

# Taxonomic study of *Isochlora* Staudinger (Lepidoptera: Noctuidae) from Xizang, China

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**Abstract:** In this paper, we record seven species of the genus *Isochlora* Staudinger, 1882 collected in 2023 from the steppe mountains of northern and eastern Xizang, including one newly recorded species from China: *Isochlora metaphaea* Hampson, 1906, and two new records from Xizang: *Isochlora (Grumia) carriei* (Boursin, 1963) and *Isochlora (Chamyla) zoeldice* Gyulai & Ronkay, 2001. We describe these three species. Morphological pictures of the adults, male and female genitalia and a geographical distribution map are provided.

**Key word:** Noctuinae; Noctuini; taxonomy

## 中国西藏绿夜蛾属 *Isochlora* 分类研究（鳞翅目：夜蛾科）

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**摘要:** 本文涉及作者 2023 年采集自西藏北部和东部草原山地的 7 个绿夜蛾属物种, 其中包括 1 中国新记录种: *Isochlora metaphaea* Hampson, 1906 和 2 个西藏新记录种: *Isochlora (Grumia) carriei* (Boursin, 1963); *Isochlora (Chamyla) zoeldice* Gyulai & Ronkay, 2001。文中对以上 3 种进行了详细描述, 并提供了各种的成虫、雌雄外生殖器形态特征图和地理分布图。

**关键词:** 夜蛾亚科; 夜蛾族; 分类

## Introduction

The genus *Isochlora* Staudinger, 1882 currently belongs to the subtribe Noctuinae of the tribe Noctuini of the subfamily Noctuinae (Kononenko 2005; Zahir *et al.* 2013). In 2023, Volynkin *et al.* (2023) made detailed explanations and clarifications of *Isochlora* Staudinger, 1882. In this paper, we follow the concept that the genus *Isochlora* Staudinger, 1882 currently belongs to the subtribe Noctuina of the tribe Noctuini of the subfamily Noctuinae (Alphéraky 1882, 1892, 1897; Boursin 1940; Poole 1989; Lafontaine 1998; Hreblay *et al.* 1998; Gyulai & Ronkay 2001, 2006; Babics *et al.* 2008). The coloration of the forewings of the genus is mostly

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green or pinkish-green, partly yellow or grayish-brown, and the apical angle of the forewing is slightly pointed; very few mottled patterns are the main identifying characters (Chen 1991, 1999). The Tibetan-Himalayan Region has the highest diversity of this genus and many species have been described from this region (Hreblay *et al.* 1998, Gyulai & Ronkay 2001, 2006).

*Isochlora* species in Xizang mainly occur in the highland mountains or wetlands from July to August each year, and the collection area extends from the northwestern end to the eastern end of Xizang, with a total of seven species collected: *I. straminea* (Leech, 1900); *I. metaphaea* Hampson, 1906; *I. goliath* Hreblay & Plante, 1998; *I. viridis albivitta* Alphéraky, 1892; *I. ossicolor* Hreblay & Plante, 1998; *I. (Grumia) carriei* (Boursin, 1963); and *I. (Chamyla) zoeldice* Gyulai & Ronkay, 2001. Among these species *I. metaphaea* is recorded for the first time in China, while *I. carriei* and *I. zoeldice* represent the first records in Xizang. Refocusing on studying and describing these species will affect subsequent research. At the same time, it provides fundamental support for insect diversity and conservation in Xizang.

## Material and methods

Dissected genitalia in anhydrous ethanol were photographed after being pressed and embedded in glycerol for preservation. The photographs of adults were taken using Canon EOS 5D Mark IV camera equipped with Canon EF 100 mm f/2.8L Macro USM lens. The genitalia were imaged using a Leica EZ24D microscope attached with imaging system. All photographs were processed using the Adobe Photoshop CC 2019 software.

The male and female genitalia terminology follows the standard of Fibiger (1997) and Kononenko (2010). The distribution map was constructed using the ArcGIS 10.6 (ESRI, Inc., Redlands, CA, USA) (Fig. 8).

Abbreviation of the depository used: TU = Tibet (Xizang) University.

