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## A review of the genus *Syrastrenopsis* Grünberg, 1914 (Lepidoptera, Lasiocampidae)

VADIM V. ZOLOTUHN<sup>1</sup> & AIDAS SALDAITIS<sup>2</sup>

<sup>1</sup>Department of Zoology, State Pedagogical University of Ulyanovsk, pl. Lenina 4, RUS-432700, Ulyanovsk, Russia.  
E-mail: v.zolot@mail.ru

<sup>2</sup>Nature Research Centre, Akademijos str. 2, LT-08412 Vilnius-21, Lithuania. E-mail: saldrasa@gmail.com

### Abstract

The genus *Syrastrenopsis* Grünberg, 1914 is revised and two new species, *S. panga* Zolotuhin & Saldaitis, **sp. nov.** and *S. hun* Zolotuhin & Saldaitis, **sp. nov.** are described from North Sichuan and Shaanxi Provinces of China, respectively. All species of the genus are illustrated including the male of *S. imperiatus* Zolotuhin, 2001 which is described for the first time.

**Key words:** Lepidoptera, Lasiocampidae, *Syrastrenopsis*, taxonomy, new species, China

### Introduction

The article deals with a small lasiocampid genus, *Syrastrenopsis* Grünberg, 1914. Previously this genus included only five species but even these were uncertain as some were described only from females. Further morphological study resulted in the description of two new species and provided a male for another species where the male was unknown.

### Material and methods

Material studied are from the museums abbreviated here as: BMNH, The Natural History Museum, London, UK; IZCAS, Institute of Zoology, Chinese Academy of Science, Beijing, China; MWM, Entomological Museum Thomas Witt, Munich, Germany; NSMT, National Museum of Nature and Science, Tsukuba, Japan; ZFMK, Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany; ZMHU, Zoologisches Museum der A. Humboldt Universität, Berlin, Germany. Other abbreviations used are: TL = type locality; TS = type species; NR = Nature Reserve.

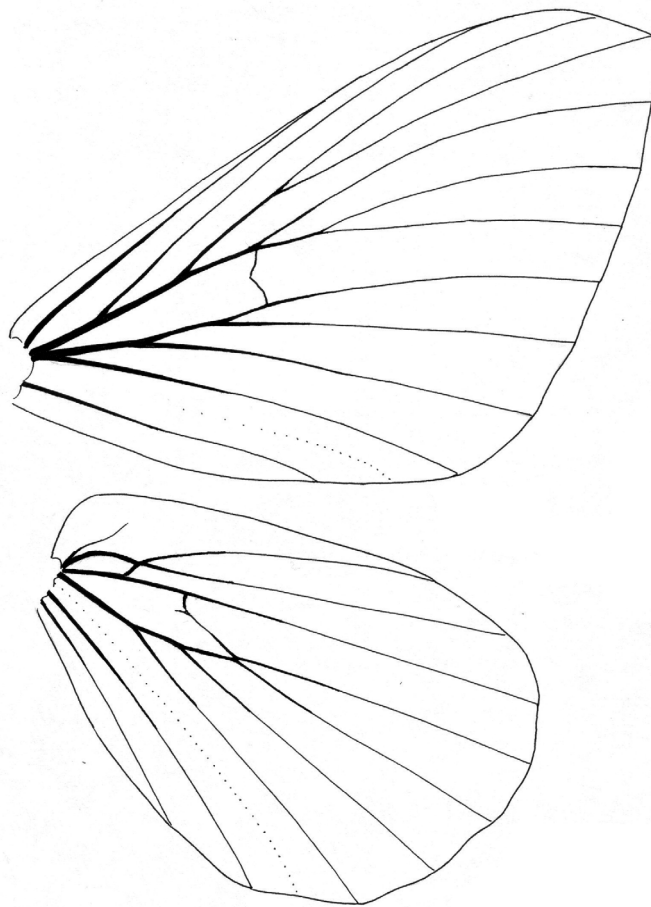
The genitalic preparations for the figures were made using standard dissecting techniques and were mounted in Euparal on glass slides. Photographs of adult, abdomen and male genitalia were taken by an Olympus Camedia C-750 camera with a Soligor Adapter Tube and Slide Duplicator for Digital 10 diopters modified for object glasses.

### Systematic account

#### *Syrastrenopsis* Grünberg, 1914

*Entomologische Rundschau* **31**: 38.

TS: *Syrastrenopsis moltrechti* Grünberg, 1914: 38, by monotypy.



**FIGURE 1.** Wing venation of *Syrastrenopsis kawabei*.

**Description.** Moderately sized Lasiocampids showing minor sexual dimorphism and often having semitransparent wings with smooth outer margins. The wing pattern consists of two or three transversal, generally oblique dark fasciae on a lighter background.

Venation (fig. 1, after *S. kawabei* and *S. moltrechti*). In forewing Sc free; R1 free, arising from basal third of R-Cu cell; (R2 + R3), R4 free but its foundation closed with a base of (R5 + M1) which is on a short branch; bases of M2 and M3 moved apart; only one anal vein present; R-Cu cell is without a trace of the M-branch. In hindwing humeral zone of the hind wing weakly developed; Sc anastomoses with Rs forming a small, narrow humeral cell with a single (*S. kawabei*) or a paired (*S. moltrechti*) additional humeral vein; M1 free; M2+M3 basically closed; 3 anal veins developed but A1 as a fold; trace of M-branch is visible in R-Cu cell near a vein; discal vein well developed in both wings but weaker than other veins.

