



SHILAP Revista de lepidopterología

ISSN: 0300-5267

ISSN: 2340-4078

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Sociedad Hispano-Luso-Americana de Lepidopterología  
España

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SHILAP Revista de lepidopterología, vol. 48, no. 192, 2020, October-, pp. 643-649  
Sociedad Hispano-Luso-Americana de Lepidopterología  
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## **Checklist of the Geometridae of the Saur Mountains and adjacent territories (Eastern Kazakhstan) (Lepidoptera: Geometridae)**

A. E. Naydenov, I. A. Makhov, S. V. Vasilenko & R. V. Yakovlev

### **Abstract**

A checklist of the Geometridae of the Saur Mountains is presented with 109 species (Ennominae: 29; Geometrinae: 10; Sterrhinae: 23 and Larentiinae: 47).

KEY WORDS: Lepidoptera, Geometridae, fauna, entomology, Tarbagatai, Zaisan, Kazakhstan.

### **Lista detallada de los Geometridae de las montañas del Saur y territorios adyacentes (Este de Kazajistán) (Lepidoptera: Geometridae)**

### **Resumen**

Se presenta una lista de los Geometridae de las montañas del Saur con 109 especies (Ennominae: 29; Geometrinae: 10; Sterrhinae: 23 y Larentiinae: 47).

PALABRAS CLAVE: Lepidoptera, Geometridae, fauna, entomología, Tarbagatai, Zaisan, Kazajistán.

### **Introduction**

The Saur is one of the mountain ranges in the Tarbagatai mountain system. It is located on the border between Eastern Kazakhstan and China south-eastwards from Zaisan lake and the Black Irtysh River (Fig. 1). To the north it is bordered by the Zaisan depression, and the Chilikty depression separates it from the Tarbagatai in the south. The Saur stretches 140 km from the west to the east and reaches an altitude of 3816 m (Muztau Mt.). In the Saur the snow line is situated at an altitude of 3300 m. The north foot of the Saur up to 700 m belongs to the semi-desert zone where semidesert plants grow on solonchic chestnut soil. South expositions are covered by mountain steppes and semi-deserts. Alpine meadows, stony mountain tundras and glaciers are situated on the crests. The hydrographic network is developed well; the main rivers are Zhemenei and Uidene.

In the beginning of the XX century the Saur was regarded as part of Dzhungaria and even Tien-Shan. Later MALOLETKO (1999) argued that the Saur and the Tarbagatai belong to the system of the Altai mountains and this view was held by leading Russian botanists (KAMELIN, 2005) who included these ridges within the Altai-Dzhungarian biogeographical region. Later some entomologists working on the fauna of the Altai mountain system (VOLYNKIN & MATOV, 2011; YAKOVLEV, 2012) accepted the demarcation of the Altai as suggested by phytogeographs (RUBIN & YAKOVLEV, 2013).

The fauna of diurnal butterflies of Saur Mountains is the most studied. The most complete review of butterflies is presented in the work of RUBIN and YAKOVLEV (2013), in which 159 species are listed. Also 216 species of the noctuid moths were listed for the Saur Mountains (VOLYNKIN *et al.*, 2016).

## Material and methods

The article is based on the materials collected by the authors in territory of the Saur Mountains and adjoining areas in the period 20-VI-27-VI-2018 and collected by V. V. Doroshkin and R. V. Yakovlev in this area in the period 17-VII-23-VII-2011. The Geometridae were collected by the following methods: mowing with a butterfly net; night catching on light. These specimens are kept in the personal collection of A. E. Naydenov (Novoaltaysk, Russia). Also materials for the publication were collection of Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia (ZISP); presumably, it is material from expeditions lead by S. Tshetverikov and P. Sushkin in 1904.

The Geometridae fauna was examined in 24 localities of this territory (Fig. 2):

