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What species of *Mecyna subsequalis* (Herrich-Schäffer, 1854) - group occurs in highlands of Central Asia? (Lepidoptera: Crambidae, Spilomelinae)

S. Yu. Sinev & S. K. Korb

Abstract

By male genitalia and external characters as well as by the mtDNA COI sequence, the species from mountain of Central Asia reported earlier as *Mecyna lutulentalis* (Lederer, 1858) now is identified as *Mecyna salangalis* Amsel, 1970. The species inhabits dry steppe slopes of Hindukush, West Pamir, Central Alai and western part of Alai valley, West Tian-Shan and western part of Inner Tian-Shan. The variability of *M. salangalis* is shown, and the female and its genitalia are described for the first time.
KEY WORDS: Lepidoptera, Crambidae, Spilomelinae, *Mecyna subsequalis*, Central Asia.

¿Qué especie del grupo *Mecyna subsequalis* (Herrich-Schäffer, 1854) existe en las tierras altas de Asia Central? (Lepidoptera: Crambidae, Spilomelinae)

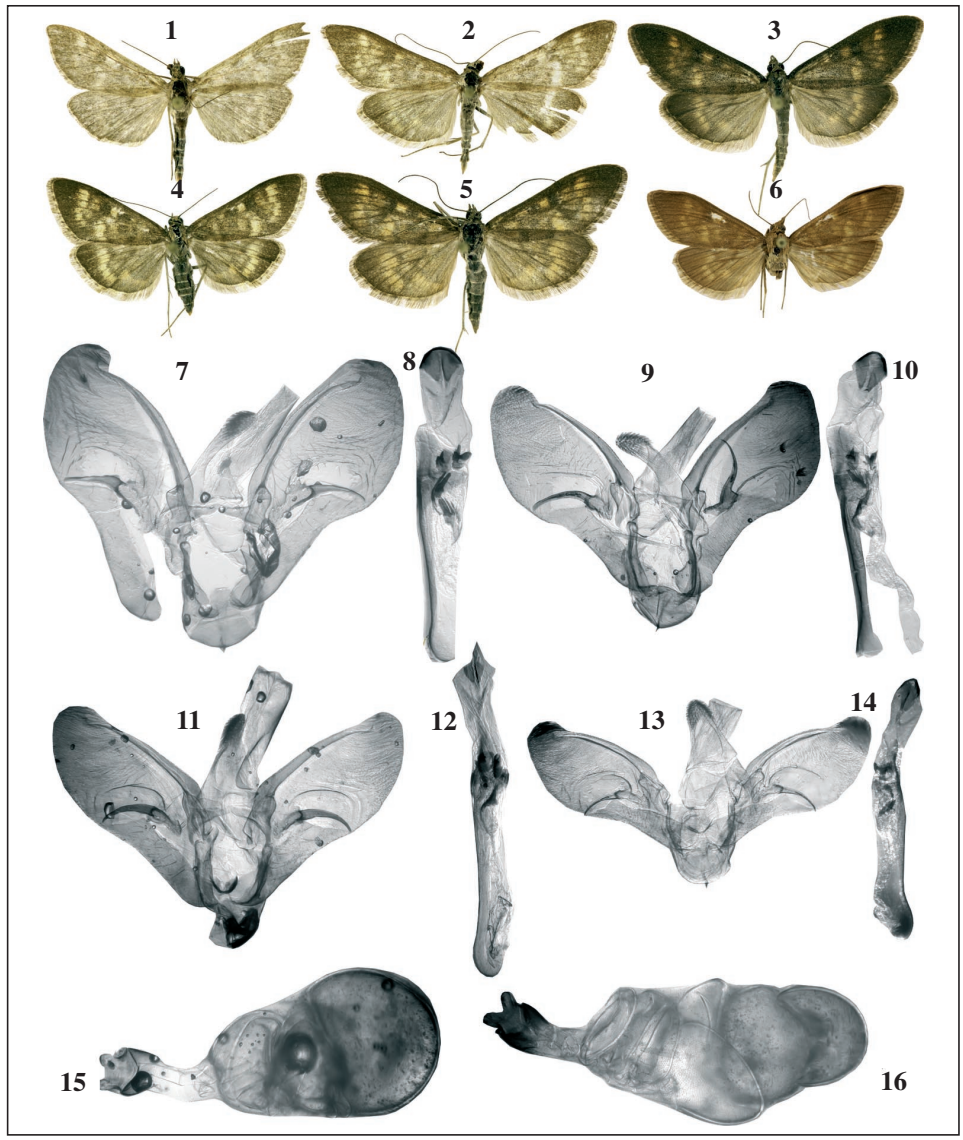
Resumen

Por la genitalia de los machos y caracteres externos tanto como por la secuencia mtADN COI la especie de las Montañas de Asia Central *Mecyna lutulentalis* (Lederer, 1858) identificada como *Mecyna salangalis* Amsel, 1970. La especie habita en las secas estepas de Hindukush, oeste del Pamir, Alai central y parte occidental del Valle de Alai, oeste de Tian-Shans y la parte occidental de Tian-Shans. Se muestra la variabilidad de *M. salangalis* y la hembra y su genitalia se describen por primera vez.
PALABRAS CLAVE: Lepidoptera, Crambidae, Pyraustinae, *Mecyna subsequalis*, Asia Central.