Fore tibia of both sexes with ellipsoid epiphysis but shorter in females.

Male genitalia with broad, flattened, leaf-shaped valvae which are divided into two lobes: upper one slender and strongly curved and lower one wide and flattened leaf-shaped to semilunar; uncus and gnathos absent; socii membranous, well developed; short aedeagus with rounded apical spur; vesica with zones of distinct scobination. Shapes of valvae, aedeagus and vesica can be used diagnostically to identify species.

Female genitalia with vaginal plates distinct, wrinkled; ductus bursae short to reduced; corpus bursae bag-shaped, membranous without signum.

**Bionomics.** Larva flattened dorso-ventrally, with lateral thoracic lappets; thorax with transversal band covered with dark scales. Pupa in a silken cocoon, formed on the food plant, in tree crevices or under bark.

Strongly univoltine species with autumnal flight period, hibernating as eggs. Likely monophagous on oaks (*Quercus* spp.) with members of the genus associated with deciduous forests. Both sexes are attracted to light.

**Distribution.** The range of the genus is widely disjunct. The species are distributed from the Russian Far East, Korea and Taiwan to the mountains of Northeastern, Central and Southern China to Northern India, Nepal and Thailand. The addition of two new species brings the total species in this genus to seven with all being very local and often known only from a very few specimens.

### *Syrastrenopsis moltrechti* Grünberg, 1914

Figs 2–4

*Syrastrenopsis moltrechti* Grünberg, 1914, *Ent. Rundsch.* **31**: 39, text-fig.

TL: [SE Russia, Primorye Region] “Ussuri-Gebiet, Sedunka [=Sedanka] bei Wladiwostok ... und Anutschino“. Types: male and female, not found.

**Diagnosis.** Forewings are reddish or pinkish brown, medial fasciae are dark grey, bordered interiorly by whitish scales—narrow in males and rather broad in females. Hind wings are darker in males, lighter in females, sometimes with a weak transversal grayish band.

In the male genitalia (fig. 21), the shape of the valva is diagnostic, as its apical part is roughly trapezoid shaped to irregularly rectangular, with an obtuse outer margin; juxta bears long lateral lobes.

In the female genitalia, the antevaginal plate is strong and broad, with its caudal margin cut; postvaginal plate with triangular caudal cut; distinct medio-transversal keel and numerous lateral wrinkles; ostium broad, membranous; antrum and ductus bursae reduced; corpus bursae short, bag-shaped, membranous.

This species is geographically isolated from other congeners. It can be distinguished by the forewings being rather unicolorous in males, with reduced whitish fasciae, well developed epiphysis and genitalic characters such as the characteristic valva shape.

