

# One new species in the genus *Rhyacia* Hübner (Lepidoptera: Noctuidae) from Xizang, China

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**Abstract:** The genus *Rhyacia* belongs to the subfamily Noctuinae of the family Noctuidae in Lepidoptera and is widely distributed in China with 8 previously characterized species. In this study, a new species in the genus, *Rhyacia jialiensis* sp. nov., is described. The adult and external genitalia photos comparing *Rhyacia mirabilis* Boursin, 1954 and *Rhyacia jialiensis* sp. nov. are provided.

**Key words:** Noctuoidea; Noctuinae; taxonomy

## 中国沁夜蛾属 *Rhyacia* Hübner 一新种记述 (鳞翅目: 夜蛾科)

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**摘要:** 沁夜蛾属 *Rhyacia* 隶属于鳞翅目 Lepidoptera 夜蛾科 Noctuidae 夜蛾亚科 Noctuinae, 我国分布有 8 种。本文记述该属 1 新种: 嘉黎沁夜蛾 *Rhyacia jialiensis* sp. nov., 提供了新种及近缘种异沁夜蛾 *Rhyacia mirabilis* Boursin, 1954 的成虫和外生殖器特征图。

**关键词:** 夜蛾总科; 夜蛾亚科; 分类

## Introduction

The genus *Rhyacia* Hübner, 1821 belongs to the subfamily Noctuinae in the family Noctuidae, and was established with *Rhyacia lucipeta* (Denis & Schiffermüller, 1775) as the

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type species (Varga 1990, 1996; Chen 1999). *Rhyacia* is a diverse pan-Palearctic genus with only a few species known to be Neopalaearctic (Hacker & Varga 1990; Gyulai & Ronkay 2001; Volynkin 2011; Gyulai 2021), and currently contains 39 species in six subgenera worldwide. The six subgenera are: *Lafontainea* Varga, 2011; *Stenorhyacia* Varga, 2011; *Dichorhyacia* Varga, 2011; *Anchorhyacia* Varga, 2011; *Ororhyacia* Varga, 2011; and *Standfussrhyacia* Hacker & Varga, 1990. Until now, eight species in *Rhyacia* were identified in China, of which *Rhyacia mirabilis* Boursin, 1954 was the earliest identified and showed a wide geographical distribution. The moths described here were found in eastern Xizang (Aug. 2023). Collected specimens were compared and interestingly, male specimens of *Rhyacia jialiensis* present similar genitalia structures as *Rhyacia mirabilis*, but yield distinctive morphological traits, e.g., wing color, stripes, length, etc. Therefore, our collected moth specimens represent a distinct new species in the genus *Rhyacia*. This is significant in the study of moth diversity in the Tibet-Qinghai Plateau.

This study illustrates the morphological classification of sets of moth species collected before August 2023. A classical morphological taxonomy protocol following the original literature published on the type specimen was deployed and confirmed by insect classification scholar Péter GYULAI. A new species collected from eastern Xizang and a closely related species also in the genus *Rhyacia* (*Rhyacia mirabilis* collected in northern Xizang) are described in this study, and the morphological traits and differences of this new species are described in detail with clear photos of the adult and male genitalia.

## Material and methods

Abbreviation for the collections. TU — Tibet University (Lhasa, China); ZFMK — Zoologisches Forschungsmuseum Alexander Koenig (Bonn, Germany); GYP — Péter Gyulai (Miskolc, Hungary). Other abbreviations used in the illustrations: HT — holotype; PT — paratype. In the type label citations, information provided in quotation marks is transcribed verbatim. Any additional data are provided in square brackets.

The genitalia were dissected applying standard methods of preparation (Kononenko 2010), then stained with Eosin B and embedded on microscope slides. The photos of adults deposited in TU were taken using the Canon 5DIX camera while the photos of genitalia were taken using the LEICA EZ4 WD camera. All pictures were processed using the Adobe Photoshop CC 2020 software. The male genitalia terminology follows Fibiger (1997), Kononenko (2010) and Kiss (2017).

## Taxonomy

### Genus *Rhyacia* Hübner, 1821

Type species: *Noctua lucipeta* Denis & Schiffermüller, 1775, by original designation.

