground color of the forewing is pale brown and the patterns are white, and the phallus is as long as the valva.

Description. Adult. Wingspan 7.0−9.5 mm. Face and head grayish white. Base of 2nd and 3rd segments of labial palpus and tip of 3rd segment white, sometimes inner side of 2nd segment almost white in a whole. Scape dark gray, flagellum brown with dense white ring. Basal part of fore coxa light yellow, 2nd and 5th segments of fore tarsus white, and sometimes end of 2nd segment slightly brown; basal half of 1st, 3rd and 4th segments of middle tarsus white, 2nd and 5th segments white with tips slightly brown; hind coxa and femur with light yellow scales, hind tarsus white basally, 2nd, 3rd and 4th segments white at large. Forewing dark brown, slightly glossy; four light yellow spots edged black scales on costal 1/3 and 2/3, on base and middle of dorsum; sometimes an indistinct dark brown vertical pattern near apex; cilia brown, with 2 or 3 dark brown lines. Hindwing and cilia gray.

Male genitalia. Tegumen densely covered with fine setae at end. Valva strongly dilated apically, shallowly concave on terminal margin, sacculus straight; a row of setae extending from base of valva to middle of sacculus. Vinculum large, sclerotized, slightly shorter than valva. Saccus thin and short. Phallus thin and straight, about 2.5 times as long as valva, pointed apically, with a row of 7–9 cornuti. Two pairs of coremata present, with posterior pair shorter than anterior (not included in the plate).

Female genitalia. Papillae anales broad and steose. Apophyses posteriores a bit shorter than anteriores. Eighth segment reduced. Ostium bursae membranous. Ductus bursae strongly sclerotized and sinuate twice near corpus bursae. Corpus bursae membranous, with a small pointed signum near opening of bursae.

Material examined. Shandong: 3♂1♀, Huimin, Binzhou, 37.725°N, 117.762°E, 10 m, 2016.VIII.05, leaf mines

collected on *Polygonum persicaria* L., leg. Tengteng Liu, genitalia slide nos. JYR17048♀, LIU16011♂, registration nos. SDNU.BZ160801–160804; 3♂5♀, 1 *ex.* without abdomen, Huimin, Binzhou, 37.725°N, 117.762°E, 10 m, 2016.VIII.05−06, leg. Tengteng Liu & Jiaxiang Li, genitalia slide no. JYR17050, registration nos. SDNU.BZ160088, 160013, 160016, 160051, 160083, 160101, 160122, 160196, 160200; 1♂, Mt. Kunyu, Yantai, 37.292°N, 121.740°E, 400 m, 2017.VII.17, leaf mines collected on *Polygonum* sp., leg. Tengteng Liu & Zhenquan Gao, genitalia slide no. LIU0031, registration no. SDNU.YT170707; 1♂, Mt. Laoshan, Qingdao, 36.211°N, 120.593°E, 390 m, 2017.VI.29−VII.07, leg. Tengteng Liu, Zhenquan Gao & Nan Wang, registration no. SDNU.Ent170308.

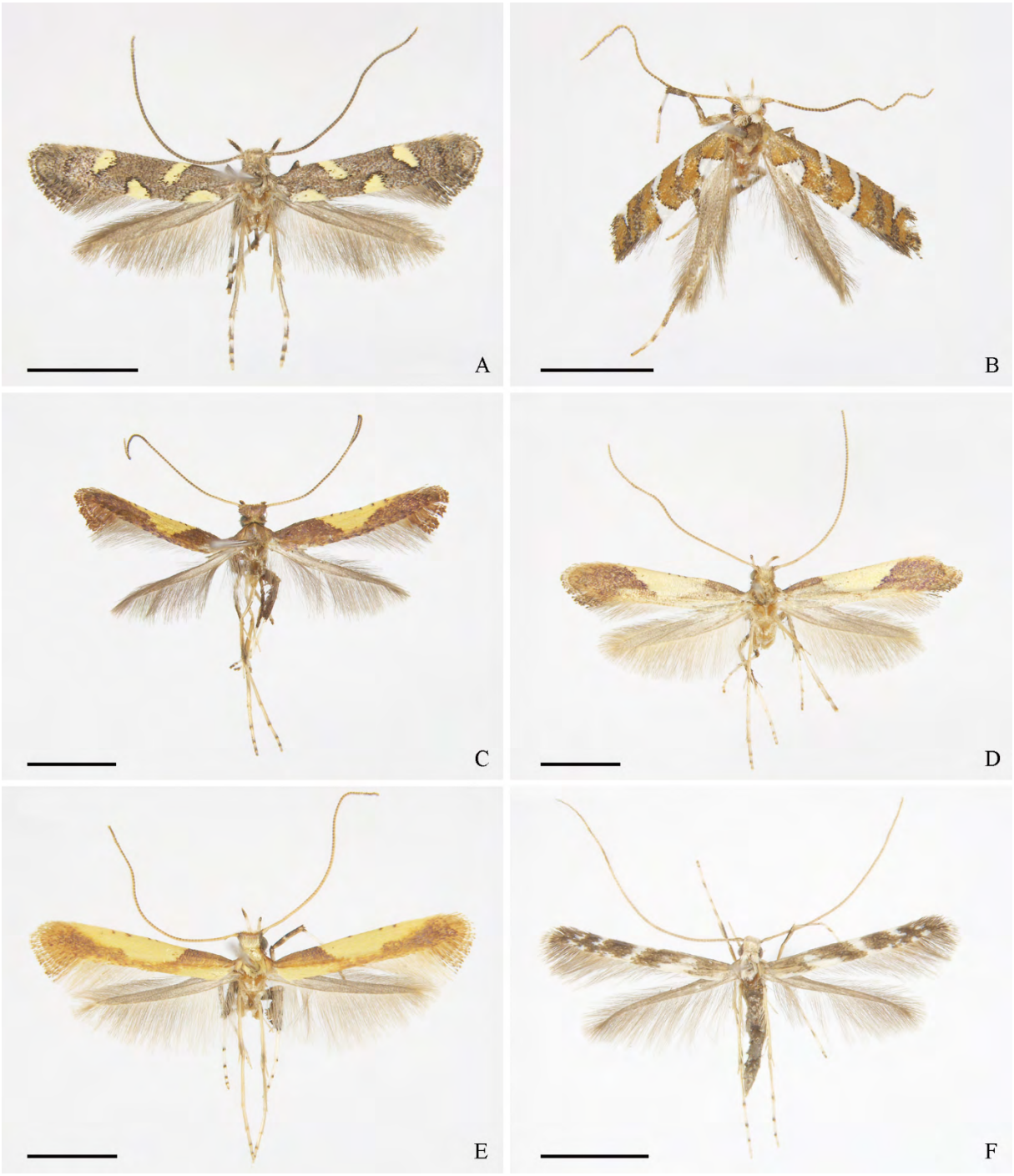

Figure 1. Adult habitus. A. *Calybites phasianipennella*, male, registration no. SDNU.YT170707. B. *Calybites securinella*, male, registration no. SDNU.Ent150632. C. *Caloptilia* (*Caloptilia*) *celtidis*, male, registration no. SDNU.Ent170235. D. *Caloptilia* (*C.*) *chrysolampra*, male, registration no. SDNU.BZ160807. E. *Caloptilia* (*C.*) *sapporella*, male, SDNU.Ent170088. F. *Acrocercops transecta*, male, registration no. SDNU.LS150701. Scale bars = 2.0 mm.

Host plant. *Persicaria maculosa* Gray and *Polygonum* sp. (Polygonaceae) in China. Polygonaceae is the most preferable host family, other host families include Amaranthaceae, Boraginaceae, Clusiaceae, Lythraceae, Poaceae, Polygonaceae, and Primulaceae (de Prins & de Prins, 2020).

Distribution. China (Anhui, Beijing, Fujian, Gansu, Guangdong, Guizhou, Heilongjiang, Henan, Hubei, Hunan, Inner Mongolia, Jilin, Ningxia, Qinghai, Shaanxi, Shanxi, Shandong, Sichuan, Tianjin, Xinjiang, Xizang, Yunnan, Zhejiang, Taiwan). This species is widespread in the Palearctic and Oriental Regions (de Prins & de Prins, 2020).

***Calybites securinella* (Ermolaev, 1986)** (Figs 1B, 3B)

Caloptilia securinella Ermolaev, 1986: 747. TL: Gornotaezhnoe, South Primorye, Russia. TD: ZIN.
Calybites securinella (Ermolaev): Noreika, 1994: 106; Noreika, 1997: 385; de Prins & de Prins, 2005: 136; Kawahara *et al*., 2010: 131.

Diagnosis. This species resembles *C. phasianipennella*, the details see the diagnosis of the latter.