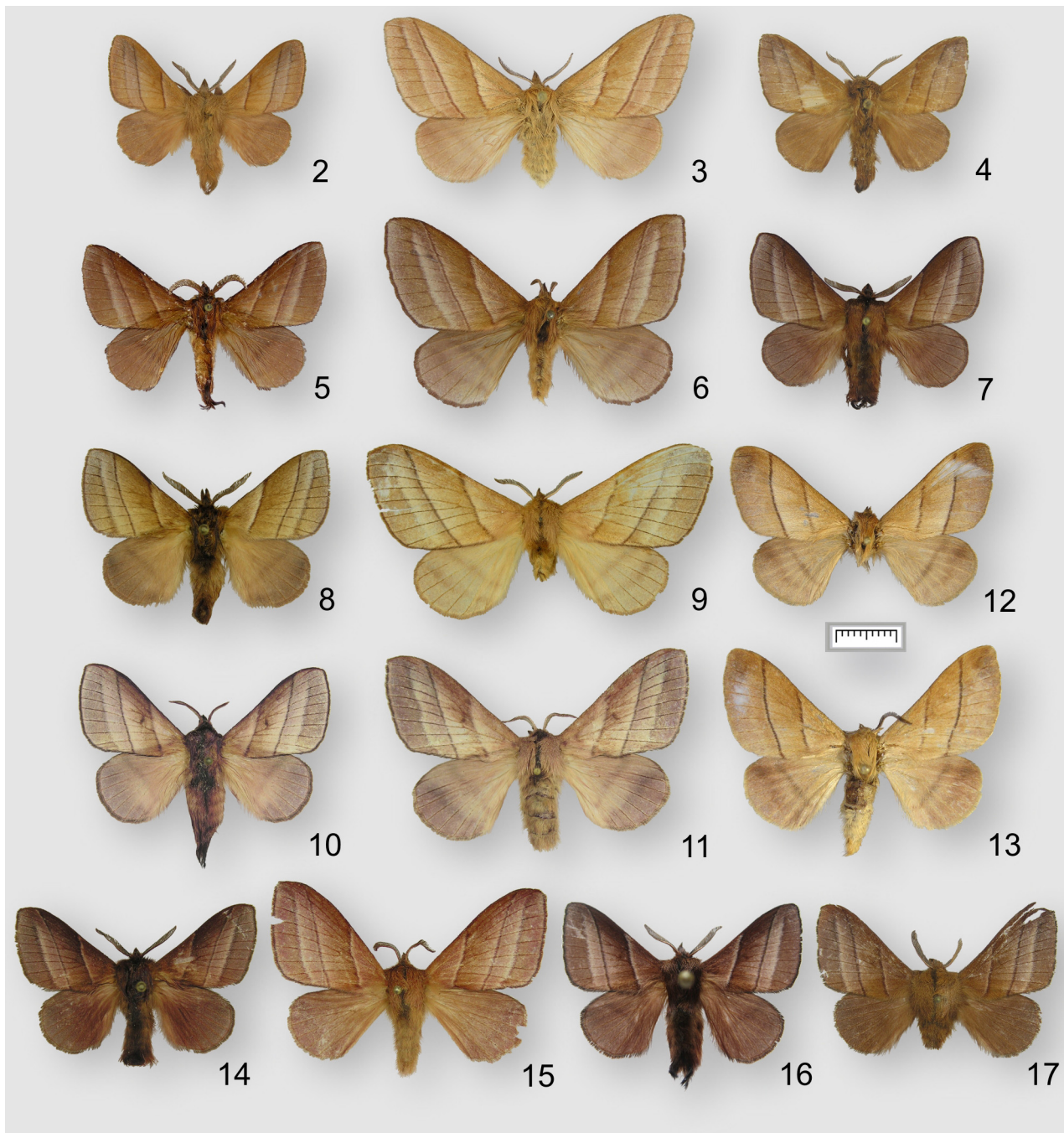
**Bionomics.** Univoltine, flight period from late August to late October, peaking in the second half of September. The adults are very local and fly in the first half of the night in humid oak forests or rarely in mixed conifer-oak forests. Tschistjakov (1995) treated it as a rare species restricted to some localities within a subzone of mixed coniferous-broadleaved forests with a predominance of *Abies holophila*. *Quercus mongolica* is a hostplant in Russia. The pupae aestivate and the moths hatch after the first autumnal ground frosts. Eggs spherical, white with spotted reddish pattern; micropylar zone pointed with black. Larva flattened dorso-ventrally, with thoracic lateral lappets; ground colour light yellowish grey with small black spots and marbled pattern especially rich laterally; second and third thoracic segments with velvet-black transversal bands; abdominal segments with a broad yellow band, A2 with 4 small black horns and A11 with a single yellowish brown hook; blackish and yellowish setae, longer laterally; length of mature caterpillar about 40 mm (Graeser, 1888).

**Distribution.** Russian Far East (from Khabarovsk (Dubatolov & Dolgikh, 2007) and NE Primorye: Maximovka (Tschistjakov, 1995) to Southern Primorye Region), Korea (Gwangleung and Mt. Jugeum-san—Park et al., 1999: 138 as *Arguda vinata* (Moore, 1865), also from Hwanghae: Sinpyong, see below), NE China (Heilongjiang, Jilin, Henan—Liu & Wu, 2006).

**Taxonomic note.** The holotype and allotype of the species were not found in any European museum and are probably lost. They were illustrated in the original description so authenticity of the species is certain. No information on the deposition of Karl Grünberg’s collection is known, however, topotypical specimens collected later are widely represented in different European collections.

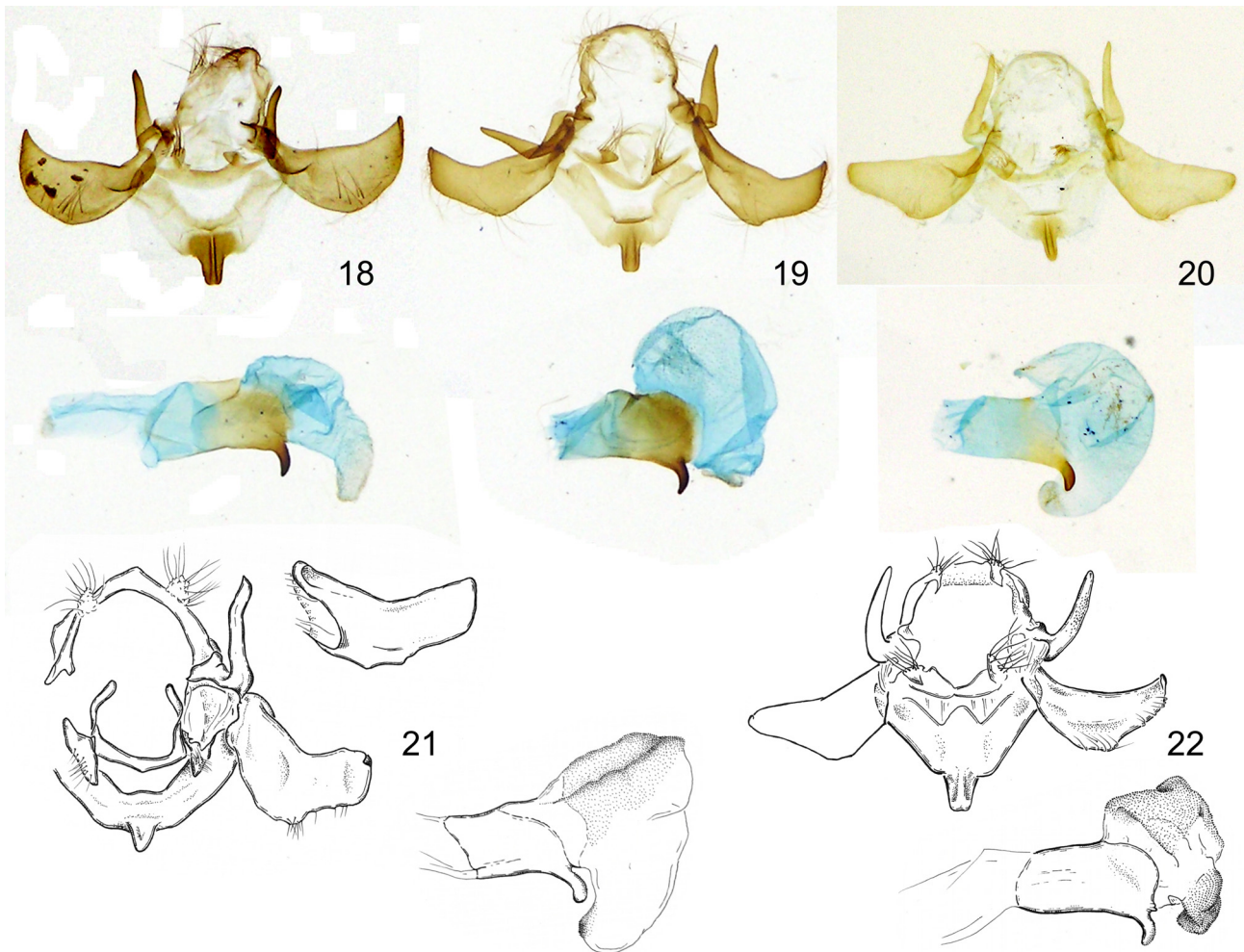
**Material examined.** About 70 specimens from different locations of Far East Russia (ZISP, MWM, BMNH, ZFMK, ZHUB, etc).