Introduction

Three species of *Mecyna* Doubleday, 1849 were known from Central Asia so far: *M. flavalis* ([Denis & Schiffermüller], 1775) from "C. Asia" (SLAMKA, 2013: 96), *M. asiaticalis* Caradja, 1916, from "Issykkul" (CARADJA, 1916: 35) and *M. lutulentalis* (Lederer, 1858) from "Alai" (CARADJA, 1916: 36). The latter species originally described from Damask (Syria) (LEDERER, 1858: 148) now treats as a subspecies of *M. subsequalis* (Herrich-Schäffer, 1854) (SLAMKA, 2013); its record for the highlands of Central Asia looks doubtful and needs careful verification.

The specimens with habitus closely related to *M. subsequalis lutulentalis* were collected by the second author from several places in the highlands of Inner Tian-Shan, West Tian-Shan and Alai (Kyrgyzstan) in 2009-2019 and of West Pamir (Tajikistan) in 2011. We tried to clarify the species affiliation of these specimens using both morphological and molecular data.



Figs 1-16.– *Mecyna salangalis* Amsel, 1970. General appearance (1-6): **1.** male, sample GWOUC159-19, Talassky Mts., Kara-Buura river coast, 35 km S Klyuchevka, 1707 m. **2.** male, sample GWOUC168-19, Alai Mts., small valley near Archaty, 2667 m. **3.** male, sample GWOUC169-19, same locality. **4.** female, sample GWOUC174-19, same locality. **5.** female, sample GWOUC175-19, same locality. **6.** male, Moldo-Too Mts., near Koro-Goo Pass, 2400 m. Male genitalia (7-14). **7-8.** sample GWOUC159-19, Talassky Mts., Kara-Buura river coast, 35 km S Klyuchevka, 1707 m. **9-10.** sample GWOUC168-19, Alai Mts., small valley near Archaty, 2667 m. **11-12.** sample GWOUC169-19, same locality. **13-14.** sample GWOUC174-19, same locality. Female genitalia (15-16): **15.** Moldo-Too Mts., near Koro-Goo Pass, 2400 m. **16.** Alai Mts., small valley near Archaty, 2667 m.

Materials and methods

Traditional methods of genitalia dissection have been used (ROBINSON, 1976). In total, we dissected 27 males and 3 females. The figures were taken by digital camera Canon EOS 5D Mark II with Canon EF 100 mm macro lens for imago and MS-VP microscope for genitalia.

Material examined: TAJIKISTAN, 1 ♂, 19-VII-2011, Shakhdarinsky Mts., Vezdara river valley near kishlak Vodzh, 37º42.254'N, 71º57.325'E, 2886 m, leg. S. Korb. KYRGYZSTAN, 2 ♂♂, 1 ♀, 14-VII-2015, Alai Mts., small valley between Tashkoro and Karabulak, 40º14.119'N 73º24.484'E, 1805 m, leg. S. Korb; 5 ♂♂, 2 ♀♀, 15-VII-2015, Alai Mts., small valley near Archaty, 39º50.370'N, 73º19.593'E, 2667 m, leg. S. Korb; 6 ♂♂, 2 ♀♀, 22-VII-2017, same locality, leg. S. Korb; 4 ♂♂, 1 ♀, 16-18-VII-2019, same locality, leg. S. Korb; 2 ♂♂, 21-22-VII-2019, Alai Mts., Kyzyl-Eshme valley, 39.620689ºN 72.286766ºE, 2961 m, leg. S. Korb; 3 ♂♂, 10-VII-2014, Moldo-Too Mts., near Koro-Goo Pass, 41º31.363'N, 74º40.517'E, 2400 m, leg. S. Korb; 4 ♂♂, 26-VII-2017, same locality, leg. S. Korb; 6 ♂♂, 2 ♀♀, 22-25-VI-2009, Dzhumgaltoo Mts., Sary-Kaiky gorge, 42º11.254'N, 74º3.171'E, 2144 m, leg. S. Korb; 1 ♂, 17-VII-2015, same locality, leg. S. Korb; 1 ♂, 25-VII-2016, same locality, leg. S. Korb; 4 ♂♂, 1 ♀, 19-VII-2017, same locality, leg. S. Korb; 10 ♂♂, 2 ♀♀, 26-VII-2016, Dzhumgaltoo Mts., Kekemeren river valley near Kyzyl-Oi, 42º11.339'N, 74º3.193'E, 2093 m, leg. S. Korb; 1 ♂, 30-VII-2019, same locality, leg. S. Korb; 20 ♂♂, 4 ♀♀, 27-28-VII-2019, Talassky Mts., Kara-Buura river coast, 35 km S Klyuchevka, 42.337976ºN 71.60727ºE, 1707 m, leg. S. Korb.