Description. Adult. Wingspan 10.5 mm. Head white and glossy. Face light brown. Maxillary palpus light brown with white tip. Second segment of labial palpus with downward tufted hair, inner side white, outer side brown; middle part of third segment slightly brown. Antennae with scape yellowish white; flagellum light brown, glossy, with black rings. Forewing with ground color pale brown, an outward curved white streak at costal 1/4, about half-wing width in length, with a gray band extending to dorsum; a transverse white fascia in middle of wing, with inner edge concaved and outer edge straight; a triangular white spot about half-wing width near apex, where cilia white on costa, below with a gray band extending to tornus; a gray band between transverse white fascia and triangular spot near apex across forewing and bend outward before dorsum; a large triangular white spot near base of dorsum, about half width of wing, above with a gray band extending to near base of costa; all white patterns edged black scales; a gray spot near apex; cilia gray except on costal spot. Hindwing and cilia gray.

Male genitalia. Tuba analis with a long sclerotized line at middle with expanded base reaching tegumen. Tegumen with several long setae on sides. Valva strongly dilated apically, shallowly concave on terminal margin, costal corner rounded, a small process before end of sacculus. Vinculum + saccus broad triangular. Phallus thin and straight, narrowed distally, as long as valva, without cornutus.

Material examined. Shandong: 1♂, Mt. Laoshan, Qingdao, 36.211°N, 120.593°E, 390 m, 2015.VII.10, leg. Tengteng Liu, genitalia slide no. LIU0036, registration no. SDNU.Ent150632.

Host plant. In Far East of Russia, *Flueggea suffruticosa* (Euphorbiaceae) was reported as host plant (Ermolaev, 1986). In China, no further information was added.

Distribution. China (Shandong), Korea (Kawahara *et al*., 2010), Russian (Far East) (Ermolaev, 1986).

Remarks. This species is recorded in China for the first time.

***Caloptilia* Hübner, 1825**

Caloptilia Hübner, 1825: 427. Type species: *Tinea upupaepennella* Hübner, 1796 [= *Tinea stigmatella* Fabricius, 1781], by subsequent designation by Fletcher, 1929.
Antiolopha Meyrick, 1894: 25. Type species: *Antiolopha hemiconis* Meyrick, 1894, by monotypy.
Calliptilia Agassiz, 1846: 59. An unjustified emendation of *Caloptilia* Hübner, 1825.
Cecidoptilia Kumata, 1982: 117. Type species: *Caloptilia cecidophora* Kumata, 1966, by original designation.
Coriscium Zeller, 1839: 210. Type species: *Coriscium ligustrinellum* Zeller, 1839, by subsequent designation by Fletcher, 1929.
Minyoptilia Kumata, 1982: 111. Type species: *Caloptilia* (*Minyoptilia*) *callicarpae* Kumata, 1982, by original designation.
Ornix Treitschke, 1833: 194. Type species: *Tinea upupaepennella* Hübner, 1796, by subsequent designation by Curtis, 1833.
Ornix Kollar, 1832: 98. Type species: *Tinea upupaepennella* Hübner, 1796, by subsequent designation by Curtis, 1833.
Phylloptilia Kumata, 1982: 89. Type species: *Caloptilia magnoliae* Kumata, 1966, by original designation.
Poeciloptilia Hübner, 1825: 427. Type-species: *Tinea falconipennella* Hübner, 1813, by subsequent designation by Fletcher, 1929.
Rhadinoptilia Kumata, 1982: 105. Type species: *Caloptilia (Rhadinoptilia) camphorae* Kumata, 1982, by original designation.
Sphyrophora Vári, 1961: 26. Type species: *Caloptilia sapina* Vári, 1961, by original designation.
Timodora Meyrick, 1886: 295. Type species: *Timodora chrysochoa* Meyrick, 1886, by monotypy.

***Caloptilia celtidis* Kumata, 1982** (Figs 1C, 3C)

Caloptilia celtidis Kumata, 1982: 76; de Prins & de Prins, 2005: 87; Bai *et al*., 2009: 497. TL: Japan. TD: HUJ.

Diagnosis. This species is closely related to *C. fidella* (Reutti, 1853), a Palearctic species also feeding on plant species of *Celtis*, but differs from the latter by the phallus with about 6−8 cornuti. In *C. fidella*, the phallus has about five cornuti and another series of some ten cornuti on the ductus ejaculatorius.

Description. Adult. Wingspan 10.0 mm. Head brown, purple luster, face bright white. Maxillary palpus yellow, with a black spot on middle of outer side. Labial palpus yellow, with outer side of 2nd segment scattered with black scales, basal half of 3rd segment white and slightly yellowish brown, distal half black. Scape dark brown, flagellum yellowish brown, with black rings. Thorax and tegula dark brown and glossy. Fore and mid legs dark brown, tarsus white and end of each segment brown; mid femur and tibia thick with long scales; hind legs yellowish white, base of coxa and end of femur dark brown, end of tibia gray, outer side of each tarsal segment brown apically. Forewing dark brown with purple luster; a large triangular yellow spot occupying costal 1/4 to 4/5, extending to 3/4 width of wing, with 6–9 dark brown dots on costa; cilia

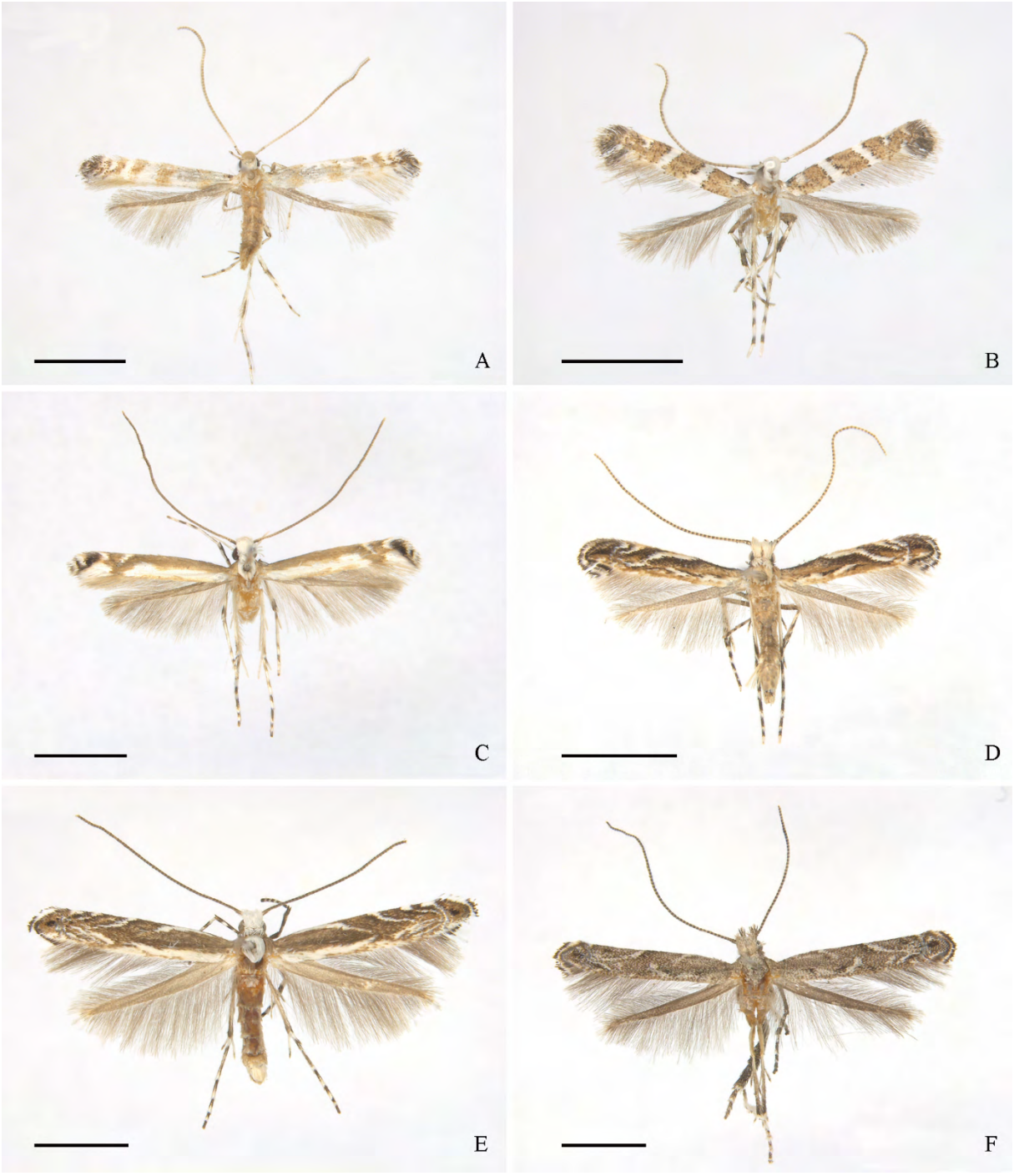

Figure 2. Adult habitus. A. *Spulerina parthenocissi*, male, registration no. SDNU.QD160704. B. *Telamoptilia grewiae*, male, registration no. SDNU.JN160818. C. *Eteoryctis picrasmae*, female, registration no. SDNU.YT170704.3. D. *Liocrobyla lobata*, male, registration no. SDNU.YT170702.6. E. *Epicephala relictella*, male, registration no. SDNU.Ent150763. F. *Conopomorpha flueggella*, female, registration no. SDNU.Ent161934. Scale bars = 2.0 mm.

on termen brown, with 3 dark brown lines, cilia on dorsum gray. Hindwing and cilia gray.