## Taxonomy

### Genus *Isochlora* Staudinger, 1882

*Isochlora* Staudinger, 1882: 39 (Type species: *Isochlora viridis* Staudinger, 1882, by monotypy).

*Grumia* Alphéraky, 1892: 453 (Type species: *Grumia flora* Alphéraky, 1892, by monotypy).

*Chamyla* Staudinger, 1900: 343 (Type species: *Chamyla idia* Staudinger, 1900, by monotypy).

Adult rostrum well-developed, lower lip whiskers extended upwards, smooth forehead without protuberances. Eyes large, round. Male antennae bipectinate, pectinate teeth long; female antennae serrate, evenly distributed on both sides. Thorax hairy, generally same colour as forewings. Tibial segments of middle and hind feet spiny. Abdomen hairy on both sides. Wings usually green or pinkish green, sometimes yellow or greyish brown, forewings elongated, apical angle slightly pointed, very few markings.

#### 1. *Isochlora straminea* (Leech, 1900) (Fig. 1)

*Heliopsis straminea* Leech, 1900: 24; TL: W. China, How-kow.

*Isochlora (Isochlora) straminea* Gyulai & Ronkay, 2006: 250.

**Specimens examined.** 5♂ 1♀, **China**, Xizang, Gyari County, Nagchu City, 16-VII-2023, H 4488, E 93°17'23", N 30° 38'19".

Distribution. China (Xizang, Yunnan).

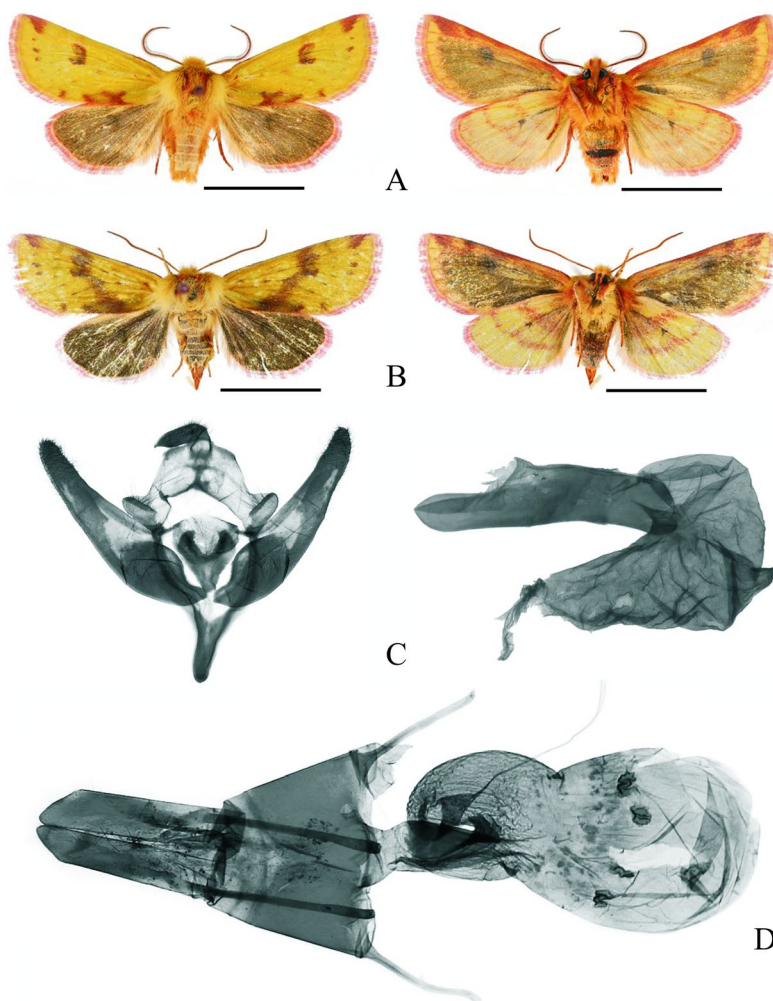


Figure 1. *Isochlora straminea* adults and genitalia. Adults: A. *I. straminea*, male; B. *I. straminea*, female. Genitalia: C. *I. straminea*, male; D. *I. straminea*, female.