### Subgenus *Rhyacia* Hübner, 1821

#### 1. *Rhyacia (Rhyacia) jialiensis* Chen & Zhou sp. nov. (Figs 1A–F, 2E, 2 F, 3A, 3B)

Description. Adults (Figs 1A–F). Forewing length 36–38 mm. Head light gray with pale yellowish brown. Antennae linear, slightly stout, finely ciliate. Thorax grayish scaly mixed

with light yellowish brown and gray scaly hairs, including patagia and tegulae. Forewing ground colour gray, saturated grayish-white scales, with medial area and additional spot area coloured brick band. Basal line bilinear, grayish-white, with black shading on both sides, terminating at basal streak. Basal streak light brick color. Basal line and medial line between gray-black and gray-white mixed, light black on trailing edge. Antemedial line single, light black, serrated inwards with grayish-white and light brick scale pattern. Middle chamber filled with light brick color patches. Orbicular is annulus, black. Medial line inconspicuous, with a black spot on the anterior marginal vein. Malpighian tubules are kidney-shaped, black, surrounded by a ring of grayish-white scale. Postmedial line is single line, black, serrate, with grayish-white spots at the end of the teeth of each wing vein. Ternal streak is a light brick-red band. Subterminal line gray, lined on the outside with grayish white. Terminal line with a black semicircular spot between each wing vein. Forewing cilia yellowish brown. Forewing ventrally dark brown, with a long yellow stripe in the middle of the C line. Terminal field outer margin to grayish brown. Hindwing grayish brown. Discal spot light black semilunar. Subterminal line dark gray, serrate. Terminal line black spotted. Hindwing cilia yellowish brown, slightly lighter than forewing. Venter of hindwing yellowish-white. Discal spot distinct and black. Medial band also distinct as black band. Male genitalia (Figs 2E, 2F, 3A, 3B ). Uncus falcate, tapering basally to tip, tip slightly sharp. Tegumen short and broad, without peniculus. Juxta discoid or cordate, discoid juxta with upper end arcuate upwardly convex, lower end broadly columnar, cordate juxta with middle of upper end concave, lower end obtuse flat. Saccus slightly U-shaped, broad and thick. Clasper lamellated, smoothly upward pointing, apically rounded. Costa short, more ossified, curved upward and weakened at middle, covered with few setae. Cucullus end rounded, covered with fine and weak setae, sparse. Sacculus broad ventrally, weakened at middle, narrowing towards ventral margin. Valvae almost evenly broad, cucullus section slightly curved ventrally and rounded terminally, corona with a row of fine spines. Clavus heavily sclerotized, huge, evenly wide and curved dorsad, with fine teeth in the inner surface distally, extending almost to base of harpe. Harpe stout, shaped like a leg, basally stout, columnar at middle, hammer-shaped at end, basal ridge extending ventrally to middle of claspers, arcuate, laterally curved. Aedeagus cylindrical, more ossified from middle to distal end, distal end of aedeagus with stout phallic spike with a series of bony spines of varying length. Aedeagus sack end rounded, slightly widened. Vesica terminal membrane slightly longer than phallus, membranous, curved ventrally in an arc. Vesica with a capsule in the middle of the dorsal surface of the diverticulum, the diverticulum tipped with a stout horny cornutus. Vesica compound side with an ossified spine extending basally to base of tip. Base of tip with a smaller diverticulum capsule and tip of diverticulum distinctly ossified.

**Holotype** (Figs 1A, 1B, 2E). ♂, **China**, Xizang, TU-02750, Azar Village, Lhari County, Nagchu City, 30°38'19"N, 93°17'23"E, 16-VIII-2023, alt. 4,490 m, coll. Enyong CHEN, Zhao HAO & Yanhong WANG (TU). **Paratypes** (Figs 1C–F, 2F, 3A, B). 3♂, same data as the holotype, unique iD Nos.: TU-02751, TU-02748, TU-02749(TU).