- 1 ♂, Korea N., Prov. N Hwanghae, Sinpyong, Pyonghwa-ri, 10.x.1978, leg. Dr. Vojnits et L. Zombori (MWM);
- 1 ♀ (abdomen absent), China, Jilin Prov., Mt. Changbai (Changbaishan), 30.ix.1985 (IZCAS);
- 2 ♂, China, Henan Prov., Lushan County (Shirensan), 1.x.1996 (IZCAS).



**PLATE 1.** Figs 2–17. Adults. 2–4: *Syrastrenopsis moltrechtii* (Grünberg, 1914): 2. ♂, Russie asiatique orient., Ussuri (BMNH). 3. ♀, Primorye territory, Kedrovaja Pad' Reserve (MWM); 4. ♂, Korea N., Prov. N Hwanghae, Sinpyong, Pyonghwa-ri (MWM). 5–7: *S. kawabei* Kishida, 1991: 5. ♂, holotype, Taiwan, Nantou Hsien, Tsuifeng (BMNH); 6. ♀, paratype, Taiwan, Nantou Hsien, Tsuifeng, (BMNH); 7. ♂, Taiwan, Peov. Taoyuan (MWM). 8–9. *S. imperiatus* Zolotuhin, 2001: 8. ♂, China, N. Sichuan, near Barkam, Zhe Gu Shan pass (MWM); 9. ♀, holotype, A-tun-tse (Nord-Yünnan) (BMNH); 10–11. *S. inthanonensis* Orhant, 2001: 10. ♂, Thailand, Changwat Chiang Mai, Mt. Doi Phahompok, (MWM); 11. ♀, Thailand, Changwat Chiang Mai, Mt. Doi Phahompok (MWM). 12–13. *S. bilinea* Kishida, 1995: 12. ♀, holotype, Nepal, Kathmandu, Godavary (NSMT); 13. ♀, paratype, Nepal, Kathmandu, Godavary (NSMT). 14–16. *S. panga* Zolotuhin & Saldaitis, **sp. nov.**: 14. ♂, holotype, China, N. Sichuan, near Jiuzhaigou (MWM); 15. ♀, paratype, China, Sichuan Prov., Xiling Shan Mts. (MWM); 16. ♂, paratype, China, N. Sichuan, near Jiuzhaigou (coll. Floriani). 17. *S. hun* Zolotuhin & Saldaitis, **sp. nov.**, ♂, holotype, China, Shaanxi, Tsinling Mts, Taibaishan Mt. (MWM). Scale bar: 1 cm.





**PLATE 2.** Figs 18–22. Male genitalia. 18. *S. imperiatus* Zolotuhin, 2001, China; 19. *S. panga* Zolotuhin & Saldaitis, **sp. nov.**, paratype, China; 20. *S. hun* Zolotuhin & Saldaitis, **sp. nov.**, holotype; 21. *S. moltrechti* (Grünberg, 1914), Russia; 22. *S. inthanonensis* Orhant, 2001, Thailand.

***Syrastrenopsis kawabei* Kishida, 1991**

Figs 5–7

*Syrastrenopsis kawabei* Kishida, 1991, *Gekkan-Mushi* 243: 14, figs 2, 3.

TL: Taiwan, Nantou Hsien, Tsuifeng, 2400 m. HT: male (BMNH, London) [examined].