## 2. *Isochlora metaphaea* Hampson, 1906 (Fig. 2), new record to China

*Isochlora metaphaea* Hampson, 1906: 488, pl. 36, f. 2; TL: Sikkim.

*Isochlora (Isochlora) metaphaea* Gyulai & Ronkay, 2006: 250.

Description (Figs 2A, 2B). Wingspan 38–51 mm. Male antenna bipectinate. Head green. Thorax and tegulae greener. Abdomen pale whitish-yellow. Forewing overall green color. Antemedial line, orbicular stigma and oedial shadow do not show; male reniform white crescentic, inconspicuous in some individuals. Subterminal line does not show. Cilia greener. Hindwing lemonchiffon peripherally, pale grayish brown centrally. Discal spot with black irregular spots on ventral. Cilia greener.

Male genitalia (Fig. 2C). Uncus falcate, weakly setose, slightly dilated postmedially, distally tapered. Tegumen with broad arch and apically rounded penicular lobe. Vinculum with V-shaped and apically rounded tip. Saccus V-shaped. Valva elongate, gradually tapering distally, with dense setae apically. Sacculus short (slightly shorter than 1/2 of valva length), broad proximally (ca. 2/3 of valva width) and distally tapered. Harpe thumbnail, distally wide. Juxta shield-shaped with medial depression, medial depression with dorsal fin-like projection, distally protrudes. Phallus cylindrical, slightly downcurved medially, with rounded coecum. Carina strongly sclerotized of proximal, bearing small appendage. Vesica recurved ventrally, dilated dorsally in middle, and distally tapered, with smaller diverticulum proximally and distally, weakly granular medially and distally, distally covered with weaker setae.