For DNA analysis, the samples of the Cytochrome Oxydase Subunit I sequence (COI) were used. The following 5 samples have been processed from the own material (all in BOLD): GWOUC159-19 - West Tian-Shan, Talas Mts., Kara-Buura river, 1800 m; GWOUC168-19, GWOUC169-19, GWOUC174-19 and GWOUC175-19 - Alai Mts., Archaty valley, 2800 m.

The following 10 samples were obtained from the BOLD online database: *M. lutealis* (Duponchel, 1833) - FBLMZ562-12 and LEATA556-1: ITALY, South Tirol; *M. flavalis* ([Denis & Schiffermüller], 1775) - FBLMS070-09 and FBLMS071-09: GERMANY; *M. gracilis* (Butler, 1879) - GWOR3208-08: CHINA, Hebei; *M. balcanica* Slamka & Plant, 2016 - PHLAF240-11 and PHLAF257-11: CROATIA; *M.* sp. (forming same BIN with our samples) - LEKIR053-13: Jalal-Abad, KYRGYZSTAN; *M. subsequalis* (Herrich-Schäffer, 1854) - IBLPC309-10: Zanjan, IRAN; IBLPC310-10: Erzurum, TURKEY; FBLMZ431-12: Ionial islands, GREECE.

DNA sampling and sequencing were implemented in the University of Guelph (Canada) by the BOLD program (RATNASINGHAM & HEBERT, 2007); it was made using processes and protocols described in HUEMER *et al.* (2014). The length of COI sequences obtained for this analysis is 658 sites.

Results and discussion

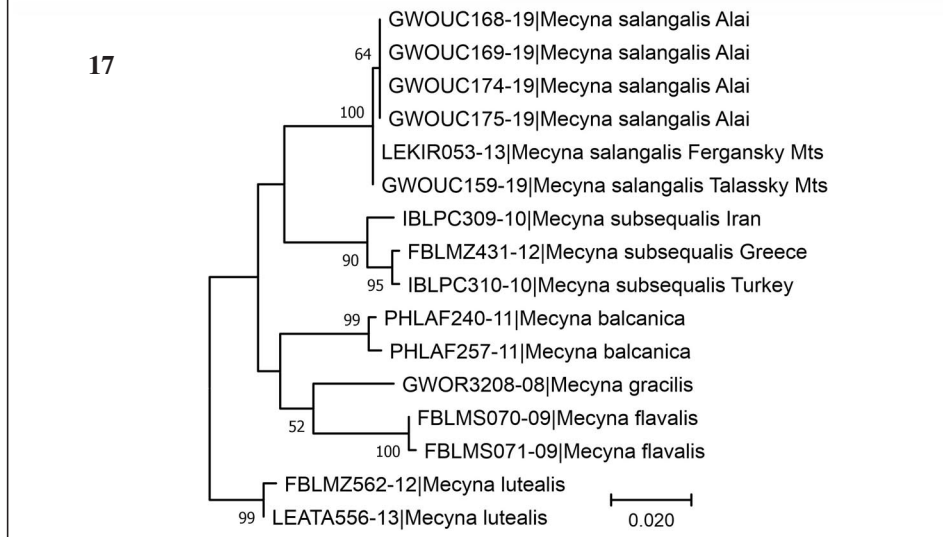
The external morphology of studied specimens differs considerably (figs 1-6). The ground color of the wings varies from light brown to dark brown or even brownish-grey. Light spots on the wings vary in size and color, from yellow to pale ochreous and light brown. The females are of the same size as males or slightly smaller, with the same ground color of wings; however, in females the light belts and spots are wider.

Male genitalia (figs 7-14): Valvae wide, slightly variable in shape, but always with distinctly convex dorsal margin and concave ventral margin. Harpa very narrow, pointed, sickle-shaped or nearly straight. Aedeagus longer than valva, straight and narrow, with 4 cornuti which differ in size, shape and number of thorns.

Female genitalia (figs 15-16): Antrum not longer than wide, of the same length with the rest of ductus bursae (in *M. subsequalis* antrum long and cylindrical, see SLAMKA, 2013: pl. 109, fig. 153); its lateral lobes rounded and distinctly spread apart. Bursa copulatrix oval, without pronounced signum.