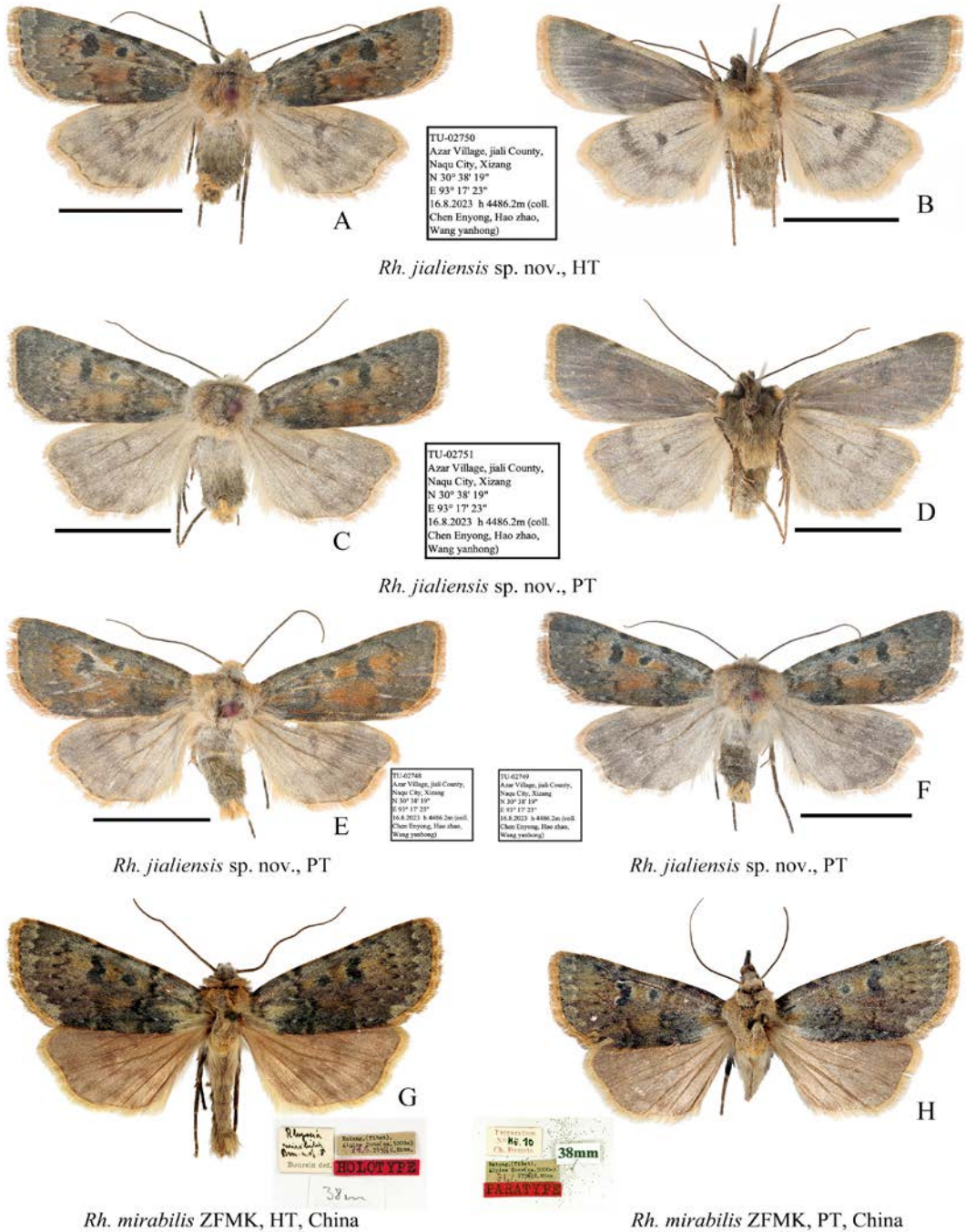


Figure 1. Photos of *Rhyacia* sp. adults. A, B. *Rh. jialiensis* sp. nov., male, holotype, dorsal and ventral views; C, D. *Rh. jialiensis* sp. nov., male, paratype, dorsal and ventral views; E, F. *Rh. jialiensis* sp. nov., male, paratype, dorsal view; G. *Rh. mirabilis* ZFMK, male, holotype, China, dorsal view; H. *Rh. mirabilis* ZFMK, male, paratype, China, dorsal view. Scale bars = 10 mm.