1. E. Kazakhstan, Saur Mts, 20 km SEE Zaisan, 47°22'N; 85°09'E, H-1225-1250 m, 20-VI-2018, R. Yakovlev, V. Doroshkin, V. Rudoj & A. Naydenov leg. (Fig. 3);
2. E. Kazakhstan, Saur Mts, Tas Mt. (northern slope), 47°16'N; 85°04'E, H-2230-2400 m, 21-23-VI-2018, R. Yakovlev, V. Doroshkin, V. Rudoj & A. Naydenov leg. (a); 20-22-VII-2011, V. Doroshkin, R. Yakovlev leg. (b) (Fig. 4);
3. E. Kazakhstan, Saur Mts, Kenderlik river Valley (left bank), 2 km W Kenderlik village, 24-VI-2018. 47°28'N; 85°12'E, H-740 m, R. Yakovlev, V. Doroshkin, V. Rudoj & A. Naydenov leg. (Fig. 5);
4. E. Kazakhstan, Saur Mts, 15 km SSW Karabulak Village, 47°24'N; 84°38'E, H-800 m, 26-VI-2018, R. Yakovlev, V. Doroshkin, V. Rudoj & A. Naydenov leg. (Fig. 6);
5. E. Kazakhstan, Saur Mts, 7 km NE Chagan-Obo, 47°06'N; 84°53'E, H-2300 m, 27-VI-2018, R. Yakovlev, V. Doroshkin, V. Rudoj & A. Naydenov leg. (Fig. 7);
6. E. Kazakhstan, Zaisan distr., Saur Mts., 24 km S Zaisan, upper stream Bolshoi Zhemenei riv., 1650 m, 47°14'N; 84°56'E, 17-19-VII-2011, V. Doroshkin, R. Yakovlev leg. (Fig. 8);
7. E. Kazakhstan, Zaisan distr., Saur Mts., Alatai pass, 2010 m, 47°18'N; 85°08'E, 23-VII-2011, V. Doroshkin, R. Yakovlev leg.;
8. E. Kazakhstan, Zaisan distr., Saur Mts. (N slopes near Kenderlyk vill.), 1200 m, 47°21'N; 85°15'E, 23-VII-2011, V. Doroshkin, R. Yakovlev leg.;
9. Tarbagatai, Saur, estuary of Temir-Su river, 18-V-1904;
10. Tarbagatai, Zaisan village, 21-V-1904 (a); 23-25-VI-1904(b); 16-IX-1904(c);
11. Tarbagatai, Zaisan, estuary of Kenderlik river, 24-26-V-1904;
12. Tarbagatai, Saur, foothills of Kishkine-Tau, 28-V-1904;
13. Tarbagatai, Saur, Kishkine-Tau pass, 29-30-V-1904;
14. Tarbagatai, Saur, Terekty river, below the mountains, 31-V-1904;
15. Tarbagatai, Saur, Sary-Bulak, in Saikan, 3-VI-1904;
16. Tarbagatai, Saur, Sarytylogai, Mustau foothills, 6-7-VI-1904;
17. Tarbagatai, Saur, Maishat, Mustau foothills, 11-15-VI-1904;
18. Tarbagatai, Saur, Kenderlik river, coal mines, 16-VI-1904;
19. Tarbagatai, Saur, headwaters of Terekty river, 17-20-VI-1904;
20. Headwaters of Uidene river, Saur, Tarbagatai, 21-VI-1904(a); 1-VII-1904(b);
21. Bolshoi Zhemenei, exit from Saur, Tarbagatai, 22-25-VI-1904;
22. Kl. Tick Bulak, South slope of Saur, Tarbagatai, 7-VII-1904;
23. Chiliktin Valley, Tarbagatai, 8-VII-1904;
24. Tarbagatai, Zaisan lake, cape Topolevyy, 22-VIII-1904.

