

New Data About Larentiinae (Geometridae, Lepidoptera) of the Kolsai Koldery State National Natural Park and its Adjacent Areas

Gulzhan Shayzatovna Nazymbetova,
Bakhytzhan Koshkinbaevich Yelikbayev and Bagdavlet Turaliyevich Taranov

Kazakh National Agrarian University, 8 Abai street, Almaty city 050010, Republic of Kazakhstan

DOI: <http://dx.doi.org/10.13005/bbra/1702>

(Received: 11 January 2015; accepted: 09 February 2015)

This research was conducted during 2009-2014 on the territory of the Kolsai Koldery National Park and the surrounding territories of the Northern Tien Shan. The purpose of the research was the determination of Larentiinae (Geometridae, Lepidoptera) fauna and the spread of its species. New fauna data of 64 species of small geometer moths from the Kolsai Koldery National Park and its surrounding territories are presented in this article. Thirty-four of them are new ones for this territory. Two of them are probably new even for the science itself: *Thera* sp., *Horisme* cf. *nigrovittata* Warren. The conducted zoogeographical analysis of small moths showed the predomination of *Palaeartic* species (11 ones). The other providing the diversity species are: *Eurasiatic*, *Turkestani*, *Turonian*, *West-Palaeartic*, 5 species per each group respectively. The other areal groups are less numerous ones. For example: *European-Westasiatic* – 4, *Transpalaeartic* – 3, *Sub-Mediterranean* – 2, *Mediterranean* – 4, *Sub-Transasiatic* – 1, *Eurosiberian* – 1, *Sub-transevraziatskiya* – 1, *Sub-Transpalaeartic* – 1, *Holarctic* – 1. 16 species are endemic and subendemic ones for this territory.

Key words: Larentiinae, faunistics, check-list.

The Kolsai Koldery State National Natural Park is situated on the northern slope of the Kungei Alatau mountains range. The park was established according to the Decree No. 88 of the Government of the Republic of Kazakhstan dated February 7, 2007. The most northern part of the park is the Chilik River, while the southern border is the border with Kyrgyzstan passing along the Kungei Alatau range. The greatest part of the park is situated on the territory of Kyrgyzstan, and only the eastern part of the northern slope of the ridge belongs to Kazakhstan. The relief of the park and adjacent areas is mostly mountainous one. Dry

steppe at the foot of the mountain ranges is replaced by orchards and groves, which respectively are replaced by forests and meadows up to the tops of the ridges sparkling with glaciers and snowfields.

The fauna of small moths on the territory of the park and its adjacent areas is understudied. This can be explained by the fact that there was no specialized research conducted there. During the last fifty years in the publications concerning the insect fauna of this area, certain types of small moths have been mentioned (Viidalepp 1976, 1977, 1978, 1979, 1986, 1997, Nazymbetova 2014). Fragmentary literature data does not provide an accurate representation of the species richness of small moths on the analyzed territory of the Republic of Kazakhstan. The purpose of this

* To whom all correspondence should be addressed.
E-mail: g.nazymbetova@mail.ru

article is to fill the gaps in the knowledge of the fauna of small moths of the Kolsai Koldery State National Natural Park and its adjacent areas.

MATERIALS AND METHODS

This research is based on the materials collected by the authors during 2009-2014 in the Northern Tien Shan. It also includes the results of processing the material collected by S. Murzin and L. Soldati during 1993-1995. Moreover the materials from the collection of Lepidoptera of the Bavarian State Collection of Zoology (Germany) were used.

Catching due to light was the main methods of collecting the night species. The incandescent lamps of 500 and 1000 watts were used as a light source. The collection of day species was done using a scoop-net in different areas of the studied territory.

The determination of the moths was conducted due to the series of scientific articles, atlases and determinants, such as: Hausmann and Viidalepp 2012; Viidalepp, 1988, 2011. Mikkola, K., Jalas, I. & Peltonen, O. (1989), Xue D., Zhu H., 1999, Savchuk, V. (2013). Dr. A. Hausmann (Zoologische Staatssammlung, München, Germany) provided an important assistance for the identification of the complex species.

