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CONTRIBUTION TO THE KNOWLEDGE OF THE LEPIDOPTERA IN THE NORTHERN CISOKHOTIA, RUSSIA

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An annotated list of species of Lepidoptera collected in the Kawa-Chelomdzhinsky cluster of Magadan Nature Reserve is given. Eight species: *Macaria artesiaria* ([Denis & Schiffermüller], 1775), *Epione repandaria* (Hufnagel, 1767), *Dysstroma latefasciata* (Prout, 1914), *Coenocalpe lapidata* (Hübner, 1809), *Clostera (albosigma) curtuloides* (Erschoff, 1870), *Hypena proboscidalis* (Linnaeus, 1758), *Apamea crenata* (Hufnagel, 1766) and *Amphipoea lucens* (Freyer, 1845) are reported from the Magadan Oblast for the first time.
Key words: *East Siberia, Magadan Nature Reserve, Noctuidae, Notodontidae, Geometridae, Nymphalidae.*

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INTRODUCTION

Until the year 2008, 435 species of Lepidoptera were registered for North Okhotsk region, Magadan area (Sinev, 2008). After publishing the catalogue one new species for science, *Dodia maja* Rekelj & Česanek, 2009 (Erebidae: Arctiinae), was described from the territory. During our expedition 44 species were registered on the area of a quarter of a kilometre in five days of effective collecting in August. With the exception of eight species not yet included in the present list of species for Magadan region we registered a little more than 8 % of known fauna. Eight newly registered species therefore represents almost 2 % increase of registered species. These results show that Lepidoprea fauna of Magadan region needs further exploration.

The territory of Magadan Oblast is situated in the North-Eastern part of the Palearctic, east of the Sakha (Yakutia) Republic, from the coast of Sea of Okhotsk in the south, to the Chersky Range, extending from arctic to subarctic, in the northwest, bordering Kamchatka Territory and Chukotka in the North-East. The vast territory of 461 400 km² is mostly uninhabited, with very little road network. That is probably the main reason that Lepidopteran fauna is relatively poorly explored and therefore particularly interesting.

Friendly acquaintance with biologists from Magadan Nature Reserve and Institute of the Biological Problems of the North, Far Eastern Branch of the Russian Academy of Sciences resulted this article.

MATERIAL AND METHODS

Study area

The Kava-Chelomdjinsky cluster of Magadan Nature Reserve covers mostly lowland basin of protected rivers – Kava and Chelomdja, which at the confluence forms river Tauy, the largest river system in the Tauisk Bay. Chelomdja originating in the upper reaches of the Okhotsk-Kolyma range, has a length of 215 km and is a part of the reserve entirely (Published collective monograph: *Flora and Fauna*..., 2011) (Figure 1).

Study area was limited to cordon Moldot in Kava-Chelomdjinsky cluster of Magadan Nature Reserve at the geographical coordinates: 059°58'48"N, 148°04'54"E, at altitude 100 m a.s.l.