## Species list

Subfamily Ennominae Duponchel, 1845

*Stegania dalmataria* Guenée, 1857 - 3

*Lomographa temerata* ([Denis & Schiffermüller], 1775) - 1  
*Cabera exanthemata* (Scopoli, 1763) - 1  
*Selenia lunularia* (Hübner, [1788]) - 1  
*Odontopera bidentata* (Clerck, 1759) - 1, 5  
*Opisthograptis luteolata* (Linnaeus, 1758) - 1  
*Ourapteryx purissima* Thierry-Mieg, 1905 - 3  
*Pseudopanthera macularia* (Linnaeus, 1758) - 1, 2a  
*Macaria alternata* ([Denis & Schiffermüller], 1775) - 1  
*Macaria liturata* (Clerck, 1759) - 1  
*Macaria shanghaiaria* Walker, 1861 - 3  
*Heliomata glarearia* ([Denis & Schiffermüller], 1775) - 1  
*Chiasmia clathrata* (Linnaeus, 1758) - 1, 2a  
*Digrammia rippertaria* (Duponchel, 1830) - 1, 2b, 3  
*Perconia strigillaria* (Hübner, [1787]) - 1  
*Siona lineata* (Scopoli, 1763) - 1  
*Synopsia sociaria* (Hübner, [1799]) - 3, 4  
*Megalycinia strictaria* (Lederer, 1853) - 1  
*Aspitates (Megaspilates) mundataria* (Stoll, 1782) - 3, 4  
*Aspitates (Aspitates) gilvaria* ([Denis & Schiffermüller], 1775) - 23  
*Charissa (Kemtroglyphos) ambigua* (Duponchel, 1830) - 1  
*Gnophopsodos stemmataria* (Eversmann, 1848) - type locality: Kazakhstan, Noor Saisan. Deposition of holotype: Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia (ERLACHER & ERLACHER, 2016).  
*Ematurga atomaria* (Linnaeus, 1758) - 1, 2a, 3  
*Angerona prunaria* (Linnaeus, 1758) - 1, 3  
*Alcis extinctaria* (Eversmann, 1851) - 1, 6  
*Megametopon grisolaria* (Eversmann, 1848) - 24  
*Cleora cinctaria* ([Denis & Schiffermüller], 1775) - 1  
*Jankowskia bituminaria* (Lederer, 1853) - 3, 4  
*Biston betularia* (Linnaeus, 1758) - 1, 3

#### Subfamily Geometrinae Leach, 1815

*Geometra papilionaria* Linnaeus, 1758 - 3  
*Thetidia smaragdaria anomica* Prout, 1935 - 1, 3, 4, 14  
*Thetidia correspondens* (Alpheraky, 1883) - 3, 4  
*Hemistola chrysoprasaria lissas* Prout, 1912 - 3  
*Thalera fimbrialis* (Scopoli, 1763) - 3, 4  
*Dyschloropsis impararia* (Guenée, [1858]) - 1, 3  
*Hemithea aestivaria* (Hübner, [1799]) - 3  
*Chlorissa viridata* (Linnaeus, 1758) - 1, 3, 4  
*Phaiogramma etruscaria* (Zeller, 1849) - 1  
*Microloxia herbaria* (Hübner, [1813]) - 4

#### Subfamily Sterrhinae Meyrick, 1892

*Idaea aureolaria* ([Denis & Schiffermüller], 1775) - 1, 5, 12, 13, 19, 22  
*Idaea aversata* (Linnaeus, 1758) - 1, 3, 21  
*Idaea dimidiata* (Hufnagel, 1767) - 3  
*Idaea nitidata* (Herrich-Schäffer, 1861) - 3, 4, 5, 21  
*Idaea rusticata* ([Denis & Schiffermüller], 1775) - 3

*Idaea sericeata* (Hübner, [1813]) - 3  
*Idaea rufaria* (Hübner [1799]) - 3, 5  
*Idaea ossiculata* (Lederer, 1870) - 4  
*Scopula beckeraria* (Lederer, 1853) - 4, 10, 11  
*Scopula dignata* (Guenée, [1858]) - 1, 4  
*Scopula immorata* (Linnaeus, 1758) - 1, 17, 19, 20  
*Scopula incanata* (Linnaeus, 1758) - 15, 19, 21  
*Scopula halimodendrata* (Erschoff, 1874) - 11  
*Scopula marginepunctata* (Goeze, 1781) - 1  
*Scopula ornata* (Scopoli, 1763) - 1, 15  
*Scopula tessellaria* (Boisduval, 1840) - 1, 3  
*Scopula umbelaria* (Hübner, [1813]) - 1, 3  
*Scopula virgulata* ([Denis & Schiffermüller], 1775) - 1, 3  
*Rhodostrophia jacularia* (Hübner, [1813]) - 11, 18  
*Rhodostrophia vibicaria* (Clerck, 1759) - 1, 3, 5, 13, 19  
*Timandra comae* Schmidt, 1931 - 1  
*Lythria purpuraria* (Linnaeus, 1758) - 2a, 4  
*Lythria venustata* Staudinger, 1882 - type locality: Zaisan. The holotype is currently housed at the Museum für Naturkunde, Humboldt-Universität, Berlin, Germany (ÖUNAP *et al.*, 2009).