We used the taxonomy and nomenclature in accordance with the list of European small moths (Hausmann and Viidalepp, 2012, Viidalepp, J. & I. Kostjuk, 2005, Müller, 1996), the USSR small moths list (Viidalepp, 1997), and the Russian catalogue of Lepidoptera (Mironov, 2008).

The names of habitat types' species and zoogeographical groups are given according to the classification proposed by Kryzhanovskii O. (2002), Semenov-Tyan-Shanskiy (1935) and using the literature data (Lopatin, 1986, Hausmann & Viidalepp, 2012; Viidalepp, 1988; Mironov, 1999-2000; Xue D., Zhu H., 1999;).

RESULTS

Annotated list of small moths

The excess of the recorded species is indicated the following way:

* = Personal collection

** = From the collection funds of the Bavarian State Collection of Zoology

*** = Literature data

***Lythria purpuraria* Linnaeus 1758.

Material: 20.04. 1993, 130 km from Almaty.

***Scotopteryx chenopodiata* Linnaeus, 1758

Material: ridge Zayilsky Alatau, Almaty (h 2000), 07.2010

**Scotopteryx sartata* (Alpheraky, 1883)

Material: Terskey Alatau, r.Orta-Kokpak, (42°04'2"N, 79°045'E h2400m), 20.07.1993

Zaailiski-Alatau, 14.07.1994, Shengeldi, (43°59'2" N 77°28'3"E), 01.10.2009.

**Scotopteryx kashghara* Moore, 1878

Material: Almaty, B.Almatinka lake, (43°032'023 N, 76°592'063 E., h2600m.), 05.1995

****Xanthorhoe asiatica* Staudinger, 1882

ridge Zayilsky Alatau, Almaty (h 2000)

****Catarhoe rubidata* Denis et Schiffermuller, 1775

Material: ridge Zayilsky Alatau, (43°032'003 N, 77°152'003 E), Talgar, (h1500)

**Costaconvexa polygrammata* Borkhausen, 1794

Material: Shengeldi 01.10.2009 (43°59'2" N 77°28'3"E)

**Epirrhoe pupillata* Thunberg, 1788

Material: B. Almatinka lake, 07.1995, (43°032'023 N, 76°592'063 E. h2600)

**Epirrhoe orientalis* (Sthelder, 1909)

Material: B. Almatinka lake, (43°032'023 N, 76°592'063 E. h2600), 07.1995; Terskey Alatau, r.Orta-Kokpak, (42°040"N, 79°048"E h 3000), 15.07.1993.

**Epirrhoe alternata* Muller, 1764

Material: B. Almatinka lake, (43°032'023 N, 76°592'063 E. h2600), 07.1995

****Epirrhoe dubiosata* (Alpheraky, 1883)

Material: ridge Zayilsky Alatau, (43°032'003 N, 77°152'003 E); Almaty, (h1600 m), 07.1995; Talgar, (h 1500); Tesken-Su, (h 1300).

**Pelurga comitata* Linne, 1758.

Material: Taldi (43°04'319"N, 78°25'644"E, h: 1838 m), 01-20.08.2013

**Larentia clavaria saisanica* Prout, 1937.

Material: Turgen, (43°13'657" N, 77°50'091"E.), 26-27.09.2010;

ridge Zayilsky Alatau, (43°032'003 N, 77°152'003 E); pass Talgar, (h 1500)