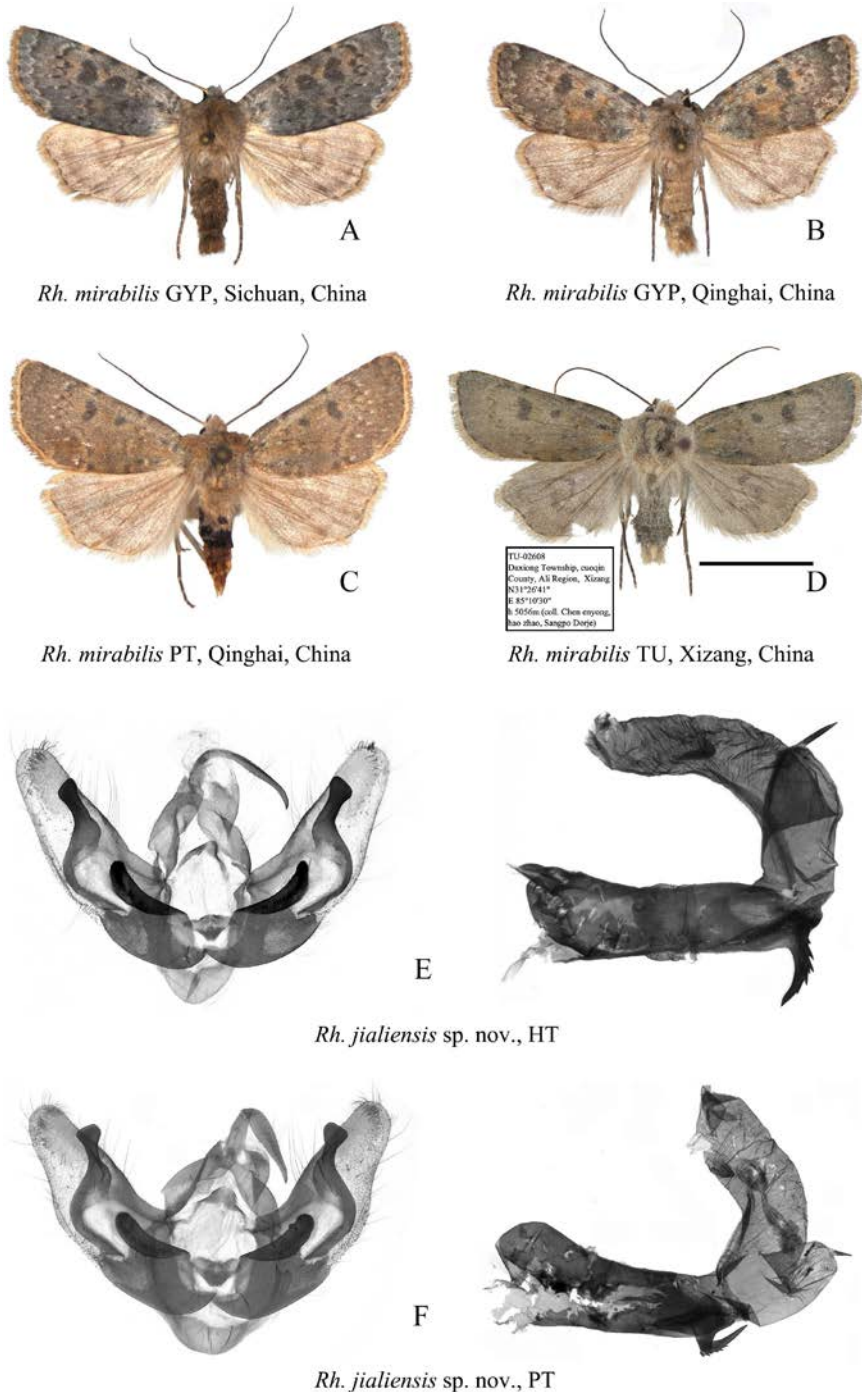


Figure 2. Photos of *Rhyacia* sp. adults and dissected male genitalia of *Rhyacia* sp. A. *Rh. mirabilis* GYP, male, Sichuan, China, dorsal view; B. *Rh. mirabilis* GYP, male, Qinghai, China, dorsal view; C. *Rh. mirabilis* GYP, male, paratype, Qinghai, China, dorsal view; D. *Rh. mirabilis* TU, male, Xizang, China, dorsal view; E. *Rh. jialiensis* sp. nov., male, holotype; F. *Rh. jialiensis* sp. nov., male, paratype. Scale bar = 10 mm.