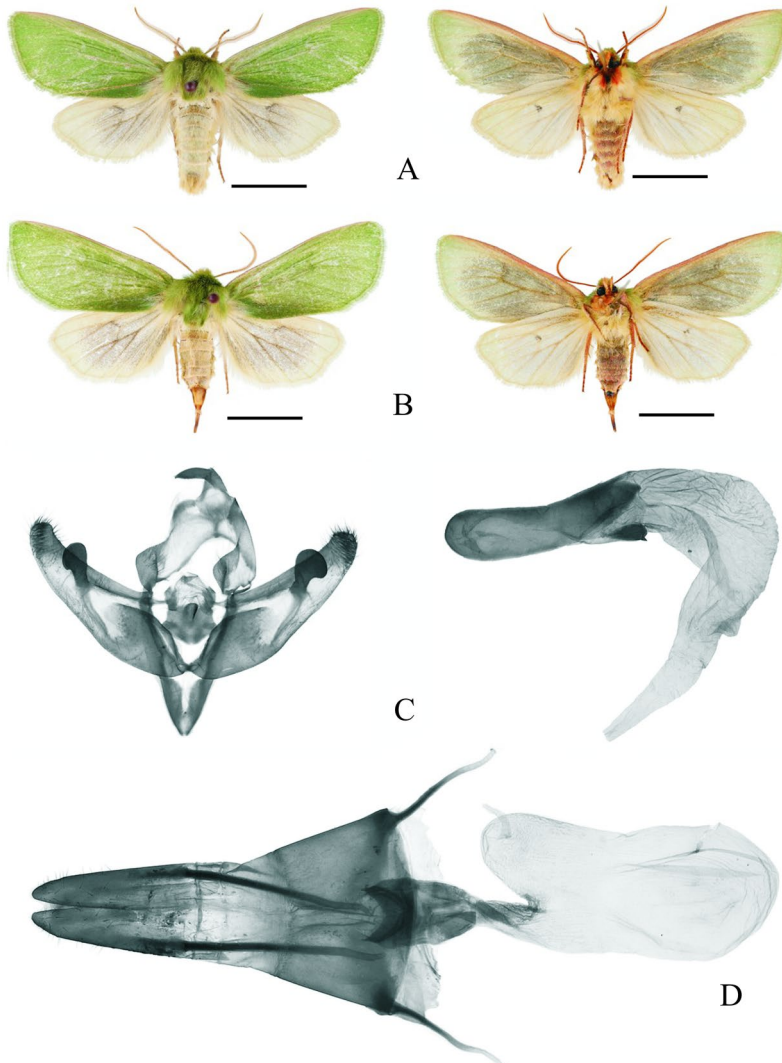


Figure 2. *Isochlora metaphaea* adults and genitalia. Adults: A. *I. metaphaea*, male; B. *I. metaphaea*, female; Genitalia: C. *I. v. albivitta*, male; D. *I. v. albivitta*, female.

Female genitalia (Fig. 2D). Ovipositor elongate and conical. Papilla analis elongate rectangular with rounded corners, with reduced setae. Apophyses strongly elongate, rod-like and distally flattened, apophysis posterioris somewhat longer than apophysis anterioris, distal cusp of anterior apophysis pointed. Apophysis posterioris strongly elongated, rod-like and distally tapered, apophysis anterioris 2/3 as long as apophysis posterioris, apophysis anterioris distally tapered. Ductus bursae tubular, severely sclerotized, antrum U-shaped. Corpus bursae oval, rugose and weakly sclerotized, anterior broad teardrop. Appendix bursae semi-elliptic membranous, overall rugose.

**Specimens examined.** 4♂ 1♀, **China**, Xizang, Gyari County, Nagchu City, 15-VII-2023, H 4936.3, E 92°54'40.06", N 30°45'36.43"; 2♂, next to National Highway 216, Tsoqin County, Ali Prefecture, 30-VII-2023, H 5051, E 85°10'30.23", N 31°26'41.76".

Distribution. China (Xizang), Sikkim.

### 3. *Isochlora goliath* Hreblay & Plante, 1998 (Fig. 3)

*Isochlora goliath* Hreblay & Plante, 1998: 108; TL: Xizang, 20 km E of Old Tingri.

*Isochlora (Isochlora) goliath*; Gyulai & Ronkay, 2006: 250.

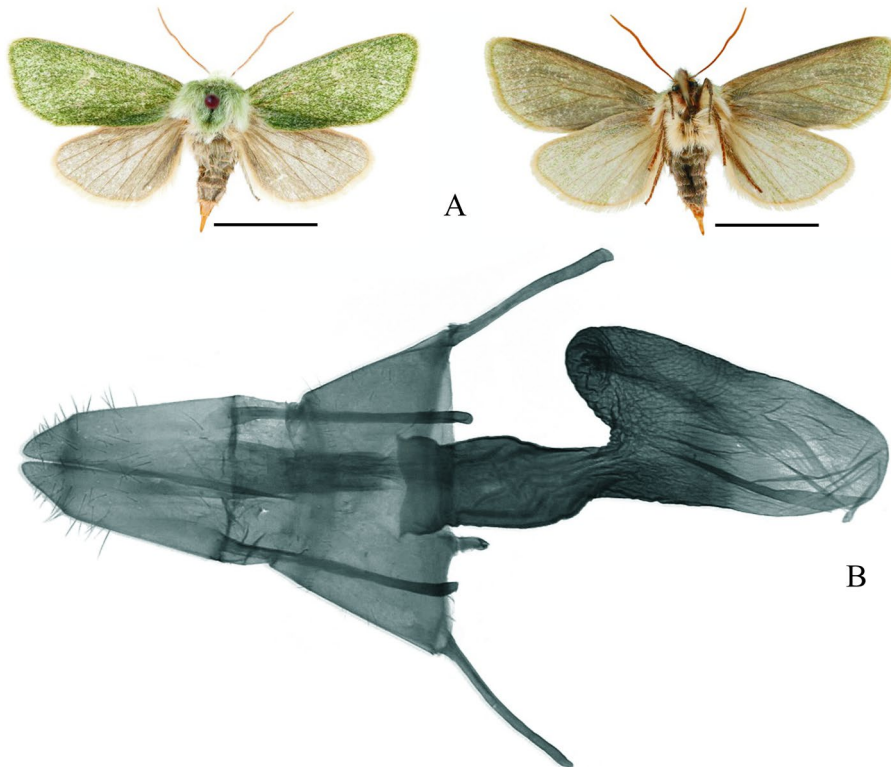


Figure 3. *Isochlora goliath* adults and genitalia. Adults: A. *I. goliath*, female; Genitalia: B. *I. goliath*, female.