Male genitalia. Tuba analis with a linear sclerotization with unclear boundary. Tegumen slightly inflated beyond middle, both sides densely setose. Valva slightly reniform, with distal part slightly enlarged, covered with long setae, apical margin densely covered with short setae. Vinculum + saccus V-shaped, narrow and long. Phallus shorter than valva, about 6−8 cornuti at base which narrowed and split at end, with micro spines inside. Two pairs of coremata present, with anterior pair longer than posterior.

Material examined. Shandong: 1♂, Mt. Laoshan, Qingdao, 36.211°N, 120.593°E, 390 m, 2017.VI.29−VII.7, leaf mine and cocoon collected on *Celtis sinensis*, leg. Tengteng Liu, Zhenquan Gao & Nan Wang, genitalia slide no. LIU0037, field no. QD170701, registration no. SDNU.Ent170235.

Host plant. *Celtis sinensis* Pers, and *Celtis jessoensis* Koidz. (Kumata, 1982) (Ulmaceae).

Distribution. China (Anhui, Gansu, Guizhou, Hainan, Henan, Hong Kong, Hubei, Hunan, Jiangxi, Ningxia, Shandong, Shaanxi, Shanxi, Sichuan, Xizang, Zhejiang) (Bai *et al*., 2009), Japan (Kumata, 1982).

***Caloptilia chrysolampra* (Meyrick, 1936)** (Figs 1D, 3D, 5B)

Gracilaria (*sic*) *chrysolampra* Meyrick, 1936: 38. TL: China (Taiwan). TD: BMNH.

Caloptilia chrysolampra (Meyrick): Esaki *et al*., 1957: 29; Yang, 1977: 133; Kumata, 1982: 34; Liu & Yuan, 1990: 183; de Prins & de Prins, 2005: 89; Bai & Li, 2012: 55.

Diagnosis. See diagnosis of the following species, *C.* (*C.*) *sapporella* (Matsumura, 1931).

Description. Adult. Wingspan 9.0–11.0 mm. Head brown, face white or yellowish white. Maxillary palpus and labial palpus white. Labial palpus with distal part of third segment dark brown, sometimes ventral side of end of second segment slightly brown. Antennae brown, with black rings on flagellum. Thorax lemon yellow. Fore and mid legs dark brown, with base of fore coxa or whole of fore coxa yellowish white, fore and mid tarsus white and end of each segment slightly brown; hind legs yellowish white, base of coxa and lateral side of femur dark brown, end of tibia gray, sometimes end of each tarsal segment slightly brown. Tegula and forewing brown with purple luster, a rectangle lemon yellow spot occupying base to 1/4 of dorsum, which slightly narrower than half of wing width; a triangular lemon-yellow patch occupying costal 1/4 to 3/4, widest in middle of wing, about 3/4 of wing width, with 0–5 dark brown spots on costa; cilia on termen light brown, long scaly, with 2–3 dark brown lines, cilia on dorsum light brown. Hindwing and cilia gray. Abdomen light brown dorsally, yellowish white ventrally.

Male genitalia. Tuba analis broad, with a linear sclerotization at middle. Tegumen ligulate, slightly inflated distally, rounded on posterior margin, densely setose on both sides. Valva reniform, densely covered with long setae, apical margin densely covered with short setae. Vinculum + saccus V-shaped. Phallus shorter than valva, densely covered with micro spines on 3/5 to 1/5 of end. Two pairs of coremata present.

Female genitalia. Papillae analis steose. Apophyses anteriores and posteriores almost same in length. Ostium bursae indistinct and membranous. Antrum a very short sclerotized tube, ductus bursae very thin, linear. Corpus bursae membranous, with two strongly sclerotized falciform signa, bifurcate at outer end, smaller one points inward.

Material examined. Shandong: 1♂, Binzhou, 37.725°N, 117.762°E, 10 m, 2016.VIII.5, leaf mines collected on *Salix matsudana*, emerged VIII.13, leg. Tengteng Liu, genitalia slide no. LIU0035, registration no. SDNU.BZ160807; 1♂5♀, 2 *ex.* without abdomen, Binzhou, 37.747°N, 117.755°E, 10 m, 2016.VIII.5–6, leg. Jiaxiang Li & Tengteng Liu, registration nos. SDNU. Ent160077, 129, 102, 191, 113, 066, 024, 194; 3♀, Binzhou, 37.747°N, 117.755°E, 10 m, 2017.VII.21, leg. Zhenquan Gao, Nan Wang & Encui Wang, registration nos. SDNU.Ent171225, 277, 286; 1♀, Shuizhai town, Jinan, 36.908°N, 117.432°E, 20 m, 2017.VII.9, leaf mine collected on *Salix babylonica*, emerged VII.18, leg. Tengteng Liu, genitalia slide no. JYR17054, registration no. SDNU.JN170703; 1♀, Baiyun Lake, Jinan, 36.858°N, 117.384°E, 50 m, 2018.IV.28, leaf mines collected on *Salix babylonica*, emerged V.06, leg. Tengteng Liu, registration no. SDNU.Ent001439; 1♂1♀, 5 *ex.* without abdomen, Yellow River Delta National Nature Reserve, Dongying, 37.76°N, 118.986°E, 10 m, 2017.VIII.4–6, leg. Tengteng Liu, Zhenquan Gao, Encui Wang & Mengfei Li, registration nos. SDNU.Ent171745, 550, 559, 636, 685, 704, 881.

Host plant. *S. babylonica* Linn., *S. integra* Thunb. (Liu & Yuan, 1990), *S. pseudo-lasiopyne* (Sohn, 2007), *Populus nigra* Linn. (Kumata, 1982) (Salicaceae).

Distribution. China (Anhui, Beijing, Guangxi, Hebei, Heilongjiang, Hubei, Jiangxi, Shandong, Shaanxi, Shanxi, Sichuan, Taiwan, Tianjin, Zhejiang) (Liu & Yuan, 1990; Bai & Li, 2012), Korea (Sohn, 2007), Japan (Kumata, 1982), Russia (Sinev, 2019).

Remarks. One of the specimens labelled *Salix matsudana*, but *S. matsudana* Koidz is treated as a synonym of *Salix babylonica* L. in The Plant List web (2013).