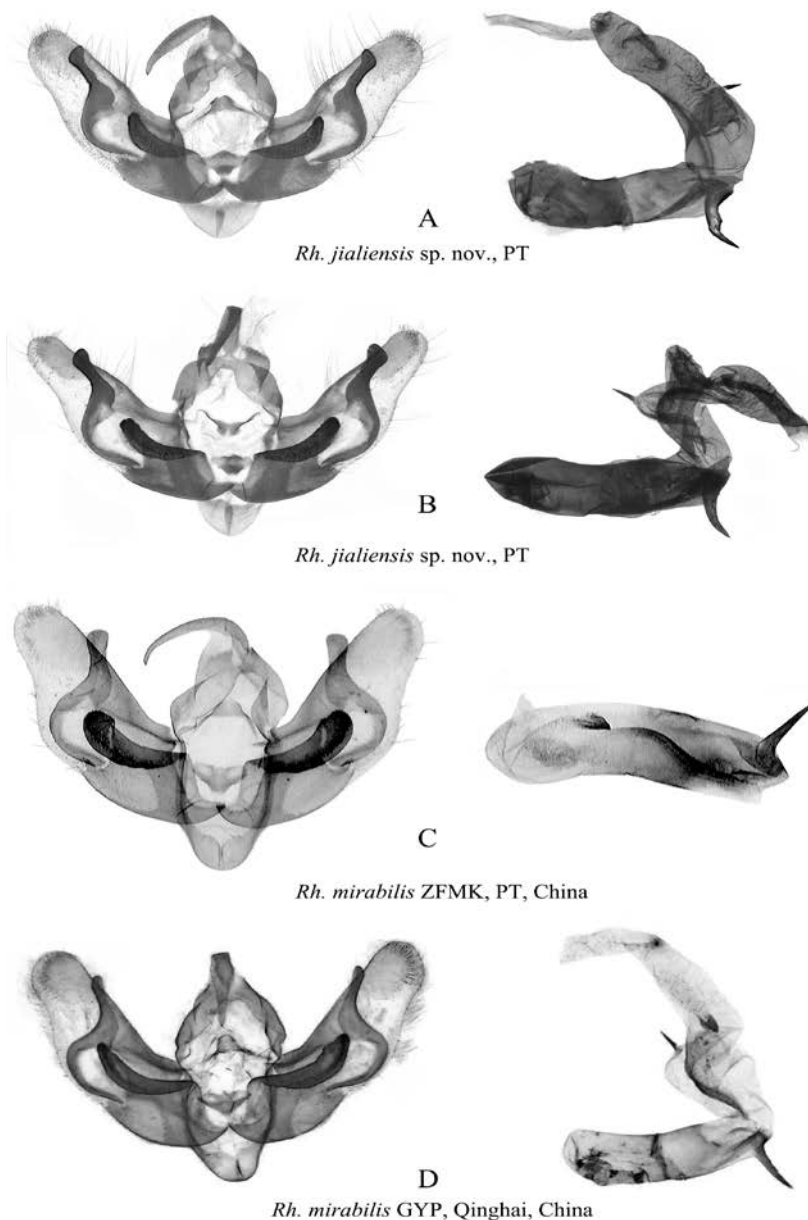


Figure 3. Dissected male genitalia of *Rhyacia* sp. A, B. *Rh. jialiensis* **sp. nov.**, male, paratypes; C. *Rh. mirabilis* ZFMK, male, paratype, China; D. *Rh. mirabilis* GYP, male, paratype, Qinghai, China.

**Distribution.** South-eastern Xizang Autonomous Region, China (Figs 5A, 5C) is the main geographic region for this new species *Rhyacia jialiensis* based on our survey.

**Etymology.** The specific epithet refers to the type locality, the Jiali County.

**Diagnosis.** *Rhyacia jialiensis* **sp. nov.** (Figs 1A–F) has dark gray background of forewings with light brick colour field, *Rhyacia mirabilis* (Figs 1G, 1H, 2A–D) exhibits light gray of forewings. Orbicular and reniform of *Rhyacia jialiensis* are black, while *Rhyacia*

*mirabilis* are pale black. Cilia of *Rhyacia jialiensis* are colored yellowish brown and *Rhyacia mirabilis* shows a lightly yellow style.

The male genitalia of the *Rhyacia jialiensis* (Figs 2E, 2F, 3A, 3B) are closest to *Rhyacia mirabilis* (Figs 3C, 3D, 4), and also resemble those of *Rhyacia miranda* and *Rhyacia admiranda*. The claspers are shorter in *Rhyacia jialiensis*, longer in *Rhyacia mirabilis*, and narrower at the corona. The harpe of *Rhyacia jialiensis* is legged and more robust, while those of *Rhyacia mirabilis* are clavate and relatively longer. Juxta ring of the phallic end of *Rhyacia jialiensis* is smaller. *Rhyacia jialiensis* sacculus with ventral projection shorter than *Rhyacia mirabilis*. Cornutus on diverticulum of *Rhyacia jialiensis* is shorter compared to *Rhyacia mirabilis* (Varga 2011; Gyulai 2021).