**Specimens examined.** 1♀, **China**, Xizang, Gyari County, Nagchu City, 16-VII-2023, H 4488, E 93°17'23", N 30°38'19".

Distribution. China (Xizang).

#### 4. *Isochlora viridis albivitta* Alphéraky, 1892 (Fig. 4)

*Isochlora albivitta* Alphéraky, 1892: 448; TL: Amdo region, Guj-duj.

*Isochlora viridis albivitta* Gyulai & Ronkay, 2001: 656; Gyulai & Ronkay, 2006: 249.

**Specimens examined.** 6♂, **China**, Xizang, Ritu County, Ngari Prefecture, next to National Highway 219, 26-VII-2023, H 5115.6, E 80°19'29", N 34°37'33".

**Distribution.** China (Xinjiang, Xizang, Sichuan, Gansu, Qinghai).

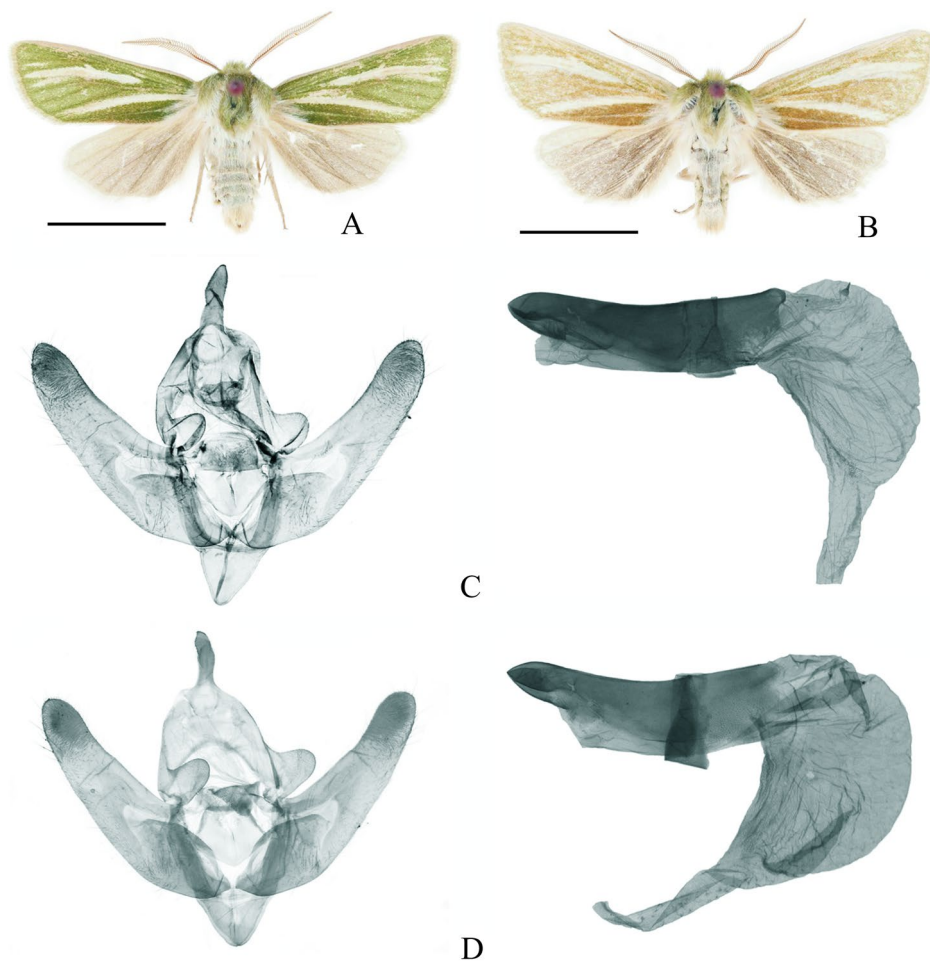


Figure 4. *Isochlora viridis albivitta* adults and genitalia. Specimens and dissections: TU. Adults: A, B. *I. v. albivitta*, male; Genitalia: C, D. *I. v. albivitta*, male.

