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Taxonomy of Palaearctic scythridids: description of *Falkovitshella hindukushi* sp. nov. and *Scythris wadiqeltella* sp. nov. (Lepidoptera, Gelechioidea, Scythrididae)

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Abstract

Two new species are here described and illustrated: *Falkovitshella hindukushi* sp. nov. from NE Afghanistan, and *Scythris wadiqeltella* sp. nov. from Palestine. *Scythris inconspicuella* Sinev is newly recorded from China, markedly extending its known range.

Keywords: new species, new record, Afghanistan, Palestine, Scythrididae

Introduction

Currently, at least 25 genera are included within the family Scythrididae (Passerin d'Entrèves and Roggero 2007b), of which *Scythris* is the most speciose and heterogeneous genus. The other genera comprise a maximum of 40 species, some of them being monospecific (Landry 1991, Bengtsson 1997, Passerin d'Entrèves and Roggero 2007b). The genus *Scythris* includes nearly 600 species, which are further divided into more than 60 known species-groups that have been established across the years, often without being formalized, following the Jäckh's proposition (1977, 1978). We may use the knowledge gained from more recent findings to hypothesize that many more genera could be easily established in Scythrididae based on the genitalia of both sexes, which is the most widely-used trait for taxonomic identification to date.

Although some attempts have been made to evaluate the phylogenetic relationships of Gelechioidea (Kaila 2004, Bucheli & Wenzer 2005), the assessment of Scythrididae remains yet limited. Studies on this family have been primarily focused on the review of small groups of species, with only Landry (1991) completing a comprehensive review of Nearctic scythridids; however, many species from this region have yet to be described (Landry *pers. comm.*).

As noted by Falkovitsh (2011), the genus *Scythris* requires careful examination to complete a full revision, at least for the Palaearctic species, which are the most studied to date. Such a revision would hopefully follow the methods used 20 years ago for the Nearctic species (Landry 1991). Furthermore, such a revision might generate a number of taxonomic problems for widespread species that are also found in Afro-tropical or

Oriental regions, or for closely related species that are almost indistinguishable, in which the speciation processes appears to be still in progress.

As previously noted (Passerin d'Entrèves *et al.* 2012), the use of molecular techniques (DNA Barcode) strongly supports the phylogenetic revision of Scythrididae, helping to obtain a better definition of species, as achieved for several taxonomic groups within Lepidoptera (Hebert *et al.* 2010, Huemer *et al.* 2012, Kaila & Mutanen 2012).

Furthermore, molecular techniques would help overcome the difficulties and limitations of using old preserved material, which is often all that is available for many taxa (as in the present case).

In the current paper, we describe two scythridid species: one belongs to the recently described genus *Falkovitshella* Passerin d'Entrèves and Roggero, 2007; the other is entirely different from any known scythridid species, but is provisionally placed in the genus *Scythris* until the phylogenetic relationships within the scythridid taxa will be clarified.

Material and methods

Two new species were identified from Amsel's scythridid material from the Staatliche Museum für Naturkunde of Karlsruhe (SMNK, Germany), and are described here.

Furthermore, a male of *Scythris inconspicuenta* from China was discovered in the same collection, thus greatly extending the known distribution of the species.

Slide preparation followed those published in the literature according to Passerin d'Entrèves & Roggero (2012). The material was photographed using a Leica® DFC320

digital camera connected to a Leica® Z16APO zoom system. The specimens were then studied in comparison to the known scythruid species.

Systematic Account

Genus *Falkovitshella* Passerin d'Entrèves and Roggero, 2007

Type species: *Scythis asema* Falkovitsh, 1972. Type locality: Ayakguzhumdy, Buchara region, Uzbekistan.

Till now, seven species were included in the genus *Falkovitshella* (Passerin d'Entrèves & Roggero, 2007b). Here, two species (i. e., *Scythis deserticola* Nupponen e *Scythis karvoneni* Nupponen) are transferred to the genus on the basis of the following characters (Passerin d'Entrèves & Roggero, 2007b: 118): uncus y-shaped and elongate; gnathos slim and characterized by the joining arms shorter than the distal arm; phallus thin and tapered to apex; S8 largely triangular shape and elongate with an evident transverse, curved ridge. Both species were collected from Uzbekistan (Nupponen, 2010). The asymmetrical valvae of *F. karvoneni* are unique within the genus, and allow us to identify a different morphological pattern, which is seemingly also present in the new species from Afghanistan described herein.