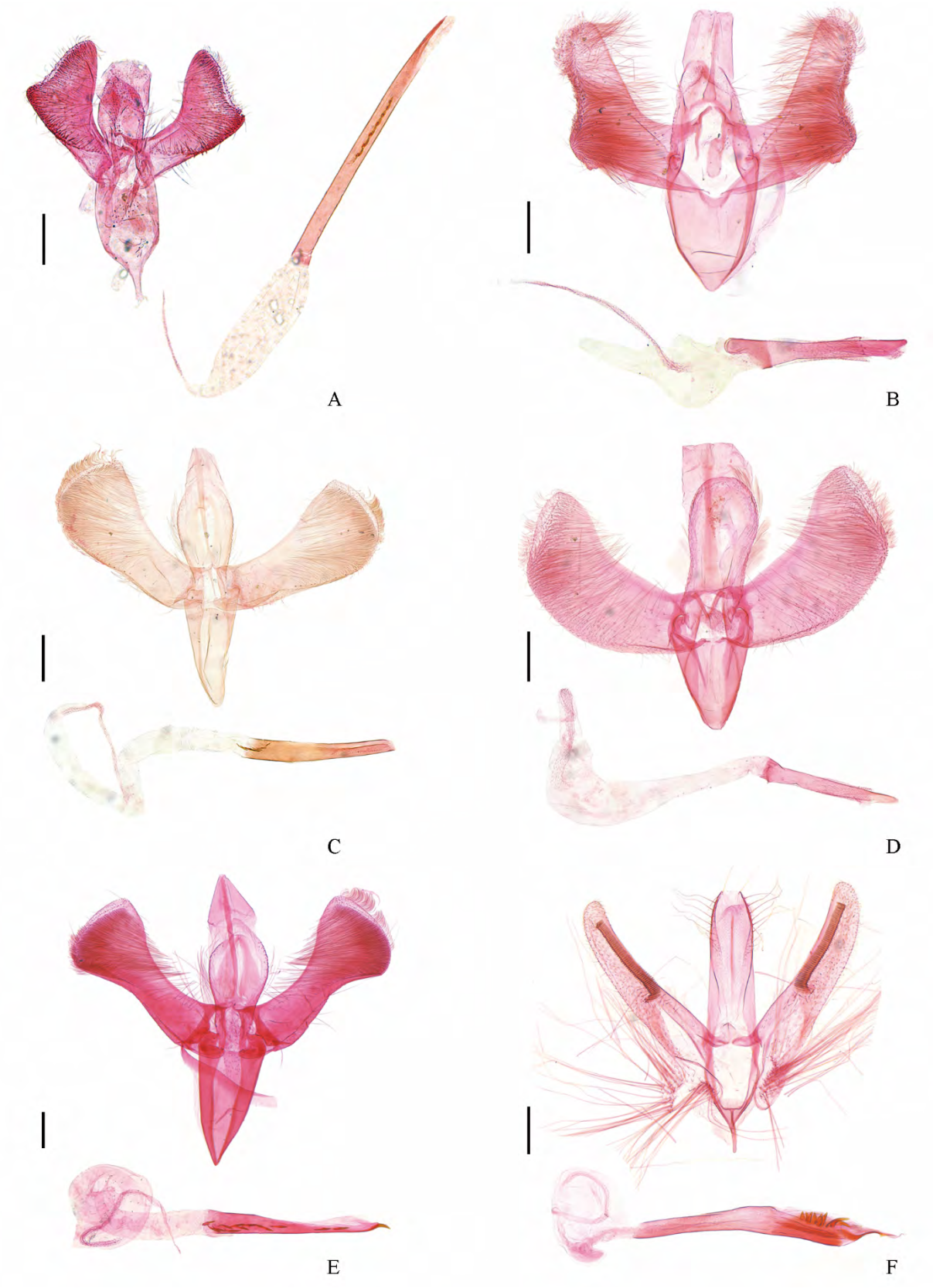

Figure 3. Male genitalia. A. *Calybites phasianipennella*, slide no. LIU0031. B. *Calybites securinella*, slide no. LIU0036. C. *Caloptilia* (*Caloptilia*) *celtidis*, slide no. LIU0037. D. *Caloptilia* (*C.*) *chrysolampra*, slide no. LIU0035. E. *Caloptilia* (*C.*) *sapporella*, slide no. LIU0038. F. *Acrocercops transecta*, slide no. LIU15001. Scale bars = 0.2 mm.

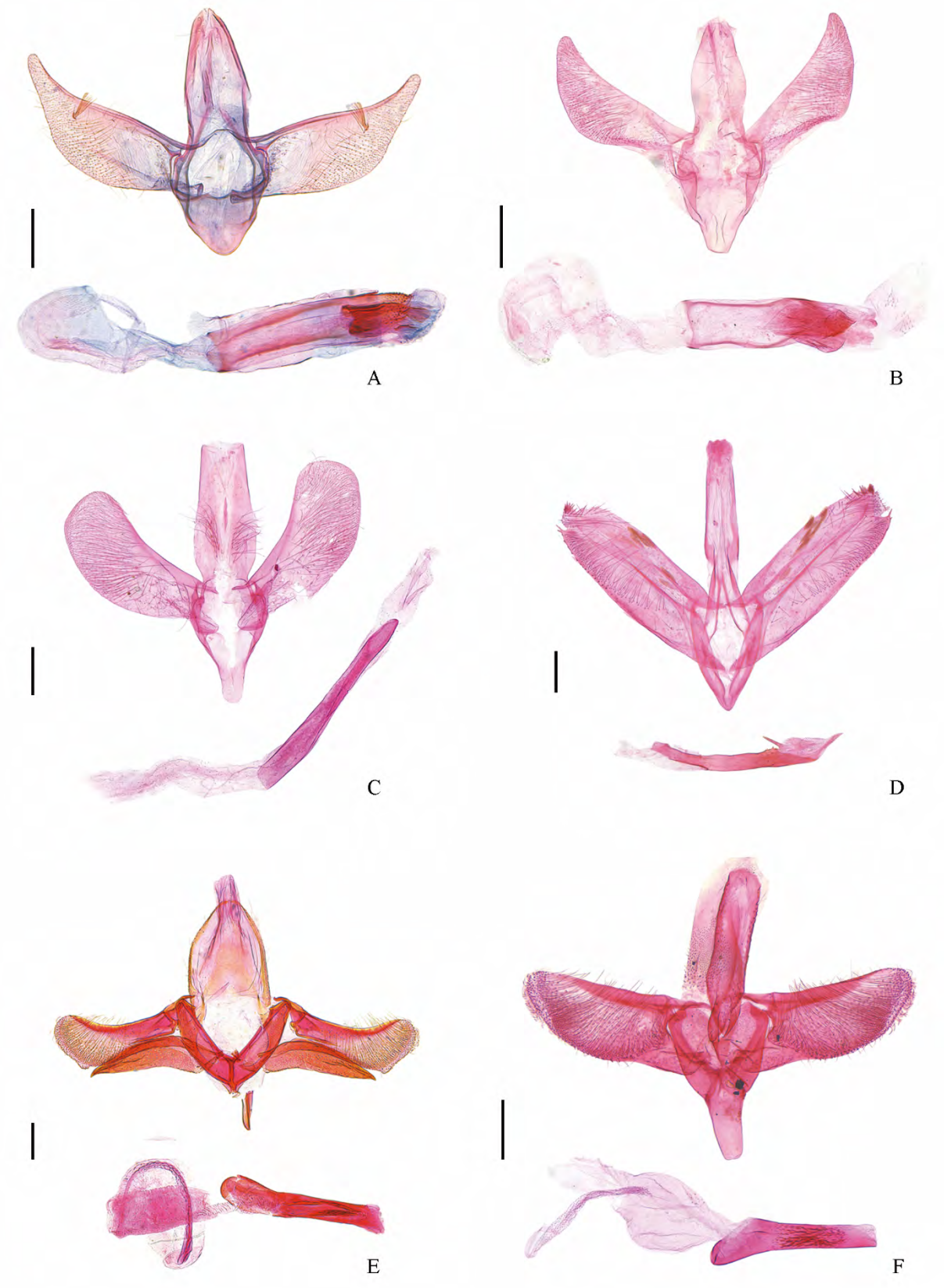

Figure 4. Male genitalia. A. *Spulerina parthenocissi*, slide no. LIU16009. B. *Telamoptilia grewiae*, slide no. LIU0033. C. *Eteoryctis picrasmae*, slide no. LIU0034. D. *Liocrobyla lobata*, slide no. LIU0028. E. *Epicephala relictella*, slide no. JYR17055. F. *Conopomorpha flueggella*, slide no. LIU0041. Scale bars = 0.2 mm.