#### 5. *Isochlora ossicolor* Hreblay & Plante, 1998 (Fig. 5)

*Isochlora ossicolor* Hreblay & Plante, 1998: 109; TL: Xizang, Mayum La (Pass), E side.

*Isochlora (Isochlora) ossicolor* Gyulai & Ronkay, 2006: 250.

**Specimens examined.** 4♂, **China**, Xizang, Coqen County, Ngari Prefecture, next to National Highway 216, 30-VII-2023, H 5051, E 85°10'0", N 31°26'41".

**Distribution.** China (Xizang).

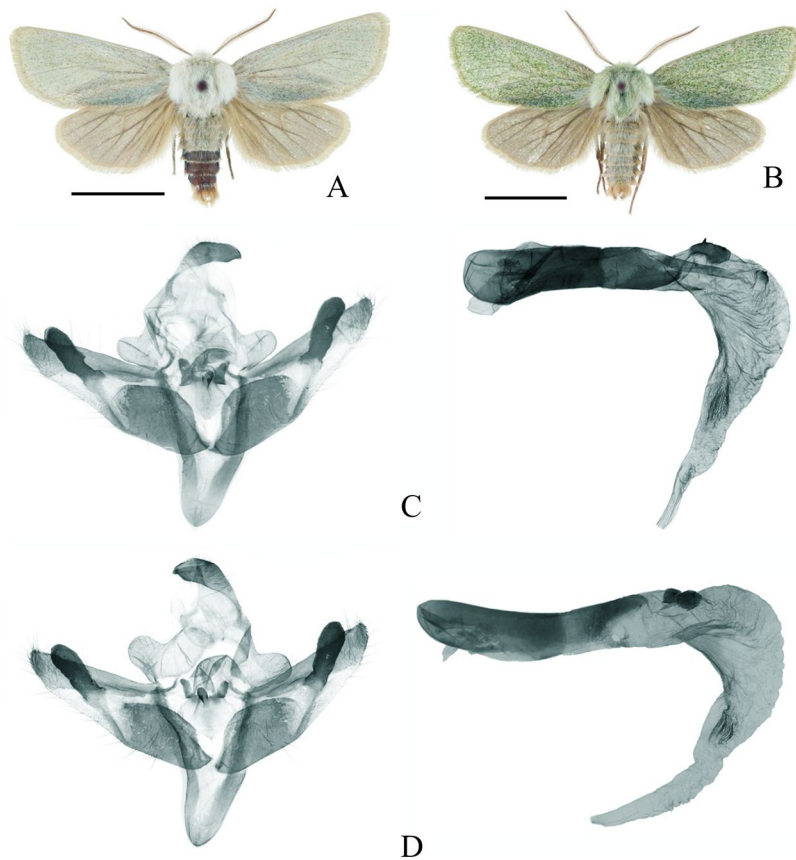


Figure 5. *Isochlora ossicolor* adults and genitalia. Adults: A, B. *I. ossicolor*, male; Genitalia: C, D. *I. ossicolor*, male.

6. *Isochlora (Grumia) carriei* (Boursin, 1963) (Fig. 6), new record for Xizang

*Grumia carriei* Boursin, 1963: 124, pl. 21, f. 2–4; TL: Batang.

*Isochlora (Grumia) carriei*; Gyulai & Ronkay, 2006: 250 (list).

Description (Fig. 6A). Wingspan 34 mm. Antenna bipectinate. Head greener. Thorax green. Abdomen pale pink. Forewing ground colour green. Costal margins dark pink, wider underside area. Antemedial line, orbicular stigma and medial shadow invisible. Pink semicircular spot with reniform postmedial line not visible. Cilia green. Hindwing grayish brown. Costal margins pink, ventral pink area wider. Discal spot not visible. Cilia pale green and whitish-yellow.