By general appearance, our specimens well correspond to *M. subsequalis* but their male genitalia are quite different having thin and only slightly curved harpa and four cornuti in aedoeagus;

M. subsequalis has well sclerotized strongly curved harpa and single large cornutus (see SLAMKA, 2013, pl. 36, fig. 153). By male genitalia, our specimens are nearly identical with *M. amasialis* (Staudinger, 1880) (see SLAMKA, 2013, pl. 35, fig. 149); however, the latter species has yellowish wings with plumbeous spots, while in our specimens wings are brownish with yellowish spots. Taking into account the variation in wing coloration and in male genitalia between specimens, we decided to use the mtDNA analysis. As it turned out all phenotypes (large or small and light or dark, with slightly different wing spotting) from the same locality have identical COI sequences and clustered together (fig. 17). The specimens taken from the distant localities (Talassky and Fergansky mountain ridges) differ from other specimens only by one site (fig. 18), while the differences in COI between *M. subsequalis* and our samples embraced 30 cites and p-distances of COI vary from 4.3 to 4.6, that is enough for the species delimitation in *Mecyna*. Thus, all collected specimens belong to the same separate species.

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RULER       0.....100.....200.....300.....400.....500.....600.....658
GWOUC159-19 .........................................T.............  Talas
LEKIR053-13 .........................................T.............  Jalal-Abad
GWOUC168-19 .........................................C.............  Alai
GWOUC169-19 .........................................C.............  Alai
GWOUC174-19 .........................................C.............  Alai
GWOUC175-19 .........................................C.............  Alai

FBLMZ431-12 ..AC.T.A.AGA.....TTAAAG.CG..CC....G.ATACTT...CC.....AAT.C Greece
IBLPC309-10 .GA.G.CACAGA.....TTAAAG..G..C......GATACTT...CC.....AAT.C Iran
IBLPC310-10 ..AC.T.A.AGA.....TTAAAG.CG..CC......ATACTT...CC.....AAT.C Turkey
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Figs 17-18.– Maximum likelihood tree of *Mecyna salangalis* Amsel, 1970 and other species of *M. subsequalis* group (**17**) and comparison of COI sequences (**18**).

Five more *Mecyna* species from the neighboring areas of Central Asia are known so far. *M. bandiamiralis* Amsel, 1970, described from Afghanistan (Band-i-Amir, 2900 m) has coloration and wing pattern as in *M. subsequalis*, but 3 cornuti in aedeagus. *M. babalis* Amsel, 1970, described from the

same locality, has lemon-yellow wings. *M. micalis* (Caradja, 1916), described from Kazakhstan (Emba) has coloration and wing pattern as in *M. subsequalis*, but very short labial palpi. *M. marioni* Amsel, 1957, described from Uzbekistan (Samarkand) has yellow wings. *M. salangalis* Amsel, 1970, described from Afghanistan (Salang-Paß, 2100 m) has wing pattern and coloration as in *M. subsequalis*, but four cornuti in aedeagus and almost straight harpa (AMSEL, 1970: fig. 16). Our specimens differ from the latter species only by the sharp apex of harpa and shape of cornuti, which are rather variable.

We believe that the known Central Asian representatives of *M. subsequalis*-group belong to *M. salangalis*. The distribution range of this species includes Hindukush (Salang Pass), West Pamir (Shakhdarinsky Mts.), Central Alai and western part of Alai valley, West Tian-Shan (Talassky Mts.) and western part of Inner Tian-Shan (Dzhumgaltoo and Moldo-Too mountain ranges) (fig. 19). The species inhabits dry and steppe biotopes near small rivers at the altitudes from 1700 to 2900 m a.s.l. (figs 20-23).

Acknowledgements

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Fig. 19.– Distribution map of *Mecyna salangalis* Amsel, 1970 (pentagon - type locality).

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S. Y. S.
Zoological Institute
Russian Academy of Sciences
Universitetskaya, 1
RUS-199034 St. Petersburg
RUSIA / *RUSSIA*
E-mail: sergey.sinev@zin.ru
https://orcid.org/0000-0002-2467-5403

*S. K. K.
Russian Entomological Society
P. O. Box 97
RUS-603009 Nizhny Novgorod
RUSIA / *RUSSIA*
E-mail: stanislavkorb@list.ru
https://orcid.org/0000-0002-1120-424X

*Autor para la correspondencia / *Corresponding author*

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Figs 20-23.– Biotopes of *Mecyna salangalis* Amsel, 1970. **20.** Alai Mts., Kyzyl-Eshme valley. **21.** Talassky Mts., Kara-Buura river. **22.** Moldo-Too Mts. near Koro-Goo Pass. **23.** Dzhumgaltoo Mts., Sary-Kaiky gorge.