Wingspan 33.5–46.5 mm, forewing length 17.5–24.0 mm. Forewings dark reddish or pinkish brown, medial fasciae dark grey, bordered interiorly by whitish scales. Hindwings darker in both sexes, with two vague transversal grayish bands.

In male genitalia narrow sickle-like or semilunar valvae are diagnostic; apical spur of aedeagus is rather long. In female genitalia antevaginal plate small, rounded, with weak caudal cut; postvaginal plate with two lateral and a single caudal projections, few lateral wrinkles weak, dispersed; ostium broad, membranous; antrum and ductus bursae reduced; corpus bursae short, bag-shaped, membranous, without signum.

**Diagnosis.** Differing from other species by darker red-brown coloration, forewings with whitish transversal fasciae wider than in other species where they are present; female fore tibia with small epiphysis; vaginal plates are very small. The species is apparently endemic to Taiwan. The author gave the following diagnosis for the species: "Closely similar to *moltrechti*, but is separate from it as follows: the body and wings have reddish purple tone, the ante- and postmedian lines are narrower, and the subterminal line is more conspicuously edged with white inside. In the male genitalia, their size is much smaller to compare with the size of moth, valva is short and straight [straight], and a caudal process of aedeagus is thick and short" (Kishida, 1991: 15).

**Bionomics.** Univoltine, flight period from early October to mid February. The moths fly in the first half of the night in humid forests at elevations between 550–2600 m; both sexes are attracted to the light. Preimaginal stages are unknown but *Quercus* spp. are believed to be hostplants. The moths hatch after the first autumnal ground frosts.

**Distribution.** Taiwan (Nantou, Taitung (Tai-Chung), Kaoshiung, Hualien).

**Material examined.** 27 ♂, 3 ♀ from different locations of Taiwan (MWM);

♂, holotype, Taiwan, Nantou Hsien, Tsuifeng, 2400 m, 29.xii.1989, leg. A. Kawabe (BMNH);

♀, paratype, Taiwan, Nantou Hsien, Tsuifeng, 2400 m, 29.xii.1989, leg. A. Kawabe (BMNH);

♂, paratype, Taiwan, Nantou Hsien, Tsuifeng, 2400 m, 29.xii.1989, leg. A. Kawabe (NSMT).

### *Syrastrenopsis imperiatus* Zolotuhin, 2001

Figs 8–9

*Syrastrenopsis imperiatus* Zolotuhin, 2001, *Atalanta* 32: 467, fig. 10c.

TL: [China, N Yunnan], Nord-Yünnan, A-tun-tse, obere Höhe ca. [=high altitudes about] 4500 m. HT: female (BMNH, London) [examined].

**Diagnosis.** Wingspan 36.0 mm and forewing length 18.0 mm in males, and 53 and 26 mm in the single known female. Forewings dark brownish yellow, medias dark grey, very vague bordered interiorly by whitish scales; submarginal fascia weak greyish. Hind wings with external zone slightly darker. The female is the largest species of *Syrastrenopsis* with contrasting prominent medias.

Male genitalia (fig. 18): Broad, flattened, semilunar valvae with regularly convex ventral margin, medially straight dorsal margin, with pointed valvar apex; aedeagus with rounded apical spur typical; vesica with zones of distinct scobination and prolonged lobe above the apical spur.

Female genitalia: Papillae analis short, densely covered by short setae; antevaginal plate strong, broad, almost rectangular with indistinct, rounded, caudal cut; postvaginal plate with obvious caudal cut and numerous lateral wrinkles. Ostium broad, membranous, antrum and ductus bursae reduced, corpus bursae bag-shaped, short, membranous, without signum.

Clearly differing from other species by lacking purplish tint on the brownish-yellow forewings; differs from similarly coloured *S. bilinea* by the presence of whitish bordering fasciae on the forewing. The shape of the valva in the male genitalia and the shape of the vaginal plate are diagnostic genitalic characters.

**Bionomics.** This high mountain species was collected in mid August and throughout September at elevations ranging from 3300 to 4500 m in virgin mixed forest, with swampy and mossy meadows. The habitat is dominated by various species of *Alnus*, *Prunus*, *Quercus*, *Rhododendron*, *Abies*, various species of small bamboos and other smaller shrubs and ferns. Preimaginal stages and hosts are unknown.

**Distribution.** Only known from a few localities in the northern part of Yunnan and western Sichuan on the east edge of the Tibetan plateau.

**Material examined.** ♀, holotype, A-tun-tse (Nord-Yünnan), Obere Höhe ca. 4500 m, 20.viii.1937, H. Höne (BMNH);

2♂, China, N. Sichuan, near Barkam, Zhe Gu Shan pass, H-3300 m, 21.ix.2011, N31°55.625", E102°39.290", Floriani leg.

### *Syrastrenopsis bilinea* Kishida, 1995

Figs 12–13

*Syrastrenopsis bilinea* Kishida, 1995, *Tinea* 14 (*Moths of Nepal* Suppl. 2): 38, fig. 607, pl. 105, figs 3, 4.

TL: Eastern Nepal, Kathmandu, Godavary, 1600 m. HT: female (NSMT) [examined].

Forewing dark yellowish-brown with darker external zone, medial fasciae dark reddish-brown without light shadows, external fascia absent. Hind wings with darker outer margin and two smooth transversal reddish-brown fasciae; fore tibia with short epiphysis.