Male genitalia (Fig. 6B). Uncus falcate, weakly setose, distally tapered. Tegumen with broad arch and apically rounded small penicular lobe. Vinculum U-shaped. Juxta bowl-shaped with deep medial depression. Saccus short V-shaped. Valva rod-shaped, gradually tapering distally, with dense setae apically. Sacculus short (slightly shorter than 1/2 of the valva length), broad proximally (ca. 2/3 of the valva width). Phallus cylindrical, with rounded coecum. Vesica recurved ventrally, dilated dorsally, and distally tapered, distally covered with weaker setae, middle to end densely covered with fine setae.

**Specimens examined.** 1♂, China, Xizang, Gyari County, Nagchu City, 16-VII-2023, H 4488, E 93°17'23", N 30°38'19".

Distribution. China (Sichuan, Xizang).

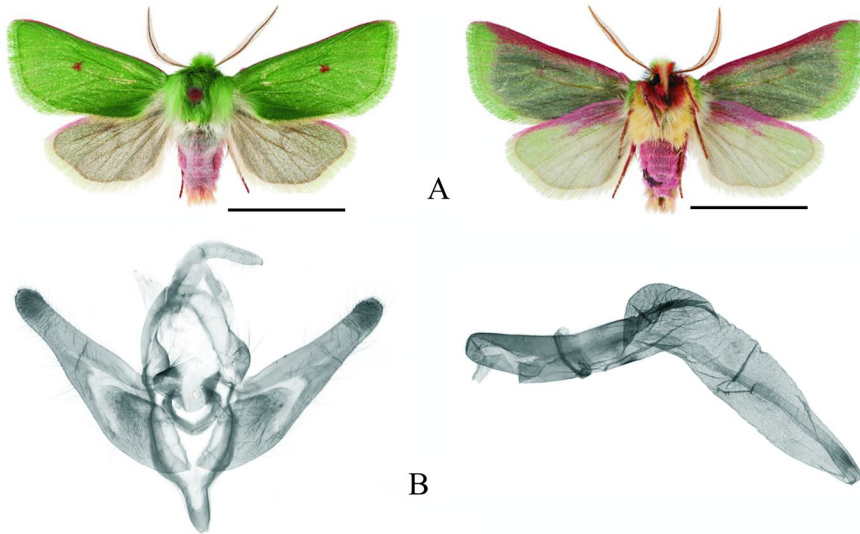


Figure 6. *Isochlora (Grumia) carriei* adults and genitalia. Adults: A. *I. (G) carriei*, male; Genitalia: B. *I. (G) carriei*, male.

**7. *Isochlora (Chamyla) zoeldice* Gyulai & Ronkay, 2001** (Fig. 7), new record for Xizang

*Isochlora (Chamyla) zoeldice* Gyulai & Ronkay, 2001: 664; TL: China, Qinghai, 30 km NW of Zadoi City, 4,500–5,000 m.

*Isochlora (Chamyla) zoeldice* Gyulai & Ronkay, 2006: 250.