Falkovitshella hindukushi Passerin d'Entrèves and Roggero, sp. nov.

(Figures 1A, 2A–D)

Diagnosis

The external features of this species are similar to the ones of many other scythridids, thus cannot be employed to identify with certainty the species. Most *Falkovitshella* species have similar external characters (Passerin d'Entrèves and Roggero 2007a), being thus not easy the identification at species level. However, as is common for Scythrididae, the new species was easily identified by the characteristics of its genitalia (at present, only the male is known). The valvae (Fig. 2D), are slightly arched, with an expanded and rounded distal part, and are different from any other *Falkovitshella* species. In addition, the S8 (Fig. 2C) is very characteristic, with a deep and narrow incisure on the distal margin. While other *Falkovitshella* species are known to have a deep incisures on the S8, such as *F. deserticola* (Nupponen), and *F. karvoneni* (Nupponen), it is nevertheless much larger and different in shape; thus, the species cannot be misidentified.

Description

Male (Figure 1A). Wingspan 7.0 mm. Forewing upper surface white, with a golden thick zigzag line extending from the base towards the apex, and a golden ovalar dot at distal third; fringe white. Hindwing upper surface pearly white, translucent; fringe white. Forewing lower surface yellowish white, and hindwing pearly white lower surface semitransparent. Head white, palpi yellowish white, and proboscis white. Thorax yellowish white. Abdomen white. Legs white, except for tarsi whitish grey. Antenna greyish white, shiny, with antennifer white.

Male genitalia (Figures 2A–D). Uncus (0.19 mm) symmetrical, almost as long as gnathos, Y-shaped, and elongate. Gnathos (0.21 mm) symmetrical, with short and thick proximal arms, and distal arm elongate, downcurved and tapered, with apex pointed. Tegumen (0.26 mm) subtriangular. Phallus (0.28 mm) cylindrical, almost as long as

tegumen, slender, downcurved. Juxta laminar, half length of phallus. Vinculum (0.20 mm) less than half length of valvae, subquadrangular. Valvae (0.44 mm) slightly asymmetrical at apex, broad, distally expanded and multilobed, inward bent at its half length, with a rounded papilla at distal two-thirds. S8 (0.46 mm) symmetrical, deeply notched apically, with transverse curved ridge at base. T8 (0.14 mm) membranous, rectangular, with thickened ridge at base.

Female. Unknown.

Type material

Holotype: Male (SMNK) Afghanistan: N.-Afghanistan, Hindukush Doab, 1400 m, 4.vi.1956 (*Amsel*). Genital slide no. 1020 PdE.

Distribution

The species is known only from the type locality in NE Afghanistan.

Etymology

The species was named after the Hindu Kush Range wherein lies the type locality, the village of Doab.

Remarks

Except for *F. pediculella* (collected from Tunisia), *Falkovitshella* species have an Eastern Palaearctic distribution, and are primarily found in Central Asia (Passerin d'Entrèves and Roggero 2007a). The newly described species described here greatly extends the genus distribution southward, as it was collected in the far east of Afghanistan, near to the border with Pakistan.

Falkovitshella species share a superficial resemblance to some species that are included in the *Scythris caroxylella* species-group (*Scythris caroxylella* Falkovitsh, *S. cramella* Nupponen, *S. fluxilis* Falkovitsh, *S. pallidella* Passerin d'Entrèves & Roggero, *S.*