- ****Thera variata* Denis et Schiffermuller, 1775
Material: Medeo, pass Talgar, (h 1500)
- **Thera* sp.
Material: Kolsai (42°59'54,1"N 78°19'62,7"E h 1858 m), 30.08.2013
- **Cidaria distincta* Staudinger, 1892
Material: Ketmen, (43°20'41"N, 80°13'14"E. h 1800 m), 19-21.07.2009; Terskey Alatau, r.Orta-Kokpak, (42°040"N, 79°048"E); B. Almatinka lake (h 300), 12.07.1993; Kyrgizsai (43°19'49"N 79°28'42"E), 12.07.2009
- **Cosmorhoe ocellata* Linne, 1758
Material: Shengeldi (43°59'2"N 77°28'3"E), 01.10.2009
- ***Eulithis inurbana* Prout, 1937
Material: Kazakhstan-SE, Almaty, (h2600); B. Almatinka lake, 07.1995
- **Ecliptopera fastigiata* (Pungeler, 1908)
Material: Shengeldi (43°59'2" N 77°28'3"E), 01.10.2009; Almaty, B. Almatinka lake, (h2600m.), 05.1995,
- ****Chloroclysta miata* Linnaeus, 1758
Material: ridge Zayilsky Alatau, (43°032 003 N. 77°152 003 E), Talgar, (h 1500)
- ****Chloroclystis chloerata* Mabilie, 1870
Material: ridge Zayilsky Alatau, (43°032 003 N. 77°152 003 E), Tesken-su, (h 1300)
- ****Coenotephria ocellata* Linnaeus, 1758
Material: ridge Zayilsky Alatau, (43°032 003 N. 77°152 003 E)
- ****Coenotephria neogamata* Pungeler, 1908
Material: ridge Zayilsky Alatau, (43°032 003 N. 77°152 003 E), "545>
- ****Minoa murinata* Scopoli, 1763.
Material: ridge Zayilsky Alatau, (43°032 003 N. 77°152 003 E); Talgar, (h 1500)
- **Hydria incertata* Staudinger, 1882
Material: Shengeldi (43°59'2" N 77°28'3"E), 01.10.2009
- **Horisme vitalbata* Denis & Schiffermuller, 1775
Material: Ketmen, (43°20'41"N, 80°13'14"E. h 1800 m), 19-21.07.2009
- **Horisme cf. nigrovittata* Warren, 1888
Material: Kolsai (42°59'54,1"N 78°19'62,7"E h 1858 m), 30.08.2013
- **Horisme stratata* Wileman, 1911
Material: Bakanas vill, 04.1993; Tuik vill. 05.1993; Ketmen, (43°20'41"N, 80°13'14"E. h 1800 m)
- ***Horisme detersata* Pungeler, 1900
Material: r.Ily, Bakanas, 30.05.1993
- **Aplocera plagiata* Linne, 1758
Material: Ketmen, (43°20'41"N, 80°13'14"E. h 1800 m), 19-21.07.2009
- **Lithostege coassata* Hubner, 1817
Material: Bakhanas, (44°482 17.93 N, 76°162 35.33 E), 2-5.05. 2011; Shengeldi (43°59'2" N 77°28'3"E), 01.10.2009
- **Lithostege staudingeri* Erschov, 1874
Material: Kyrgizsai (43°19'49"N 79°28'42" E), 12.07.2009
- ****Lithostege griseata* Petersen, 1924
Material: ridge Zayilsky Alatau.
- **Lithostege infusate* Eversmann, 1837
Material: Bakhanas, (44°482 17.93 N, 76°162 35.33 E), 2-5.05. 2011
- ***Kuldscha staudingeri* Alpheraky, 1883
Material: ridge Zayilsky Alatau, Bolshoe Almatinka lake, (43°032 023 N. 76°592 063 E. h260, 07.1995)
- **Photoscotisia palaeartica* Staudinger,
Material: Shengeldi (43°59'2" N 77°28'3"E), 01.10.2009; Terskey Alatau, r.Orta-Kokpak, (42°040"N, 79°048"E h 3000), 12.07.1993; Bolshoe Almatinka lake, (43°032 023 N. 76°592 063 E. h260, 07.1995)
- ***Eupithecia biornata* Christoph, 1867
Material: Kazakhstan – B. Almatinka lake, 15.07.1994
- **Eupithecia mima* Mironov, 1989
Material: Chingrlau, 24-25.05.2011
- **Eupithecia extensaria* Freyer, 1845
Material: Arharli, (44°132 313 N, 77°312 203 E), 06.05.2010; Chingrlau, 24-25.05.2011
- **Eupithecia subpulchrata* Alpheraky, 1882
Material: in the neighborhood of the city Kapshagai, Ili, (44°11'40"N, 76°54'42,12"E.), 22,04,2013
- ***Eupithecia pallescens* Dietze
Material: Kazakhstan-SE, B. Almatinka lake, (h2600), 07.1995,