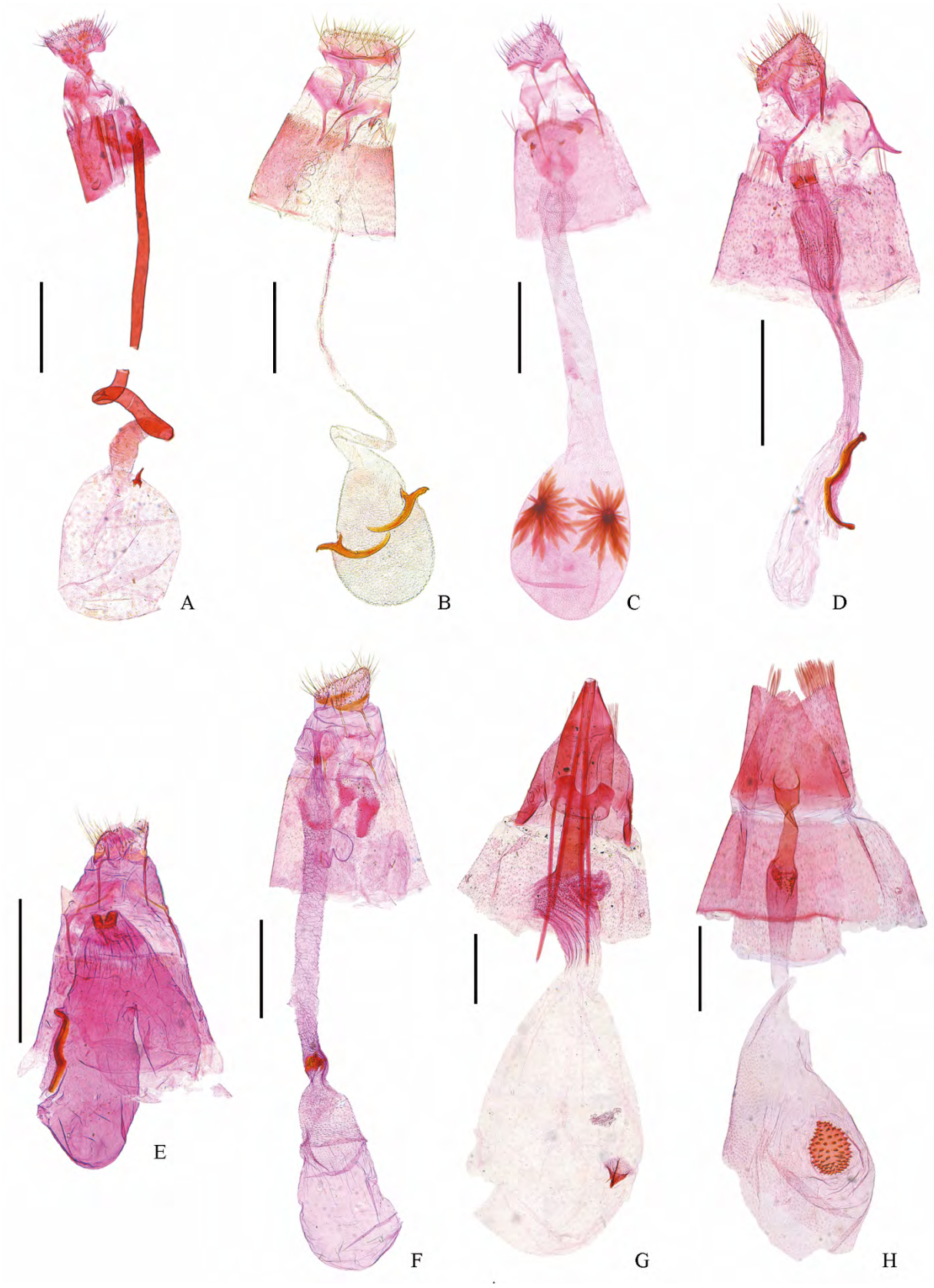

Figure 5. Female genitalia. A. *Calybites phasianipennella*, slide no. JYR17048. B. *Caloptilia* (*Caloptilia*) *chrysolampra*, slide no. JYR17054. C. *Acrocercops transecta*, slide no. LIU0027. D. *Spulerina parthenocissi*, slide no. LIU16010. E. *Telamoptilia grewiae*, slide no. JYR17052. F. *Eteoryctis picrasmae*, slide no. JYR17053. G. *Epicephala relictella*, slide no. JYR17046. H. *Conopomorpha flueggella*, slide no. LIU0041. Scale bars = 0.5 mm.

***Caloptilia sapporella* (Matsumura, 1931)** (Figs 1E, 3E)

Gracillaria sapporella Matsumura, 1931: 1101. TL: Japan.

Caloptilia sapporella (Matsumura): Inoue, 1954: 26; Kumata, 1982: 79; Liu & Yuan, 1990: 183; de Prins & de Prins, 2005: 123; Bai & Li, 2012: 54.

Caloptilia rhodinella (Herrich-Schäffer): Esaki *et al*., 1957: 29. Misidentification.

Diagnosis. This species is similar to *C. sapporella* on the forewing patterns, but can be distinguished from the latter by the yellow pattern on forewing extending to near apex on costa, the valva dilated on distal part and the phallus having about 14−15 cornuti. In *C. sapporella*, the yellow pattern on forewing extends to 3/4 on costa, the valva is almost parallel-sided on the distal part and the phallus lacks any cornutus in the male genitalia.

Description. Adult. Wingspan 10.3 mm. Head, face and thorax yellowish white and light brown between two antennae. Maxillary palpus yellowish white, with white end. Labial palpus yellowish white, 3rd segment white with dark brown apex. Scape yellowish white, slightly dark brown at base; flagellum yellow, with brown rings dorsally. Fore legs dark brown, with inner side white except tarsus; mid legs dark brown, femur and tibia covered with long scales; fore and mid tarsus white and end of each segment brown; hind legs yellowish white, base of coxa and end of femur dark brown, gray on end of tibia, second to fourth tarsal segments slightly brown at end. Tegula and forewing brown with purple luster. A rectangle lemon yellow spot occupying basal 1/4 of dorsum, slightly narrower than half of wing width; a lemon-yellow spot occupying costal 1/4 to 7/8, widest in middle of wing, about 3/4 width of wing, with 3–5 dark brown dots on costa; cilia on termen light brown, with 2–3 dark brown lines, cilia on dorsum gray. Hindwing and cilia gray.

Male genitalia. Tuba analis with a linear sclerotization with unclear boundary. Tegumen slightly dilated apically, both sides densely setose. Valva reniform, dorsal and ventral margin obviously depressed, with distal part remarkably enlarged and covered with long setae, apical margin densely covered with short setae. Vinculum + saccus V-shaped, narrow and long. Phallus short, with about 14−15 cornuti inside, a larger hook-like thorn on apex.

Material examined. Shandong: 1♂, Yaoxiang National Nature Reserve, Jinan, 36.328°N, 117.122°E, 700 m, 2017.VI.14, leg. Tengteng Liu, Zhenquan Gao & Nan Wang, genitalia slide no. LIU0038, registration no. SDNU.Ent170088.

Host plant. *Quercus mongolica* Fisch *et* Ledeb., *Q. dentata* Thunb., *Q. serrata* Thunb., *Q. acutissima* Carr., *Q. cerris* Linn., *Castanea crenata* Sieb. *et* Zucc. (Liu & Yuan, 1990) (Fagaceae).

Distribution. China (Anhui, Beijing, Gansu, Guizhou, Henan, Heilongjiang, Hunan, Jilin, Jiangxi, Ningxia, Shandong, Shanxi, Tianjin, Yunnan, Zhejiang) (Liu & Yuan, 1990; Bai & Li, 2012), Korea (Park, 1983), Japan (Kumata, 1982), Russian Far East (Sinev, 2019).

3.2 Subfamily Acrocercopinae

***Acrocercops* Wallengren, 1881**

Acrocercops Wallengren, 1881: 95. Type species: *Tinea brongniardella* Fabricius, 1798, by monotypy.

***Acrocercops transecta* Meyrick, 1931** (Figs 1F, 3F, 5C)

Acrocercops transecta Meyrick, 1931: 169; Kuroko, 1982: 186; Kumata *et al*., 1988a: 59; Xu *et al.*, 2013: 61.

Acrocercops lyoniella Kuroko, 1982: 186, 450. Synonymized by Kumata *et al.* (1988a).

Diagnosis. This species is closely related to *A. leucophaea* Meyrick, 1919, and *A. defigurata* Meyrick, 1928, both distributed in India, in the general forewing pattern and the male genitalia, but can be separated from the latter two species by the valva with its width at apical tooth of comb 1/6.2 to 1/6.3 length of valva based on a statistical analysis (Kumata *et al*., 1988a). In *A. leucophaea* the width of valva at the apical tooth of comb is 1/5.4 to 1/5.8 length of valva, and in *A. defigurata* the value is 1/7.2 (Kumata *et al.*, 1988a).

Description. Adult. Wingspan 7.5–9.7 mm. Face and head bright white or yellowish white. Maxillary palpus white, tip black. Labial palpus smooth, inner side white, outer side yellowish white, with outer side of second segment brown. Antennae yellowish white, with smooth scape. Thorax yellowish white or white, silver white ventrally. Legs bright white, outer side of fore femur light brown, outer side of fore and mid tibiae dark gray and end of each segment of tarsus black. Forewing brown, gradually darkens to end; spots white, sometimes yellow, most of them edged with dark brown scales; a white spot bending inward from basal 1/4 of dorsum, usually not touching costa, a thin white or yellowish white stripe arising from former spot extending along dorsum to base of wing; a white transverse oblique fascia in middle, extending along dorsum to near tornus; a white spot on costa at apical 1/4, about half wing width; 5−7 white spots on apical area; cilia near apex dark brown, sometimes with a white broad line at extreme end, cilia on dorsum dark gray, white at white spot. Hindwing and cilia

dark gray. Abdomen dark gray with silvery white luster dorsally, bright white ventrally.