In female genitalia both pairs of apophyses are of the same length, long and narrow; antevaginal plate weak, short, with few wrinkles.

Males unknown so far.

**Diagnosis.** The basic wing pattern is nearly the same as that of *S. moltrechti* and *kawabei*, but the ground color of both wings is paler brown and not tinged with red, the submarginal line of the forewing is absent, and the median fasciae of the hind wing is more prominent.

Differs from congeners by yellow saturated wings, absence of any light transversal fasciae, patterned hind wings and having the smallest epiphysis. Genitalic characters including the small antevaginal plate should confirm the identification.

**Bionomics.** Believed to be univoltine, with flight period in late August to early December; is known from 1500–1600 m. Females attracted to the light. Preimaginal stages still unknown

**Distribution.** Nepal (Godavary), N India (Kumaon-Himalaya). New for India.

**Material examined.** ♀, holotype, Nepal, Kathmandu, Godavary, 1600 m, 2.xii.1991 (NSMT);

♀, paratype, Nepal, Kathmandu, Godavary, 1600 m, 3.xii.1991 (NSMT);

♀, N.-India, Bhimtal (Kumaon), 1600 m, 24.viii–03.ix.1980, leg. A.Hauenstein & S. Ihle (coll. Armin Hauenstein);

♀, N.-India, Bhimtal (Kumaon), 1500 m, 02.ix.2003, leg. Peter Smetacek (coll. Armin Hauenstein).

### ***Syrastrenopsis inthanonensis* Orhant, 2001**

Figs 10–11

*Syrastrenopsis inthanonensis* Orhant, 2001, *Bull. Soc. ent. Mulhouse* 57(1): 6, figs 1, 2.

Type-locality: “Thaïlande, Doi Inthanon, Chiang Mai”. Holotype: male (coll. G. Orhant) [after colour photo examined].

Wingspan 33–36 mm in males and 47 mm in female, forewing length 18–20 mm in males and 25 mm in female. Forewings rosy-brown, external field covered by greyish scales; both medial fasciae dark brown, distinct, almost parallel; slightly concave diagonal lines, flecked inside with creamy rose scales; external fasciae present as a vague grey band, also flecked inside with creamy rose scales; external edge creamy rose; cilia grey-brown; discal spot vague but clearly visible, dark brownish-grey, absent in some specimens; hindwings of the same ground colour, with two vague brownish-grey transversal bands in medial zone; wing scaling weak, making the wings appear semitransparent with strong iridescent shine; body brownish-cream colour, darker dorsally; thorax with blackish-brown dorsal line; foretibia with elongated epiphysis (as long as one third of the tibial length).

Male genitalia (fig. 22): tegumen narrow; socii small, membranous; vinculum broad, with distinct saccus; valva with curved conical upper lobe and flattened semilunar lower lobe; aedeagus short tubular with curved apical spur; vesica with two zones of point-like scobination.

**Diagnosis.** With its semitransparent wings, iridescent shine, pale coloration and distinctly obscure discal spot, the species cannot be confused with the other members of the genus. The relatively short epiphysis is typical, and in the male genitalia, the semilunar lower lobe of the valva is characteristic of the males.

**Bionomics.** Preimaginal instars and biology are unknown. All moths were collected at lights at 2050–2370 m from November to mid December. The 18.v.1999 (Orhant, 2001: 7) collecting date on the holotype is assumed to be incorrect.

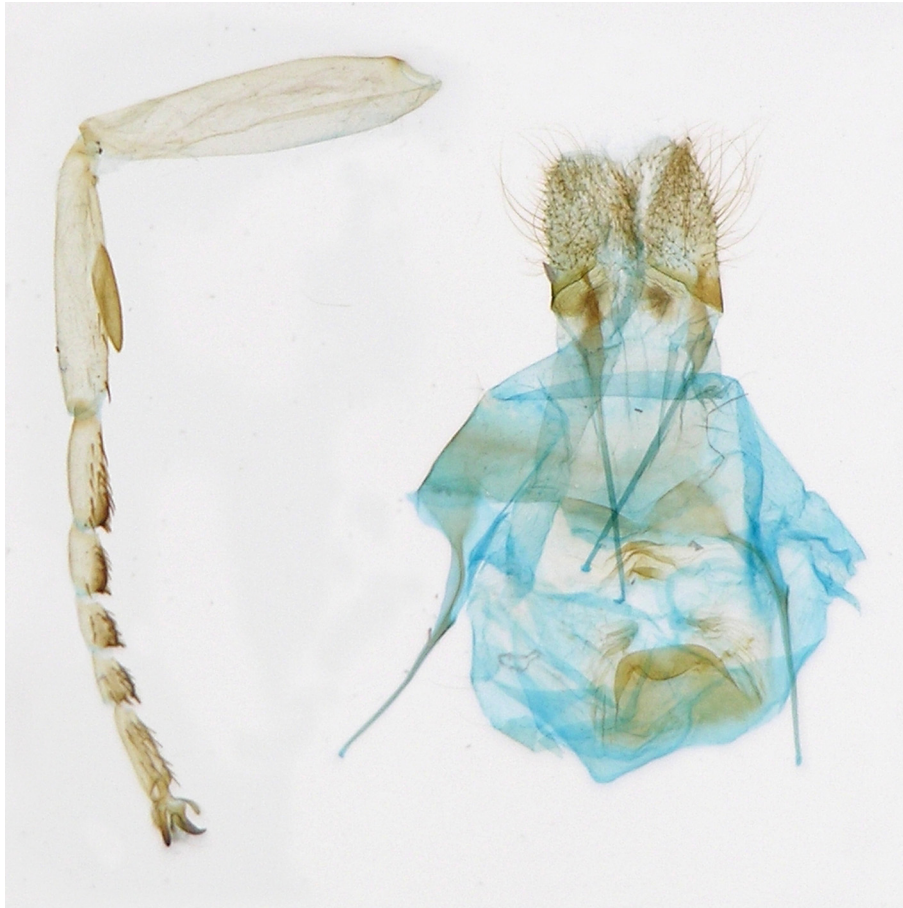
**Distribution.** The only records are from Prov. Chiang Mai, Thailand (Doi Inthanon, from 37.5 to 45.5 km N of Chom Thong, 10 and 18 km NW of Fang).