- **Eupithecia remmi* Viidalepp, 1988
Material: Hatutau, (44°03'120"N 79°27'60,54"E), 28-30.05.2010
- **Eupithecia ochridata* Pinker, 1986
Material: Ili, (44°11'40"N, 76°54'42,12"E.), 18.05.2010
- **Eupithecia gratiosata* Herrich-Schaffer, 1861
Material: !holak, (44°22 14.243 N, 77°462 28.543 E), 01.06.2010
- ***Eupithecia opistographata* Dietze, 1906
Material: Bakanas, 30.05.1993, Liy, 04.1993
- **Eupithecia parallelaria* Bolatsch, 1893
Material: Bakanas, 04.1993; Shengeldi (43°59'2" N 77°28'3"E), 01.10.2009
- ***Eupithecia usbeca* Viidalepp, 1992
Material: Bakanas, 15-20.08.1994
- ***Eupithecia exalbidata* Staudinger, 1901
Material: B. Almatinka lake, (h2600) 07.1995; Terskey Alatau, (h 2400), 05.07.1993.
- ***Eupithecia rebeli* Bohatsch, 1893
Material: B. Almatinka lake, (h2600) 20.07.1995.
- ***Eupithecia rubellata* Dietze, 1903
Material: B. Almatinka lake, (h2600) 07.1995
- ***Eupithecia absinthiata* Clerck, 1759
Material: B. Almatinka lake, 07.1995,
- ***Eupithecia centaureata* Denis & Schiffermuller, 1775
Material: B. Almatinka lake, (h2600) 07.1995.
- ****Eupithecia satyrata* Hubner, 1813
Material: ridge Zayilsky Alatau.
- ****Eupithecia assimilate* Doubleday, 1856
Material: Almaty
- ****Eupithecia denotata* Hubner, 1813 ssp. *Livida* Dietze, 1913
Material: Medeo
- **Eupithecia subfuscata* Haworth, 1809
Material: ridge Zayilsky Alatau, (43°032 003 N. 77°152 003 E.), 05.06.2014
- ****Odontorhoe tianschanica* Alpheraky 1883,
Material: Almaty, riv. Kolbelsu, (42°039"N, 79°041"E. h3900m), 07.1993;
Terskey Alatau, r.Orta-Kokpak, (42°042"N, 79°045"E h 2600) 17.07.1993
- ****Odontorhoe icterica* Djakonov 1908.
Material: Medeo, pass Alyosha, (h 2700), valley Lake, (h 2000-2500).
- ***Odontorhoe fidonaria* Staudinger, 1892
Material: Dzhenisk, Kara-Si, (h 2500-3000); Almaty, B. Almatinka lake, (h 2600), 10-20.07.1994
- ***Odontorhoe alexandraria* Staudinger, 1892
Material: Valley Lake, (h 1750-3400); valley Kohl Almaty, (h 3100-3400), Science peak, Big Almatinka, (h 2600), 10-20.07.1994
- ****Lasiogma palearctica* Staudinger, 1882.
Material: ridge Zayilsky Alatau, Medeo, Talgar, (h 1500).
- **Stamnodes danilovi* Erschov, 1877
Material: ridge Zayilsky Alatau, The lake, (h 3100-3400)
- ****Stamnodes pauperarius divitarius* Staudinger, 1882
Material: ridge Zayilsky Alatau, Minzhilki, (h 3200).
- **Operophtera brumata* (Linnaeus, 1758)
Material: ridge Zayilsky Alatau, (43°032 003 N. 77°152 003 E.), 05.10.2014