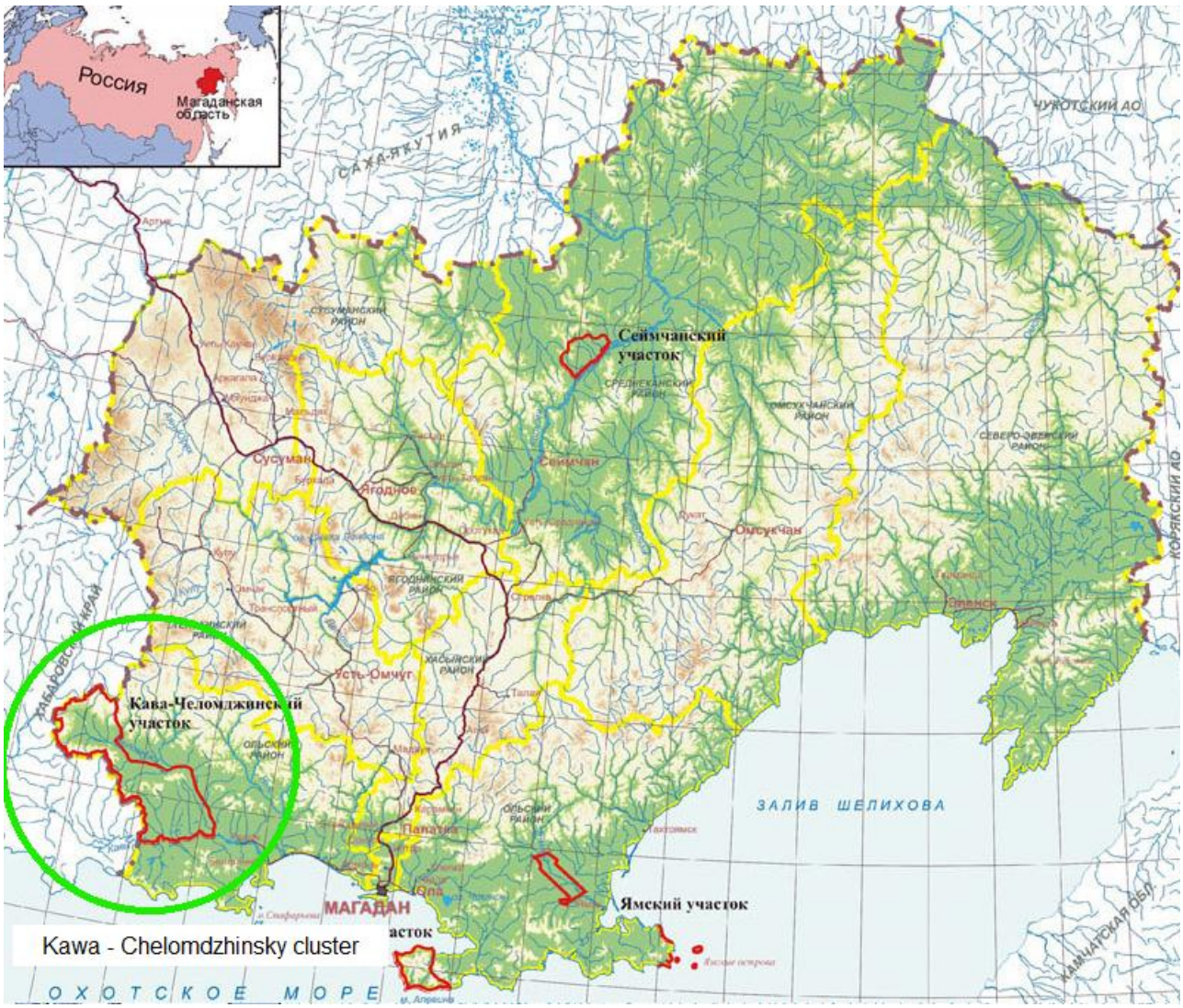

Figure 1. Clusters of the Magadan Nature Reserve (source: http://www.magterra.ru/интерактивная-карта.html).

Four sampling sites (locality 01-01c) with most typical microhabitats were chosen. Characteristic predominant plant groups in microhabitat of each selected sampling site were: *Betula-Populus-Alnus* forest near the pond (locality 01: Figure 2), *Larix-Vaccinium* forest (locality 01a: Figure 3), *Salix-Populus* river bank (locality 01b: Figure 4) and *Larix-Vaccinium-Cladonia-Cetraria* thin larch forest (locality 01c: Figure 5). The distance between sampling sites was a few hundred meters.

Figure 2. Locality 01 – *Betula-Populus-Alnus* forest near the pond (Photo: N. Tridrih).

Figure 3. Locality 01a – *Larix-Vaccinium* forest (Photo: N. Tridrih).

Figure 4. Locality 01b – *Salix-Populus* river bank (Photo: M. Černila).