parafluxilis Passerin d'Entrèves & Roggero, and *S. rotundella* Nupponen); however, the actual relationship between these two taxa is subject to debate (Nupponen 2010, Passerin d'Entrèves & Roggero 2012). Although both taxa have a very elongate and Y-shaped uncus, as well as an elongate, slender tegumen, other characteristics of the genitalia are remarkably different. Males exhibit many noticeable differences, such as: 1) the gnathos arms are narrow and elongate in *Falkovitshella*, but are shorter and larger in the *S. caroxylella* species-group; 2) in *Falkovitshella* the phallus is short, much broader at base and tapering to apex, while in the *S. caroxylella* species-group it is half as long as the valvae, with a similar diameter along two thirds of the entire valvae length; 3) the valvae in *Falkovitshella* are inward arched, differently shaped (also, asymmetrical) in the different species, and often with laminar projections, whereas they are symmetrical, subrectilinear and spatulate in the *S. caroxylella* species-group; 4) in *Falkovitshella* the S8 is elongate, with an arched, well-sclerotized reinforcement at the base, and often with a deep notch distally, whereas in the *S. caroxylella* species-group it is triangular, with a blunt, rounded tip; and 5) the T8 in *Falkovitshella* is ovalar-shaped, narrow and elongate, but in the *S. caroxylella* species-group it is subquadrangular, half as long as the S8, with a large and rounded notch at base. Furthermore, the females also exhibit several differences. For example, the sterigma is usually almond-shaped, very narrow, and well-sclerotized in *Falkovitshella*, whereas it is a large, sclerotized, subrectangular plate in the *S. caroxylella* species-group. In addition, the sclerotized parts of the 7th abdominal segment very differently shaped in the two taxa. Therefore, due to these marked differences, species belonging to the *S. caroxylella* species-group cannot be included in the genus *Falkovitshella*. Hence, similarities in genitalia traits

must be carefully checked; however, it is hypothesized that such similarities may be examples of convergent evolution.

Genus *Scythris* Hübner, [1825]

Type species: *Tinea chenopodiella* Hübner, [1825]. Type locality: [Europe].

Scythris wadiqeltella Passerin d'Entrèves and Roggero, sp. nov.

(Figures 2A, 3A–D)

Diagnosis

The species is easily confused with several other pale, small-sized scythridids on the basis of external features alone. However, the male genitalia are uniquely distinct. The gnathos is very elongate (Fig. 3B), the tegumen is short and globose (Fig. 3B), and the phallus is short, thick and enlarged subapically (Fig. 3A). In contrast, the valvae have no unique characteristics, being slightly arched inwardly, evenly narrow, with a blunt distal apex (Fig. 3D), as found in many other scythridids.

Description

Male (Figure 1B). Wingspan 7.2 mm. Forewing upper surface white, with three small, equally spaced, light brown dots; fringe yellowish white. Hindwing upper surface translucent, with a shining hue; fringe yellowish white. Forewing and hindwing lower surfaces cream-coloured. Head yellowish white, palpi white, and proboscis light brown. Thorax white. Abdomen greyish white. Legs white except for tarsi light brown. Antenna brown, two thirds as long as the forewing, with antennifer white.

Male genitalia (Figures 3A–D). Uncus (0.19 mm) laminar, slightly shorter than tegumen, not bilobed, elongate. Gnathos (0.32 mm) symmetrical, elongate, slightly

sinuate, with short proximal arms, and distal arm elongate, tapered, tip pointed and bent downwards. Tegumen (0.13 mm) short, subtriangular. Phallus (0.27 mm) cylindrical at base, enlarged at two thirds of its length, and beak-like at apex. Juxta ribbon-shaped, half as long as the phallus; endophallus distinct. Vinculum (0.13 mm) well-developed, subpentagonal. Valvae (0.46 mm) elongate, incurved, with blunt apex. S8 (0.29 mm) symmetrical, sclerotized and thickened at base, membranous distally, with large and rounded notch at distal margin. T8 (0.20 mm) symmetrical, reduced, membranous, with a short and large notch at apex.

Female. Unknown.

Type material

Holotype: Male (SMNK) Palestine [Jordan]: Georgskloster, 1.vi.1932, (*Einsler*). Genital slide no. 1023 PdE.

Distribution

The species is known only from the type locality in Palestine, near the Wadi Qelt (Prat River), on the road between Jerusalem and Jericho.

Etymology

The species was named after the type locality, the Qelt stream near the St. George Monastery.

Remarks

This species does not resemble any other known species from the same area.

Furthermore, it is clearly different from any other known scythruid species. At present, we include this new species in the genus *Scythis*; however, we chose not to place it in any known species-group, due to the unique combination of genital traits of *S.*

wadiqeltella, that are only vaguely similar to those of *S. senecai* Bengtsson (1997: 89).