**Material examined.** 14 ♂, 1 ♀ from Chiang Mai of Thailand (MWM).

### ***Syrastrenopsis panga* Zolotuhin & Saldaitis, sp. nov.**

Figs 14–16

Holotype: ♂, China, N. Sichuan, near Jiuzhaigou, H-2100 m, 24.ix.2011, N33°18.955", E103°55.531", Floriani leg. (MWM).



**FIGURE 23.** *Syrastrenopsis panga* Zolt. & Saldaitis, **sp. nov.**, female fore leg and genitalia.

Paratypes: 5 ♂, the same data like holotypus (coll. Floriani), 2 ♂, 3 ♀, China, N. Sichuan, near Jiuzhaigou, H-2161 m, 13–17.x.2012, N 29°87.340", E102°30.970", A. Floriani leg. (coll. Floriani);

3 ♀, China, Sichuan Prov., Xiling Shan Mts., 1700 m, 50 km W Dayi, 25.x–7.xi.2006, leg. J. S. Lou (MWM).

**Description.** Wingspan 36–37 mm in males and 43–44 mm in female, forewing length 17–17.5 mm in males and 22.5–23 mm in female. Forewings dark pinkish brown; external field contrast covered by pale greyish scales. Both medial fasciae present as dark purple brown, distinct, almost parallel straight slightly diagonal lines, pointed inside with creamy rose scales; external fasciae present as a vague pinkish band, visible by creamy rose inner scales forming wide pale coloured field; external edge pinkish brown; cilia grey-brown; discal spot absent; hindwings the same ground colour, without distinct or prominent pattern; body brownish-cream, darker dorsally; thorax with blackish-brown dorsal line; foretibia with elongated epiphysis (as long as one half of the tibial length in the males and one third in the females—fig. 23). Females similarly patterned but much paler and with yellowish ground color, with weaker purplish saturation.

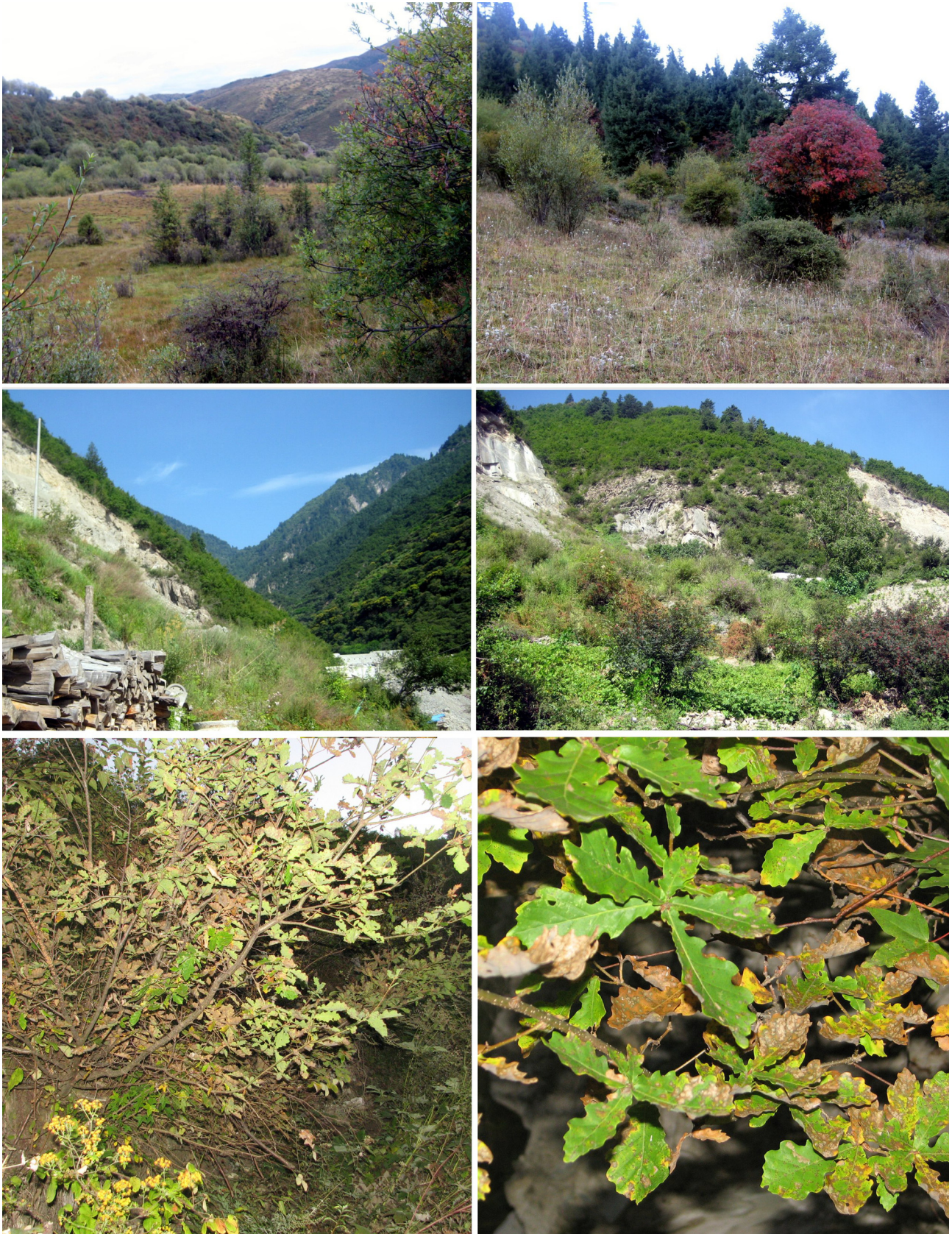
Male genitalia (fig. 19): similar to other congeners, valva rather narrow, convex, semilunar or sickle-like but with characteristic angled ventral margin and triangularly concave dorsal margin and pointed apex; aedeagus short tubular with curved apical spur; vesica with two zones of point-like scobination.