Male genitalia. Tuba analis densely covered with micro spines. Tegumen linguiform, nearly parallel-sided, much sclerotized laterally, truncated apically, with about 7 long setae and many short setae on each side, and one long seta on both sides of apex. Valva slightly longer than tegumen, densely covered with small spines and short setae; dorsal margin slightly curved up at middle; with a comb of 56–60 teeth on apical half of valva near costa, bending towards dorsum basally; coremata at both sides of valva basally. Vinculum Y-shaped, saccus thin, about 1/3 as long as comb. Phallus about as long as valva, tubular, a sclerotized long horn apically with a minute thorn process at before its end, about 4 pairs of cornuti at crack, with distal pair bend. Eighth sternite shorter than 7th, widely cleft ventrally, dorsal apodeme about 1/2 as long as 7th abdominal segment, bilobed apically.

Female genitalia. Papilla analis densely covered with short setae. Apophysis posteriores as long as anteriores. Antrum pot-shaped, cavity and opening large; sometimes heavily sclerotized at opening, about half length of 7th abdominal segment. Ductus bursae long and membranous, with numerous micro granules; corpus bursae spherical or ellipsoid, with two signa surrounded by many lanceolate sclerites of various lengths.

Material examined. Shandong: 6♂2♀, Mt. Laoshan, Qingdao, 36.215°N, 120.601°E, 400 m, 2015.VII.9, leaf mines collected on *Pterocarya stenoptera*, emerged VII.18, leg. Tengteng Liu, genitalia slide nos. LIU15001♂, LIU0032♀, registration nos. SDNU.LS150701.1−8; 1♀, 1 *ex.* without abdomen, Mt. Laoshan, Qingdao, 36.211°N, 120.593°E, 390 m, 2017.VI.29−VII.07, leg. Tengteng Liu, Zhenquan Gao & Nan Wang, genitalia slide no. LIU0027, registration no. SDNU.Ent170180, 290; 1 *ex.* without abdomen, Yaoxiang National Nature Reserve, Jinan, 36.328°N, 117.122°E, 700 m, 2016.VIII.8−9, leg. Tengteng Liu & Jiaxiang Li, registration no. SDNU.Ent162720; 1♀, Yaoxiang National Nature Reserve, Jinan, 36.350°N, 117.103°E, 700 m, 2018.VIII.24, leaf mines collected on *Pterocarya stenoptera,* leg. Tengteng Liu & Zhongfeng Jiang, registration no. SDNU.Ent001410; 4♂2♀, Mt. Laoshan, Qingdao, 36.211°N, 120.593°E, 390 m, 2015.VII.10, leg. Tengteng Liu, registration nos. SDNU.Ent150084, 131, 656, 787, 822, 910; 3♀, Mt. Laoshan, Qingdao, 36.215°N, 120.601°E, 400 m, 2015.VII.8, leaf mines collected on *Pterocarya stenoptera*, emerged VII.22, leg. Tengteng Liu, registration no. SDNU.LS150704; 1♂, Yaoxiang National Nature Reserve, Jinan, 36.328°N, 117.122°E, 700 m, 2017.VI.14, leg. Tengteng Liu, Zhenquan Gao & Nan Wang, registration no. SDNU.Ent170061.

Host plant. *Pterocarya stenoptera* (Juglandaceae).

Distribution. China (Anhui, Hainan, Hebei, Henan, Hubei, Hunan, Jiangxi, Shandong, Shanxi, Sichuan, Taiwan, Zhejiang) (Xu *et al*., 2013 for records except Shandong), Korea (Park, 1983), Japan and Russian Far East (Kumata *et al*., 1988a).

***Spulerina* Vári, 1961**

Spulerina Vári, 1961: 181; Bai & Li, 2009: 33. Type species: *Ornix simploniella* Fischer von Röslerstamm, 1840.

***Spulerina parthenocissi* Kumata & Kuroko, 1988** (Figs 2A, 4A, 5D)

Spulerina parthenocissi Kumata & Kuroko, 1988, *In*: Kumata *et al*., 1988b: 86. TL: Japan. TD: HUJ.

Diagnosis. This species is most similar to *S. castaneae* Kumata & Kuroko, 1988 in the forewing patterns, but can be separated from the latter by the fan shaped comb about 1/3 width of valva in the male genitalia, the signum with median projection minute and only forming an angulated point in the female genitalia. While in *S. castaneae*, the fan shaped comb is about 2/3 width of the valva, the median projection of the signum is long and somewhat ensiform (Kumata *et al*., 1988b).

Description. Adult. Wingspan 6.4−7.5 mm. Head smooth and raised, bright white. Labial palpus white, with end of 2nd and 3rd segments brown. Scape white with brown scales downward; flagellum light brown or yellowish white with metallic luster, gradually darken towards tip. Thorax and tegula bright white. Legs white, with black spots or rings; fore leg with tibia having black spot; mid and hind leg with tibia having black spot, black ring of distal part of each segment of tarsus. Forewing brown, with five white fasciae inlaid with black scales across forewing: first fascia at basal 1/7, with costal part slightly bend outward, inner part scattered black scales; second about 1/5 of forewing in width at base 2/7, with outer edge slightly outward inclined; third in middle of wing, parallel-sided, slightly narrower than second; fourth one at distal 1/3 and about 1/2 width of third, sometimes broken; fifth wider than fourth, with an irregular black transverse line go across; area beyond fifth fascia black; cilia around apex black, grayish yellow on dorsum. Hindwing and cilia gray.

Male genitalia. Tegumen nearly parallel-sided on basal half, narrowed on distal half. Tuba analis with a linear sclerotization in middle. Valva longer than tegumen, curved upward, wide basally, with distal 1/3 tapering, rounded apically, inner side densely covered with fine short setae, fan-shaped comb with 5–6 long teeth in middle near costa at distal 1/3, about 1/3 width of valva. Phallus thick, same length as valva, with densely covered with small spines distally; vesica having a conical sclerotization, ductus ejaculatorius J-shaped, slightly shorter than valva. Eighth abdominal segment about as long

as 7th, dorsal apodeme about 3/4 as long as 8th abdominal segment.

Female genitalia. Apophysis anteriores as long as posteriores. Ostium bursae small. Antrum weakly sclerotized, annular, with a narrow crack ventrally. Ductus bursae lined with small spines, slightly expanded and with longitudinal wrinkles at basal 1/3. Corpus bursae membranous, oval; signum strongly sclerotized, long and slender, with median process an acute point, anterior part strongly curved, posterior part shorter.

Material examined. Shandong: 4♂3♀, campus of No. 2 Middle school of Qingdao, Qingdao, 36.113°N, 120.482°E, 60 m, 2016.VII.5, leaf mines collected on *Parthenocissus tricuspidata*, emerged VII.7, 10, 15, 20, 24, leg. Tengteng Liu, genitalia slide nos. LIU16009♂, LIU16010♀, registration nos. SDNU.QD160701, 02, 04, 06−08, 10.

Host plant. *Parthenocissus tricuspidata* (Siebold & Zucc.) Planch. (Vitaceae).

Distribution. China (Shandong), Japan (Kumata *et al*., 1988b).

Remarks. This species is recorded for the first time in China.

Telamoptilia **Kumata & Kuroko, 1988**

Telamoptilia Kumata & Kuroko, 1988, *In*: Kumata *et al.* 1988b: 57. Type species: *Acrocercops cathedraea* Meyrick, 1908, by original designation.

Telamoptilia grewiae **Liu, Wang & Li, 2015** (Figs 2B, 4B, 5E)

Telamoptilia grewiae Liu, Wang & Li, 2015: 121. TL: China (Tianjin). TD: NKU.

Diagnosis. The species resembles *T. prosacta* (Meyrick, 1918), but can be separated by the male genitalia with tegumen having 3−4 long setae on each lateral side, the valva same width on basal 3/4; the female genitalia with ductus bursae not reaching anterior margin of the seventh abdominal segment, the signum without a median process. In *T. prosacta*, the tegumen has 9−12 long setae on each lateral side, the valva is widest at middle; the ductus bursae are two times longer than the seventh abdominal segment, and the signum has a median process.

Description. Adult. Wingspan 5.8−6.3 mm, head smooth, bright white, face slightly brown. Labial palpus white, with end of second segment and middle of outer side of third segment brown, sometimes inner side of these two parts slightly brown. Scape brown, white dorsally; flagellum light brown with metallic luster and white base. Thorax and tegula brown. Legs white, femur and tibia having black dots, tarsus with black rings on distal part of each segment. Forewing brown, with four white stripes on costa 1/6, 1/3, 1/2 and 2/3, respectively, edged with dark scales, median two wider and cross wing, others shorter than half length of wing; apical area with several white spots; cilia around apex black, light brown on dorsum. Hindwing and cilia light brown.

Male genitalia. Tegumen slightly dilated at middle, rounded apically, two rows of long setae along median line, with two setae before apex. Valva longer than tegumen, basal 3/4 equal in width, distal 1/4 gradually narrowed, apex blunt. Saccus somewhat triangular, rounded apically. Phallus straight, about as long as valva, distal part strongly sclerotized, with a pointed process distally, vesica with two patches of micro setae. Eighth tergite with apodeme reaching posterior 1/3 of seventh segment, nearly parallel-sided.