Figure 5. Locality 01c – *Larix-Vaccinium-Cladonia-Cetraria* thin larch forest (Photo: N. Tridrih).

Data collection

The entomological material was collected by four methods (Table 1): manual collection on pyramidal shaped white sheet screen with two 12V/8W UV (black light) fluorescent tubes (Figure 6), automatic light trap with UV cold cathode light kit switched on/off by timer (Figure 7), collecting by net and observation.

Figure 6. Mlt –pyramidal shaped white sheet screen with two 12V/8W UV (black light) fluorescent tubes (Photo: N.Tridrih)

Figure 7. Alt – automatic light trap with UV cold cathode light switched on/off by timer (Photo: N.Tridrih)

Table 1. Microhabitat types and collecting methods used in each chosen locality

Locality code	Microhabitat type	Collecting methods			
01	*Betula-Populus-Alnus* forest near the pond	M.lt		Net	
01a	*Larix-Vaccinium* forest	M.lt		Net	
01b	*Salix-Populus* river bank		A.lt		
01c	*Larix-Vaccinium-Cladonia-Cetraria* thin larch forest		A.lt	Net	Obs.

Mlt – manual collection on pyramidal shaped white sheet screen with two 12V/8W UV (black light) fluorescent tubes; Alt – automatic light trap with UV cold cathode light kit switched on/off by timer; Net – collecting by net; Obs. – observation. Data was collected from August 3th until August 8th 2016.

Data analysis

All specimens were pinned, set and dried. Identification was conducted by comparison of external morphology with specimens in the authors personal collection (Kamnik, Slovenia) and studying literature sources (Fibiger, 1993; Goater et al., 2003; Kononenko, 2005; Mikkola et al., 1987; Pekarsky, 2014; Volynkin, 2012; Dubatolov & Vasilenko, 1988, Vasilenko, 1990, 1991).

The areals of species were verified in literature and Internet sources (Sinev, 2008; Kononenko, 2005; Beljaev & Vasilenko, 2002; Burnasheva & Beljaev, 2011; Beljaev & Burnasheva, 2014; Vasilenko, 1998; Kamchatka Branch of the Pacific Institute of Geography FEB RAS, 2009, http://lepbarcoding.org/northamerica/species_checklists.php).

Specimens from genus *Dysstroma* (Geometridae) was dissected and determined by the shape of cornuti bundle on the everted vesica (Hausmann & Viidalepp, 2012).

RESULTS

Annotated list of species

LYCAENIDAE

Lycaeninae

1. *Plebeius optilete* (Knoch, 1781) – 01c: Obs, 1♀.

NYMPHALIDAE

Nymphalinae

2. *Aglais urticae* (Linnaeus, 1758) – 01: Net, 1♂
3. *Polygonia c-album* (Linnaeus, 1758) – 01: Net, 2♂
4. *Nymphalis xanthomelas* (Esper, 1781) – 01: Net, 1♂

GEOMETRIDAE

Ennominae

5. *Macaria (wauaria) halituaria* (Guenée, 1858) – 01: Mlt, 2♀, 4♂; 01b: Mlt, 6♂
6. **Macaria artesiaria* ([Denis & Schiffermüller], 1775) – 01a: Mlt, 2♀
7. *Itame brunneata* (Thunberg, 1784) – 01: Mlt, 1♀, 3♂; 01a: Mlt, 1♂
8. *Itame loricaria* (Eversmann, 1837) – 01: Mlt, 3♂; 01a: Mlt, 4♂; 01b: Alt, 4♂
9. **Epione repandaria* (Hufnagel, 1767) – 01: Mlt, 8♂
10. *Cabera exanthemata* (Scopoli, 1763) – 01: Mlt, 1♂