## 2. *Rhyacia mirabilis* Boursin, 1954 (Figs 1G, 1H, 2A–D, 3C, 3D, 4)

*Rhyacia mirabilis* Boursin, 195: 260, pl. 4, f. 20, 23; (Type locality: Batang [Sichuan]).

**Type and paratype specimens examined.** Photographs of the specimens (Figs 1G, 1H): 1♂, HT (Figs 1G), **China**, Xizang, Batang, 5,000 m, 1936, H. Höne. 1♂, PT (Figs 1H), **China**, Xizang, Batang, 5,000 m, 1936, H. Höne. 1♂, PT (Figs 2C), **China**, Qinghai, No.: GYP 1270.

**Other specimen examined.** Photograph of the specimen. (Fig. 2D) 1♂, **China**, Xizang, Ali Prefecture, Cuoqin County, Daxiong Township, 5,055.8 m, 31°26'41"N, 85°10'30"E, 30-XII-2023, Enyong CHEN leg., gen. prep. No.: TU-02608 (♂). 1♂ (Fig. 2A), **China**, Sichuan, No.: GYP 5372. 1♂ (Fig. 2B), **China**, Qinghai, No.: GYP 5368.

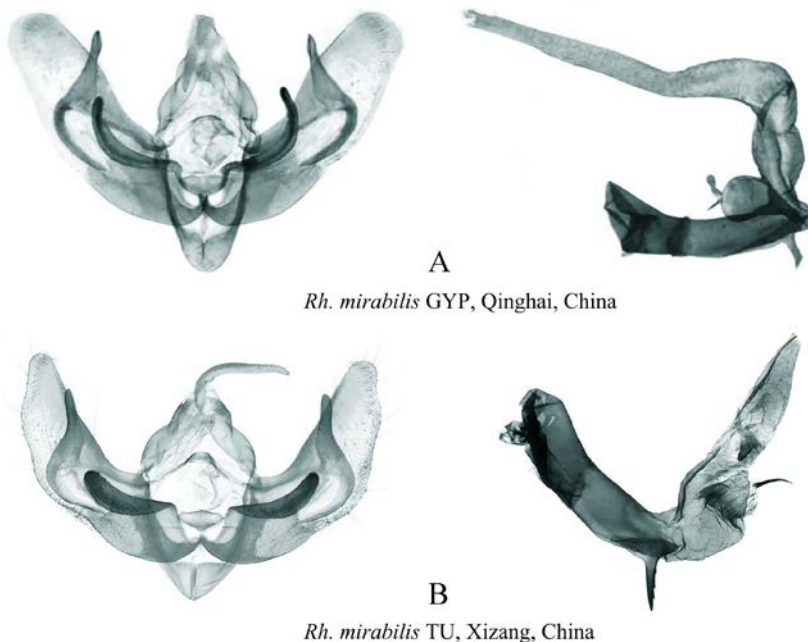


Figure 4. Dissected male genitalia of *Rhyacia* sp. A. *Rh. mirabilis* GYP, male, paratype, Qinghai, China; B. *Rh. mirabilis* TU, male, Xizang, China.

Diagnosis. The forewing length is 37 mm in males. A detailed comparison with *Rh. jialiensis* **sp. nov.** is provided above in the diagnosis of the latter species.

Distribution. This species is currently known from Sichuan, Xizang and Qinghai of China (Draudt 1950) (Figs 5B, 5D).



Figure 5. The habitat of *Rhyacia jialiensis* **sp. nov.** and *Rhyacia mirabilis*. A, C. The habitat of *Rh. jialiensis* **sp. nov.** in Jiali County, Nagchu City, Xizang, China, (N30°38'19", E93°17'23", 4,490 m, August 16th, 2023), the photographs were taken from both the left front A and right front C of the collection point. B, D. The habitat of *Rh. mirabilis* in Daxiong Township, Cuoqin County, Ngari Area, Xizang, China (N31°26'41", E85°10'30", 5,055.8 m, July 30th, 2023), the photographs were taken from directly behind B and directly in front D of the collection point. All the photos were taken by Enyong CHEN.

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The authors declare they have no conflict of interest.

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