Female genitalia. Apophysis anteriores as long as posteriores. Antrum a ring, disconnected ventrally, embed with a heavily sclerotized belt medially. Ductus bursae membranous, extremely short, not reaching anterior margin of seventh segment, wrinkled basally, without spines. Corpus bursae oval, membranous, without spines; signum slender and long, curved by about 150° medially, posterior half slightly S-shaped, anterior half curved at anterior 2/5, sometimes slightly C-shaped.

Material examined. Shandong: 1♂3♀, Yaoxiang National Nature Reserve, Jinan, 36.328°N, 117.122°E, 700 m, 2016.VIII.8, leaf mines collected on *Grewia biloba*, emerged 2016.VIII.19, 21, 22, leg. Tengteng Liu, genitalia slide nos. LIU0033♂, JYR17052♀, JYR17047♀, registration nos. SDNU.JN160818, SDNU.JN160820−22.

Host plant. *Grewia biloba* G. Don and its variety *parviflora* Hand. –Mazz. (Malvaceae).

Distribution. China (Shandong, Tianjin) (Liu *et al.*, 2015 for Tianjin).

Eteoryctis **Kumata & Kuroko, 1988**

Eteoryctis Kumata & Kuroko, 1988, *In*: Kumata *et al.*, 1988b: 22. Type species: *Acrocercops deversa* Meyrick, 1922, by original designation.

Eteoryctis picrasmae **Kumata & Kuroko, 1988** (Figs 2C, 4C, 5F)

Eteoryctis picrasmae Kumata & Kuroko, 1988, *In*: Kumata *et al.*, 1988b: 28. TL: Japan. TD: HUJ.

Diagnosis. The species resembles *E. deversa* (Meyrick, 1922) in both forewing pattern and the genitalia, but can be separated from the latter by the phallus without any cornutus in the male genitalia and the corpus bursae without any distinct signum in the female genitalia. In *E. deversa*, the phallus has 10 to 30 cornuti near apex and the corpus bursae has 20 to 30 small signa encircling its middle (Kumata *et al.*, 1988a).

Description. Adult. Wingspan 6.0–8.0 mm. Head and thorax bright white. Maxillary palpus and labial palpus white, sometimes with dark brown scales on outer surface. Antennae light brown, scape black dorsally, flagellum dark brown dorsally. Legs white, with black dot or rings; fore femur with white long scales on inner surface. Tegula brown. Forewing brown, with basal 3/4 of dorsal half white, tinged brown on dorsum; a white stripe obliqued outward at costal 3/4, sometimes inlaid with black scales; costa near apex interconnected with white and black spots which extending to cilia; cilia on dorsum light brown. Hindwing and cilia brown.

Male genitalia. Tegumen somewhat parallel-sided, with two tufts of long setae on both sides of middle part. Tuba analis with a short linear sclerotization. Valva gradually widened towards apex, rounded apically, densely covered with setae. Saccus almost parallel-sided on distal half, rounded apically. Phallus slender, about as long as tegumen + vinculum + saccus. Eighth abdominal segment with dorsal apodeme slender.

Female genitalia. Papilla analis short, with setae arranged in lines. Apophysis anteriores as long as posteriores. Ostium bursae funnel-shaped. Antrum short and sclerotized. Ductus bursae membranous, narrow at base, somewhat parallel-sided towards bursae, with spinules distally, a strong sclerotization near corpus bursae. Corpus bursae ovate, membranous, with basal 2/5 densely covered with micro spines.

Material examined. Shandong: 1♂3♀, Mt. Kunyu, Yantai, 37.292°N, 121.740°E, 400 m, 2017.VII.17, leaf mines collected on *Picrasma quassioides*, pupated VII.18, emerged VII.30, VIII.1, leg. Tengteng Liu & Zhenquan Gao, genitalia slide nos. LIU0034♂, JYR17049♀, JYR17053♀, registration nos. SDNU.YT170704.1−4; 1♀, Mt. Laoshan, Qingdao, 36.211°N, 120.605°E, 600 m, 2018.VII.02, leaf mines collected on *Picrasma quassioides*, leg. Tengteng Liu, registration nos. SDNU.Ent001219.

Host plant. *Picrasma quassioides* (D. Don) Benn. (Simaroubaceae).

Distribution. China (Shandong), Japan (Kumata *et al.*, 1988b).

Remarks. This species is recorded for the first time in China.

3.3 Subfamily Ornixolinae

Liocrobyla Meyrick, 1916

Liocrobyla Meyrick, 1916: 5. Type species: *Liocrobyla paraschista* Meyrick, 1916, by monotypy.

Liocrobyla lobata Kuroko, 1960 (Figs 2D, 4D)

Liocrobyla lobata Kuroko, 1960: 5; Kuroko, 1982: 184; Park, 1983: 62; Liu *et al.* 2018: 307. TL: Japan (Kyushu). TD: ELKU.

Diagnosis. This species resembles *L. desmodiella* Kuroko, 1982 in the general appearance of the forewing patterns, but can be distinguished from the latter by the brownish-grey forewing ground color, the ninth tergite of the male lacking sclerotized lines and the valva almost parallel-sided and bearing straight spines apically in the male genitalia. In *L. desmodiella*, the forewing ground colour is blackish-grey, the ninth tergite of the male bears a pair of sclerotized lines originated from the middle of the posterior margin, the valva has a remarkable concave at distal 1/4 and bears a small ventro-apical hook.

Description. Adult. Wingspan 6.2−6.6 mm. Head white on frons and face, tinged blackish fuscous on base of antennae, vertex white, with a brownish-grey median line. Maxillary palpus black mixed with white. Labial palpus white, black on distal part of second segment, with a black spot on middle of third segment ventrally. Antennae brownish grey with darker rings. Thorax yellowish fuscous, tegula brownish grey. Forewing ground colour brownish grey, darker towards costa, a white stripe from costal 1/3 to before 1/2, then curved downwards to near tornus; two white stripes beyond distal 1/3 and 2/5 on costa obliquely to middle of wing; two longitudinal striae near apex, with costal one indistinct, one white spot on tornus; a white stripe along dorsum from base to tornus, partially edged with black scales and largely covered by brownish-fuscous scales on dorsum; cilia white with two black lines around apex, grey on dorsum. Abdomen light fuscous dorsally, white ventrally.

Male genitalia. Tegumen slender, almost parallel-sided. Vinculum narrowly triangular. Valva almost parallel-sided, bears some 15-minute teeth along dorsal margin and two longer ventro-apical spines. Phallus shorter than length of valva, slightly curved before middle, a membranous part on distal 1/4 ventrally, with a pointed long process and numerous granules

on membrane, apex pointed. Paired clusters of slender scales and black short scales on membrane between seventh and eighth terga. Ninth segment with tergite heart-shaped, a line of slender scales along lateral side.

Material examined. Shandong: 4♂, Mt. Kunyu National Nature Reserve, Yantai, 121.740°E, 37.292°N, 400 m, 2017.VII.18, leaf mines collected on *Pueraria montana* var. *lobata*, emerged vii.29, leg. Tengteng Liu & Zhenquan Gao, genitalia slide nos. LIU0028, registration nos. SDNU.YT17170702.3–6; 1♀, Mt. Fu, Qingdao, 2019.VII.05, leaf mines collected on *Pueraria montana* var. *lobata*, emerged VII.21, leg. Tengteng Liu & Zhongfeng Jiang, registration nos. SDNU.Ent003566.

Host plant. *Pueraria montana* var. *lobata* (Fabaceae).

Distribution. China (Shandong) (Liu *et al*., 2018), Korea (Park, 1983), Japan (Kuroko, 1960).

Liocrobyla indigofera **Liu, Wang & Wang, 2018**

Liocrobyla indigofera Liu, Wang & Wang, 2018: 313. TL: Shandong (Qingdao), China. TD: SDNU.

Diagnosis. The species resembles *L. lobata* in the male genitalia, but can be separated by the phallus longer than the valva and the minute cornutus; In *L. lobata*, the phallus is shorter than valva and the cornutus is more than 1/12 length of the phallus (Liu *et al*. 2018). In *L. indigofera*, the head is dark grey and the forewing ground colour is blackish fuscous, while in *L. lobata*, the head is white and the forewing ground colour is brownish grey.