Larentiinae

11. *Xanthorhoe abrasaria* (Herrich-Schäffer, 1855) – 01: Mlt, 1♀
12. *Entephria caesiata* ([Denis & Schiffermüller], 1775) – 01: Mlt; 01a: Mlt, 2♀, 8♂
13. *Eulithis prunata leucoptera* (Djakonov, 1929) – 01: Mlt, 4♂; 01a: Mlt, 2♀, 5♂
14. *Eulithis testata* (Linnaeus, 1761) – 01a: Mlt, 1♀, 5♂
15. *Eulithis populata* (Linnaeus, 1758) – 01b: Alt, 2♀
16. *Dysstroma infuscatum* (Tengström, 1869) – 01a: Mlt, 1♀, 2♂
17. *Dysstroma citrata* (Linnaeus, 1761) – 01: Mlt, 2♀, 2♂; 01a: Mlt, 1♀, 5♂
18. **Dysstroma latefasciata* (Prout, 1914) – 01: Mlt, 3♂; 01a: Mlt, 2♀, 4♂; 01b: Alt, 1♀
19. *Plemyria rubiginata* ([Denis & Schiffermüller], 1775) – 01: Mlt, 4♂; 01a: Mlt, 1♀, 2♂
20. *Hydriomena furcata* (Thunberg, 1784) – 01: Mlt, 6♀, 8♂; 01a: Mlt, 8♀
21. **Coenocalpe lapidata* (Hübner, 1809) – 01a: Mlt, 2♂

22. *Carsia sororiata* (Hübner, 1813) – 01: Mlt, 1♀; 01a: Mlt, 3♀, 5♂; 01c: Alt, Net, 1♀, 15♂

NOTODONTIDAE
Pygaerinae
23. **Clostera (albosigma) curtuloides* (Erschoff, 1870) – 01: Mlt, 1♂

EREBIDAE
Calpinae
24. *Scoliopteryx libatrix* (Linnaeus, 1758) – 01: Mlt, 4♂; 01a: Mlt, 4♂; 01c: Alt, 1♀, 1♂
Hypeninae
25. **Hypena proboscidalis* (Linnaeus, 1758) – 01b: Alt, 1♀

NOCTUIDAE
Plusiinae
26. *Polychrysia esmeralda* (Oberthür, 1880) – 01: Mlt, 1♂
27. *Autographa buraetica* (Staudinger, 1892) – 01: Mlt, 1♂
28. *Syngrapha interrogationis transbaikalensis* (Staudinger, 1892) – 01: Mlt, 1♂; 01b: Alt, 3♂; 01c: Alt, Net, 7♂

Hadeninae
29. *Caradrina montana* (Bremer, 1861) – 01b: Alt, 7♂
30. *Parastichtis suspecta* (Hübner, 1817) – 01b: Alt, 2♂
31. *Cirrhia icteritia* (Hufnagel, 1766) f. *flavescens* Esper – 01b: Alt, 1♂
32. *Mniotype bathensis* (Lutzau, 1901) – 01: Mlt, 1♂
33. **Apamea crenata* (Hufnagel, 1766) – 01: Mlt, 1♂; 01a: Mlt, 1♀; 01b: Alt, 1♂
34. **Amphipoea lucens* (Freyer, 1845) – 01c: Net, 1 ♀
35. *Mythimna impura* (Hübner, 1808) – 01b: Alt, 1♀, 2♂

Noctuinae
36. *Chersotis juncta* (Grote, 1878) – 01b: Alt, 1 ♀
37. *Eurois occulta* (Linnaeus, 1758) – 01: Mlt, 1♀, 2♂; 01a: Mlt, 1♀
38. *Graphiphora augur* (Fabricius, 1775) – 01a: Mlt, 1♀, 2♂; 01b: Alt, 3♀, 5♂
39. *Xestia fuscogrisea* Kononenko, 1984 – 01a:Mlt, 3♀, 24♂
40. *Xestia subgrisea* (Staudinger, 1897) – 01: Mlt, 3♂; 01a: Mlt, 2♂
41. *Xestia c-nigrum* (Linnaeus, 1758) – 01: Mlt, 4♀, 1♂
42. *Xestia baja* ([Denis & Schiffermüller], 1775) – 01: Mlt, 5♀, 8♂; 01a: Mlt, 1♀, 2♂
43. *Anaplectoides prasina* ([Denis & Schiffermüller], 1775) – 01a: Mlt, 1♀
44. *Protolampra sobrina* (Duponchel, 1843) – 01a: Mlt, 1♂; 01b: Alt, 4♂

* The species is reported here for the Magadan Oblast for the first time.