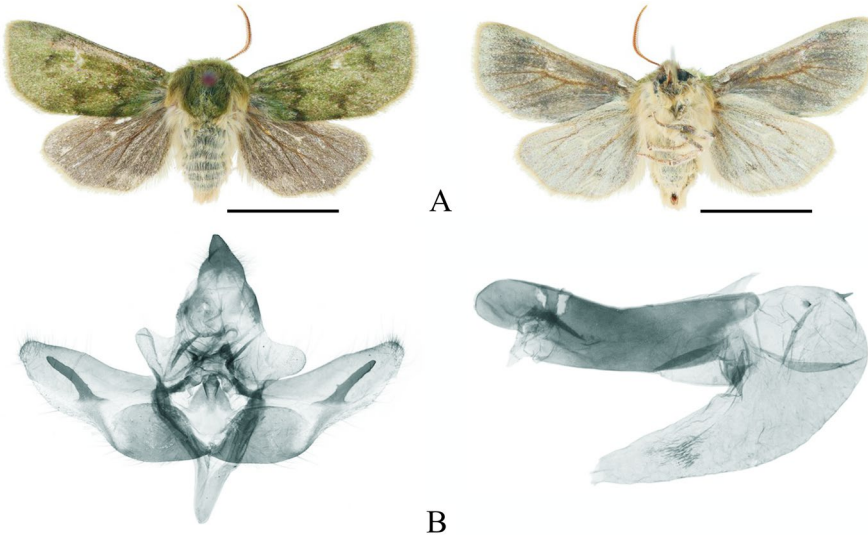


Figure 7. *Isochlora (Chamyla) zoeldice* adults and genitalia. Adults: A. *I. (C) zoeldice*, male; Genitalia: B. *I. (C) zoeldice*, male.

Description (Fig. 7A). Wingspan 36 mm. Antenna bipectinate. Head and thorax gray-green scaly hair, tegulae gray-green and with goose-yellow scales. Abdomen base color brown, surface covered with yellowish. Forewing gray-green. Basal line not visible. Antemedial line brownish-green wavy. Orbicular not visible. Reniform grayish-white, crescentic. Postmedial line brownish green, inwardly oblique. Cilia yellowish. Hindwing pale brown. Discal spot weakly white. Cilia yellowish.

Male genitalia (Fig. 7B). Uncus triangular, weakly setose, with basal expansion, distally acute. Tegumen broadly lamellate, with apically elliptic penicular lobe. Vinculum with V-shaped and apically rounded tip. Saccus narrower V-shaped. Juxta triangular, apically with an inverted conical projection, lower side rounded and convex. Valva flaky, gradually narrowing distally, distal part rounded, with dense setae apically. Sacculus short (slightly shorter than 1/2 of the valva length), broad proximally (ca. 2/3 of the valva width). Phallus cylindrical, slightly downcurved medially, with rounded coecum. Vesica recurved ventrally, dilated dorsally, and distally tapered, distally covered with patches by weaker bristles. Two subbasal–submedial cornuti of different size.

**Specimens examined.** 4♂, **China**, Xizang, Coqen County, Ngari Prefecture, next to National Highway 216, 30-VII-2023, H 5051, E 85°10'0", N 31°26'41".

Distribution. China (Xinjiang, Xizang).

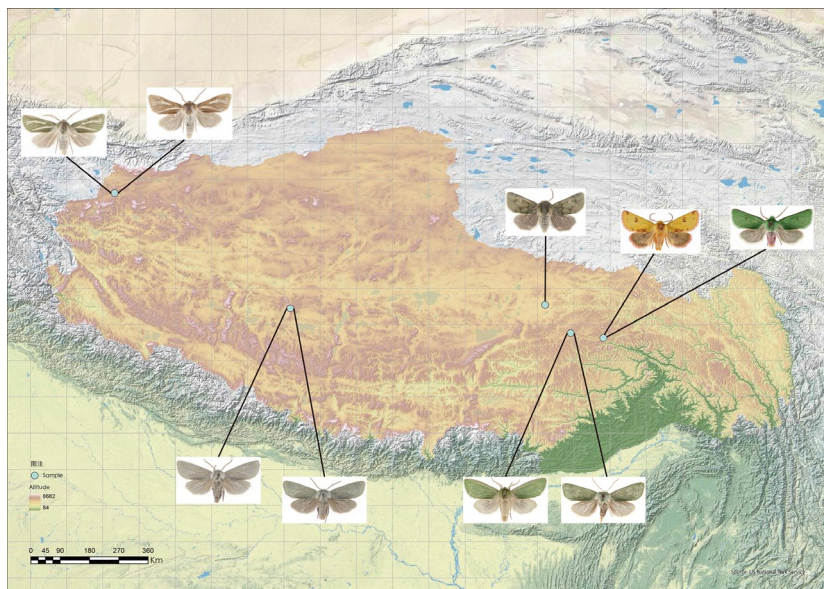


Figure 8. Distribution map of *Isochlora* spp. in Xizang, China.

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