Material examined. Shandong: 1♂, holotype, Mt. Laoshan, Qingdao, 120.609°E, 36.204°N, 400 m, 2017.VII.01, leaf mine collected on *Indigofera kirilowii*, pupated VII.05, emerged VII.18, leg. Tengteng Liu & Zhenquan Gao, genitalia slide no. LIU0030, registration no. SDNU.QD170710.2. Paratype. 1♀, genitalia slide no. LIU0029, registration no. SDNU.QD170710.1, other data same as holotype. Others. 1♂, Mt. Laoshan, Qingdao, 120.593°E, 36.211°N, 390 m, 2015.VII.10, leg. Tengteng Liu, registration no. SDNU.Ent150092; 1♂, Mt. Laoshan, Qingdao, 120.605°E, 36.211°N, 600 m, 2018.VII.02, leaf mine collected on *Indigofera kirilowii*, leg. Tengteng Liu, registration no. SDNU. Ent001220.

Host plants. *Indigofera kirilowii* Palib., *I. tinctoria* L. (Fabaceae).

Distribution. China (Shandong).

Notes. This species was well described and illustrated in the recent open access publication (Liu *et al*., 2018).

Epicephala **Meyrick, 1880**

Epicephala Meyrick, 1880:137 (in key), 168. Type species: *Epicephala colymbetella* Meyrick, 1880, by monotypy.

Iraina Diakonoff, 1955: 84, 92. Type species: *Iraina periplecta* Diakonoff, 1955, by original designation, synonymized by Vári (1961).

Leiocephala Kuznetzov & Baryshnikova, 2001: 32. Type species: *Epicephala colymbetella* Meyrick, 1880, by original designation, synonymized by de Prins & de Prins (2005: 177).

Epicephala relictella **Kuznetzov, 1979** (Figs 2E, 4E, 5G)

Epicephala relictella Kuznetzov, 1979: 854; Kuznetzov, 1981: 179; de Prins & de Prins, 2005: 181; Hu *et al*., 2011: 50. TL: Russia. TD: ZIN.

Diagnosis. This species is extremely similar to *E. vitisidaea* Li, Wang *et* Zhang, 2012 in Zhang *et al.* (2012), on the forewing pattern and the outline of the genitalia, but can be separated from the latter by the valva arched on dorsal margin of costa and phallus with 1–3 bundles of compact micro spines as cornuti in the male genitalia, the triangular signum in the female genitalia. In *E. vitisidaea*, the dorsal margin of the costa of valva is more or less straight, the cornuti are comprised of two clusters of strong spines, and the signa are two weak rectangular sclerotization.

Description. Adult. Wingspan 8.0–11.0 mm. Head bright white, tufted. Maxillary palpus and labial palpus white, with gray outer surface. Antennae brown, with white scape. Thorax bright white. Abdomen brown dorsally and white ventrally, with about 5 equidistant V-shaped brown lines opening backward. Tegula and forewing brown, one white line from near base of costa, extending along costa to 2/5 then curved to middle of wing, three similar oblique white lines from costal 1/2, 2/3, 5/6 to middle of wing, sometimes inlaid with black scales, a white stripe along dorsum from base to tornus, with one white stripe protruded to end of first costal line; four to five oblique white stripes above tornus; one black spot at apex, cilia on termen white, with two black lines, light brown on dorsum. Hindwing and cilia light brown.

Male genitalia. Tegumen wide, distal 2/5 tapering, rounded apically. Tuba analis wide and obvious. Valva narrow, slightly longer than tegumen, inflated near apex, with dense setae, rounded apically; costa sclerotized, slightly concave; sacculus strongly sclerotized, separated from valva, about 4/5 of length of valva, inner margin arched, ventral margin slightly concave, pointed apically. Vinculum wide, heavily sclerotized. Saccus thin and short, about 1/3 length of tegumen. Phallus tubular, as long as valva, cornuti 1–3 bundles of compact micro spines. Two pairs of coremata present.

Female genitalia. Ovipositor weakly dentated apically. Apophysis posteriores slightly longer than anteriores. Ostium bursae broad, lamella antevaginalis nearly trapezoid, with caudal margin concave. Antrum a sclerotized short tube, parallel-sided. Ductus bursae short, posterior half broad, with numerous irregular spines, gradually narrowed towards corpus bursae, anterior half with longitudinal folds. Ductus seminalis originated from base of ductus bursae. Corpus bursae membranous, elliptic, signum a small conical sclerotization, pointed apically, placed near anterior end of bursae.

Material examined. Shandong: 9♀10♂, 2 *ex.* without abdomen, Mt. Laoshan, Qingdao, 36.211°N, 120.593°E, 390 m, 2015.VII.10, leg. Tengteng Liu, genitalia slide nos. LIU0042♀, JYR17046♀, JYR17055♂, registration nos. SDNU.Ent150078, 107, 211, 214, 215, 234, 608, 613, 614, 617, 618, 688, 716, 751, 763, 806, 823, 851, 874, 886, 890; 1♀, Mt. Kunyu National Nature Reserve, Yantai, 121.737°E, 37.300°N, 80–300 m, 2017.VII.17, leg. Zhenquan Gao, Nan Wang & Encui Wang, registration nos. SDNU.Ent170651.

Host plant. *Flueggea suffruticosa* (Pall.) Baill. (Hu *et al*., 2011) (Euphorbiaceae).

Distribution. China (Hebei, Heilongjiang, Gansu, Shandong, Tianjin) (Hu *et al*., 2011 for distribution except Shandong), Russia (Kuznetzov, 1979).

Conopomorpha **Meyrick, 1885**

Conopomorpha Meyrick, 1885: 592. Type species: *Conopomorpha cyanospila* Meyrick, 1885, by monotypy.

Conopomorpha flueggella **Li, 2011** (Figs 2F, 4F, 5H)

Conopomorpha flueggella Li, 2011, *In*: Hu *et al*., 2011: 46. TL: China (Tianjin). TD: NKU.

Diagnosis. This species mostly resembles *C. litchiella* Bradley, 1986, but can be readily separated from the latter by the greyish brown to dark gray forewing ground color, the valva lacking any process on ventral margin in the male genitalia, and the corpus bursae shorter than twice the length of the ductus bursae in the female genitalia. In *C. litchiella*, the forewing is black but whitish yellow on distal part, the valva bears a prominent tusk-like prong distally on ventral margin and an adjacent small tooth proximally, and the corpus bursae is twice as long as the ductus bursae (Bradley, 1986).

Description. Adult. Wingspan 9.0–9.5 mm. Head light brown. Maxillary palpus and labial palpus brown, white inside, with upward tufted hair. Antennae brown, scape light brown ventrally, flagellum dark brown with white rings. Thorax and tegula grayish brown. Forewing grayish brown, four grayish white stripes on costal 1/3, 2/3, and on dorsal 1/3, 2/3 oblique outward, respectively, with first dorsal stripe longest and thickest; a silvery gray vertical fascia from near costa to before tornus, with metallic luster; a black spot on apex; cilia on termen light gray, part of them having blue gray metallic luster at base, with a median white line, gray on dorsum. Hindwing and cilia grayish brown.

Male genitalia. Tegumen narrow and long, nearly parallel-sided, with rounded apex. Tuba analis with basal half and distal part densely covered with micro spines. Valva slightly longer than tegumen, densely covered with setae on ventral half; dorsal margin almost straight and heavily sclerotized, ventral margin slightly concave at basal 1/4, rounded apically. Vinculum U-shaped. Saccus about half as long as valva. Phallus tubular, nearly straight, expanded at base, slightly shorter than valva, cornuti clusters of micro spines.

Female genitalia. Ovipositor broken and lost, not observed. Ostium bursae round. Antrum sclerotized, long and tubular. Ductus bursae with a cluster of micro teeth at conjunction of ductus bursae, membranous towards anterior. Corpus bursae membranous, oval; signum an oval plate densely covered with micro teeth. (posterior two abdominal segments absent on the slide)

Material examined. Shandong: 1♂, Mt. Laoshan, Qingdao, 36.211°N, 120.593°E, 390 m, 2017.VI.29−VII.07, leg. Tengteng Liu, Zhenquan Gao & Nan Wang, genitalia slide no. LIU0041, registration no. SDNU.Ent170284; 2♀, Mt. Kunyu, Yantai, 37.300°N, 121.736°E, 80−300 m, 2016.VII.29−31, leg. Tengteng Liu, Ziyuan Li & Encui Wang, genitalia slide nos. WEC2016028, WEC2016033, registration nos. SDNU.Ent161934, 161966; 2♀, Beijiushui, Qingdao, 36.091°N, 120.423°E, 70−300 m, 2018.VII.01, leg. Tengteng Liu, registration no. SDNU.Ent000304, 313.

Host plant. *Flueggea suffruticosa* (Pall.) Baill. (Hu *et al*., 2011) (Euphorbiaceae).

Distribution. China (Shandong, Tianjin) (Hu *et al*., 2011 for the record of Tianjin).

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