#### Subfamily Larentiinae Duponchel, 1845

*Aplocera plagiata* (Linnaeus, 1758) - 1  
*Scotopteryx chenopodiata* (Linnaeus, 1758) - 6  
*Scotopteryx sp.* - 1  
 Remarks: Only one specimen was collected. The species is most similar to *S. pseudoburgaria* Vasilenko, 2018, however, it has differences in the genital structures. A series of specimens is required to accurately identify the species.  
*Phibalapteryx virgata* (Hufnagel, 1767) - 2a  
*Cataclysmes rigata* (Hübner, [1813]) - 1, 3, 4  
*Xanthorhoe asiatica* (Staudinger, 1882) - 1  
*Xanthorhoe decoloraria* (Esper, [1806]) - 6  
*Xanthorhoe fluctuata* (Linnaeus, 1758) - 1  
*Xanthorhoe sajanaria* (Prout, 1914) - 3  
*Xanthorhoe spadicearia* ([Denis & Schiffermüller], 1775) - 1  
*Juxtephria consentaria* (Freyer, [1846]) - 1  
*Catarhoe cuculata* (Hufnagel, 1767) - 1  
*Catarhoe rubidata* ([Denis & Schiffermüller], 1775) - 1  
*Epirrhoe alternata* (Müller, 1764) - 1, 2a  
*Epirrhoe pupillata* (Thunberg, 1788) - 1, 2a  
*Epirrhoe tristata* (Linnaeus, 1758) - 1  
*Pseudentephria lamata* (Staudinger, 1897) - 3, 5  
*Photoscotosia palaearctica* (Staudinger, 1882) - 1, 6  
*Hydriomena ruberata* (Freyer, [1831]) - 1  
*Cidaria fulvata* (Forster, 1771) - 1  
*Dysstroma truncata* (Hufnagel, 1767) - 1  
*Cosmorhoe ocellata* (Linnaeus, 1758) - 1  
*Lampropteryx suffumata* ([Denis & Schiffermüller], 1775) - 1  
*Stamnodes pauperaria* (Eversmann, 1848) - 2a, 5  
*Eupithecia assimilata* Doubleday, 1856 - 1  
*Eupithecia bastelbergeri* Dietze, 1910 - 5

*Eupithecia centaureata* ([Denis & Schiffermüller], 1775) - 1, 10c, 21  
*Eupithecia exigua* (Hübner, [1813]) - 1  
*Eupithecia extensaria* (Freyer, 1845) - 1, 9, 14  
*Eupithecia extraversaria* Herrich-Schäffer, 1852 - 3  
*Eupithecia holti* Viidalepp, 1973 - 2a  
*Eupithecia icterata* (De Villers, 1789) - 1, 6  
*Eupithecia ochridata* Schutze & Pinker, 1968 - 1  
*Eupithecia olgae* Mironov, 1986 - 1  
*Eupithecia parallelaria* Bohatsch, 1893 - 9  
*Eupithecia pygmaeata* (Hübner, [1799]) - 2a  
*Eupithecia satyrata* (Hübner, [1813]) - 1, 16, 17  
*Eupithecia simpliciata* (Haworth, 1809) - 10b  
*Eupithecia subfuscata* (Haworth, 1809) - 1, 3, 16  
*Eupithecia subumbrata* ([Denis & Schiffermüller], 1775) - 1, 16, 21  
*Eupithecia uliata* Staudinger, 1897 - 1, 21  
*Eupithecia virgaureata* Doubleday, 1861 - 1  
*Horisme aemulata* (Hübner, [1813]) - 1  
*Horisme incurvaria* (Erschoff, 1877) - 1  
*Horisme plurilineata* (Moore, 1888) - 3  
*Horisme tersata* ([Denis & Schiffermüller], 1775) - 1, 3, 4  
*Horisme vitalbata* ([Denis & Schiffermüller], 1775) - 1, 3

## Discussion

Altogether 109 geometer moths species (Ennominae: 29; Geometrinae: 10; Sterrhinae: 23; Larentiinae: 47) have been recorded in the Saur Mountains and adjacent territories.

The fauna of Geometridae of the Saur comprises the following elements: Transpalaeartic, West Palaeartic, Siberian and Central Asian species.

## Acknowledgements

The authors are grateful to Vladimir Mironov (St. Petersburg) for the assistance in identifying the material (genus *Eupithecia*) and to Vyacheslav Doroshkin (Chelyabinsk) and Valentin Rudoj (Barnaul) for assistance in collecting material. The work of the second author was financially supported by the Russian Foundation for Basic Research (grants RFBR 19-34-90008 and 18-04-00263).

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(Recibido para publicación / *Received for publication* 10-IV-2020)

(Revisado y aceptado / *Revised and accepted* 12-V-2020)

(Publicado / *Published* 30-XII-2020)