Female genitalia (fig. 23): Apophyses of eighth sternite about  $\frac{1}{4}$  shorter than that of ninth sternite, both slender and narrow; antevaginal plate weak; postvaginal plate W-shaped; antevaginal as short trapezium; there are some short concentric wrinkles caudally, weak wrinkles around ostium.

**Diagnosis.** Very dark and contrasting forewings with prominent pale fasciae, and sickle-shaped valvae with angled ventral margins are diagnostic for this species.

**Bionomics.** Eight males and three females were collected at ultraviolet light from the end of September 2011 to the beginning of October 2012 in the Min Shan mountains. The area (fig. 24) was little known before 1975 and is near the incomparable Jiuzhaigou National Park. The climate in the valley is cool, with a mean annual temperature of 7.2 °C and total annual rainfall of 661 mm, 80% of which occurs between May and October.





**FIGURE 24.** *Syrastrenopsis panga* Zolt. & Saldaitis, **sp. nov.**, biotopes in Min Shan mountains and bushes of local *Quercus*, presumably host.



Jiuzhaigou's ecosystem is classified as temperate broad-leaved forest and woodlands, with mixed mountain and highland systems. Nearly 300 km<sup>2</sup> of the core scenic area are covered by virgin mixed forests and are home to oaks (very abundant local species, shrubby, but with foliage similar to European *Q. robur*), endemic varieties of rhododendrons and bamboos, and the endangered giant panda. Other Lasiocampidae species collected there at that time included typical autumnal fliers such as *Trabala vishnou* (Lefebvre, 1827), *Pyrosis rotundipennis* (de Joannis, 1929), *Malacosoma insignis* de Lajonquière, 1972, and *Kunugia undans* (Walker, 1855). Three females were collected between late October and early November, 2006 in the Xiling (Snow) Shan mountains in near proximity to Min Shan, in the same Sichuan Province.

**Distribution.** So far only known from two mountain localities in Sichuan Province.

**Etymology.** Panga—mythological progenitor of China.

### *Syrastrenopsis hun* Zolotuhin & Saldaitis, sp. nov.

Fig. 17

Holotype: ♂, China, Shaanxi, Tsinling Mts, Taibaishan Mt., 33°55'N, 107°44'E, 3050 m, Aug. 2004, leg. V. Siniaev & his team (MWM).

Paratype: ♂, same data (coll. V. Zolotuhin).

**Description.** Wing span 37 mm, forewing length 17.5 mm. Forewings reddish or pinkish brown, medial fasciae dark grey; hind wings darker, without streaks. The species resembles *S. moltrechti* in appearance being larger and with distinctly prominent pale pinkish fasciae along the external band.

Male genitalia (fig. 19): similar to congeners, but with unusual valvar shape that resembles a shoe being almost triangular, rather wide, with a characteristic angled ventral margin straight in the basal part but concave in the caudal part; dorsal margin almost straight; apical part is narrowly rounded. Saccus longer than in other congeners; juxta with low medial lobes; aedeagus short tubular with slightly curved apical spur; vesica with two zones of point-like scobination and two (caudal and cranial) lobes.

Female is unknown.

**Diagnosis.** Shape of valva is diagnostic; externally prominent pale pinkish fasciae along the external band are characteristic.

**Bionomics.** Both males were collected at light in August 2004 in high mountain forest with oaks at an altitude of 3050 m.

**Distribution.** The species is only known from its type locality in Shaanxi Province.

**Etymology.** Hun (Chinese)—red.

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