DISCUSSION

Due to the provided research, literature data, and collection materials of Zoologische Staatssammlung, (München, Germany), the composition of the fauna of small moths of Kolsai Koldery State National Natural Park and its adjacent areas was revealed. Nowadays 64 species of small moths from the *Larentiinae* subfamily are officially recorded. The fauna of the small moths of this area is varied. Zoogeographical fauna analysis of *Larentiinae* was based on conventional zoogeographical methods (Lopatin, 1986), personal collected materials, and literature data (Hausmann & Vildalepp, 2012; Vildalepp, 1988; Mironov, 1999-2000; XUE, ZHU, 1999). The described species are strictly those existing on the territory of the Kolsai Koldery State National Natural Park and its adjacent areas. Because of the relatively poorly studied fauna of *Larentiinae* subfamily in Kazakhstan, zoogeographical analysis of small moths is the preliminary one. Nevertheless, it is obvious that the Palaearctic species dominate here (7 ones); the Eurasiatic areal group consists of 5 species, as well as Turkestanian, Turonian, and West-Palaearctic groups. Other areal groups are relatively small:

European-Westasiatic (4 species), Transpalearctic (3 species), Sub-Mediterranean (2 species), Mediterranean (4 species), while Sub-Transasiatic, Eurosiberian, Sub-Transevraziatskiya, Sub-Transpalearctic, Holarctic groups are each represented by one species.

Two genera of small moths subfamily are endemic and subendemic for Tien Shan (genera *Odontorhoe* and subendemic *Kuldscha*). The endemic genera *Odontorhoe* is presented by four species: *Odontorhoe tianschanica* Alpheraky 1883, *Odontorhoe icterica* Djakonov 1908, *Odontorhoe fidonaria* Staudinger, 1892, and *Odontorhoe alexandriaria* Staudinger, 1892. These taxa are confined to the Alpine landscape, the mentioned species were found in subalpine and alpine zones. Subendemic genera *Kuldscha* is presented by a single species *Kuldscha staudingeri* Alpheraky 1883. Relatively abundant species are endemic to the Tien Shan, or its zones: the Tien Shan mountain species are: *Eupithecia pallescens* Dietze, *Xanthorhoe asiatica* Staudinger, *Scotopteryx kashghara* Moore, *Scotopteryx sartata* Alpheraky. The North Tien Shan Turkestan mountain species is *Coenotephria neogamata* Pungeler.

The following species are endemic for the Tien Shan: *Stammodes pauperarius divitarius* Staudinger, *Lasiogma palearctica* Staudinger, *Eupithecia mima* Mironov, *Photoscotia palaeartica* Staudinger, *Ecliptopera fastigata* Pungeler, *Lithostege staudingeri* Erschov. *Horisme* cf. *nigrovittata*, *Thera* sp. (h 2000 m., July-August 2013) the new species were identified while going through mountain-step zone up to the top of the forest one.

It was determined that the plains and highlands areas can be considered as the centers of formation of a number of small moths endemic forms. The major role in the formation of small moth fauna of the region belongs to the Tien Shan (16 forms) and other, younger Kazakh hotbeds of speciation (2 form), where the core of the small moths of the southeast of Kazakhstan was formed.

The further research of small moths fauna of the Kolsai Koldery State National Natural Park and its adjacent areas will help to improve our understanding of zoogeographic boundaries in the Central Asian region.

CONCLUSION

On the territory of the Kolsai Koldery State National Natural Park and its adjacent areas 64 species of the small moths were identified. 34 of them were described for the first time by the authors for mentioned territory. Two species out of them are probably the new ones even for the science; they are *Thera* sp., *Horisme* cf. *nigrovittata* Warren. Among the registered species, 2 genera and 16 species are endemic ones. They are mostly confined to subalpine and alpine zones. Nevertheless, despite such extensive faunal novelty, based on the collection over the years, several species of small moths remained to be known only due to literature sources. The observed number of species, definitely, is not the final one; it is be complemented by arriving materials.

ACKNOWLEDGMENTS

The authors express their sincere gratitude to Dr. A. Hausmann (Zoologische Staatssammlung, München, Germany), for the provided materials, for his help in determining the material and for his valuable advice.

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