DISCUSSION

In northern territories with polar day or white nights it is almost impossible to use standard methods of light trapping for collecting Lepidoptera active at night due to the lack of dark period, from the very beginning of spring until late summer. In the period of our expedition the totally dark period of night was approximately four hours, from 23 p.m. until 3 a.m. local time. We were able to use standard light trapping methods only during limited period, which resulted in a relatively high number of collected specimens. We did not use method of 'sugar bite' for attracting Noctuidae and species of some other families because of the danger from the large number of brown bears living on the studied area. The largest number of specimens was collected during totally cloudy and even rainy nights probably because of higher air temperature and less temperature drop after sunset. The average daily air temperature was from 12 °C in a cloudy or rainy days, to 22 °C in the warmest sunny day. The average air temperature at totally cloudy or rainy nights was almost the same as it was during cloudy or rainy days (10–14 °C), while during clear nights the temperature fell to 7–3 °C.

In spite the fact that in general the number of collected specimens was small, because of the short sampling time and very limited area of collecting, considering that many Lepidopteran species are closely related to their habitats and imagos of majority of species have limited seasonal occurrence, an interesting type of lepidopteran fauna was found on the research area. Nine species are recorded for the first time from Magadan Oblast (Sinev, 2008). Eight of nine newly recorded species for Magadan Oblast are Euro-Siberian, except *Clostera albosigma* Fitch, 1856 which have Holarctic distribution. The known areal of distribution of five species is extended to the NE: *Macaria artesiaria* ([Denis & Schiffermüller], 1775) with up to now known NE border of distribution in the

mid-Amur region, *Epione repandaria* (Hufnagel, 1767) with up to now known NE border of distribution in the Yakutia south of Viluy and Aldan rivers, *Dysstroma latefasciata* (Prout, 1914) with up to now known NE border of distribution in the SW Yakutia (Averensky et al., 2006; Burnasheva & Beljaev, 2011) and mid-Amur region, and *Clostera (albosigma) curtuloides* (Erschoff, 1870) with up to now known NE border of distribution in the Yakutia south of Viluy and Aldan rivers, the Lower Amur region south of Khabarovsk Krai and Sakhalin island. Closer to the areal of the nominotypical subspecies distributed in North America. The blank spots in known areal of distribution of four species are filled in and connected in the North with Kamchatka region: *Coenocalpe lapidata* (Hübner, 1809) to the North-East Yakutia, *Hypena proboscidalis* (Linnaeus, 1758) to the Sakhalin Island, South Kuril region, *Apamea crenata* (Hufnagel, 1766) to the Yakutia south of Viluy and Aldan rivers and *Amphipoea lucens* (Freyer, 1845) to the South Yakutia region. *Plemyria rubiginata* ([Denis & Schiffermüller], 1775) was cited as newly recorded species for the Magadan region in Annals of nature for the year 2012 of Magadan Nature Reserve.

All are inhabitants of temperate-climate ecoregions. Studied area is located at lowland river basin with relatively rich vegetation, at the southwestern part of the Magadan Oblast territory and linked with the Khabarovsk Territory temperate-climate ecoregions. Therefore, presence of these species on studied area is not a surprise. The partial information and some photographs of collected species and locality stored in our Internet database can be seen in our E-Book:

http://188.121.60.140/playground/Matjaz/Magadan/Lepidoptera_ParkMagadan.php

All the collected specimens are stored in the authors private collection and are available for scientific study.

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