Scythris senecai is included at present in the *Scythris canescens* species-group, a heterogeneous and provisional group; the inclusion of fifteen species (see Bengtsson 1997:79-80 for the whole list) in the group is only tentative, as remarked by the same Bengtsson (1997). The most characteristic part of *S. wadiqeltella* is the phallus, which vaguely resembles the phallus of *S. passerini* Bengtsson, *S. curletti* Bengtsson and *S. bicruris* Zhang & Li. On the whole, the male genitalia of these three species are different to the genitalia of *S. wadiqeltella*, thus these taxa are definitely not related.

New record

Scythris inconspicuella Sinev 2001: male, China, Changzhou, Tianmushan, 1931 (*Höne*). Genital slide 1818 PdE (SMNK).

Remarks. Previously, this species was known from various localities of East Russia (Sinev 2001: 12). The new record greatly extends the species distribution southward, since the Tianmushan Biosphere Reserve is located in the Zhejiang Province of east coastal China (230 km south of Shanghai). The area is characterized by a high plant biodiversity, including bamboo and coniferous forests, and is known as the “*Kingdom of the Big Trees*”, as the most ancient [oldest] wild *Ginkgo biloba* is found there.

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Captions to figures



Figure 1. (A) *Falkovitshella hindukushi* sp. nov.; (B) *Scythris wadiqeltella* sp. nov.

Scale bar = 1 mm

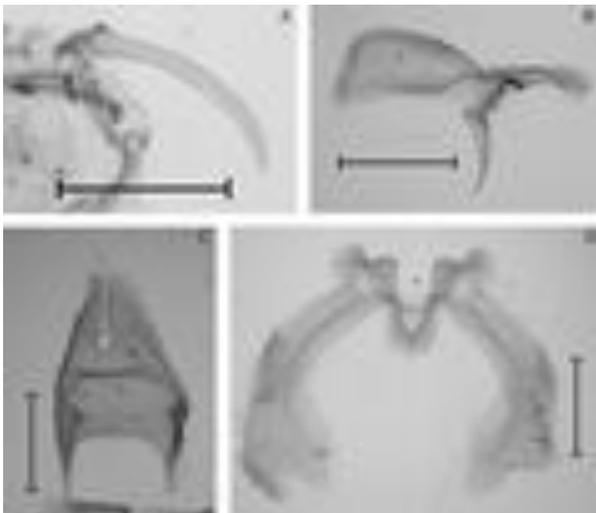


Figure 2. *Falkovitshella hindukushi* sp. nov.: (A) phallus; (B) complex uncus-gnathostegumen; (C) S8; (D) valvae and vinculum. Scalebar = 0.5 mm.

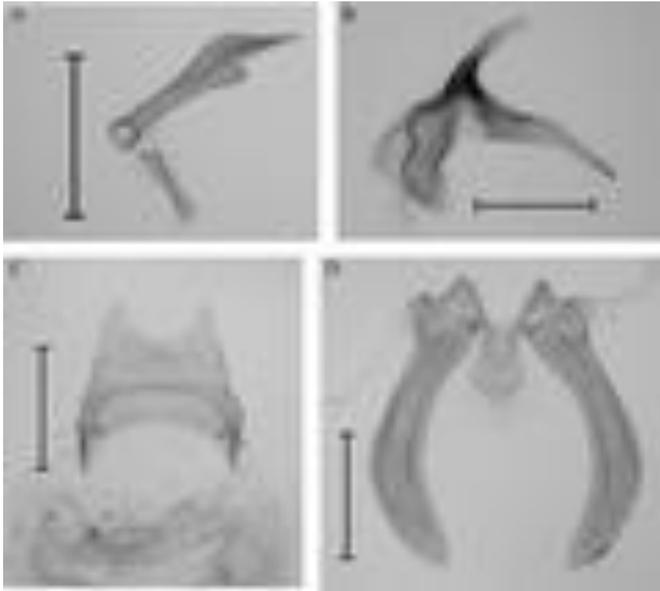


Figure 3. *Scythis wadiqeltella* sp. nov.: (A) phallus; (B) complex uncus-gnathos-tegumen; (C) S8; (D) valvae and vinculum. Scalebar = 0.5 mm.