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# First report on late autumn geometer moths (Lepidoptera: Geometridae) from Kunashir Island, Russia (Southern Kurils)

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***Abstract.*** This study presents the first report on the late autumn fauna (mid-October – late November) of geometrid moths (Lepidoptera: Geometridae) from Kuril Islands, Far East of Russia**.** A total of 22 species from Kunashir Island were identified, including two species new to Russia: *Alsophila inouei* Nakajima, 1989 and *Inurois punctigera* (Prout, 1915). Additionally, nine species are recorded for Kunashir Island for the first time: *Erannis golda* Djakonov, 1929, *Erannis jacobsoni* (Djakonov, 1926), *Pachyerannis obliquaria* (Motschulsky, 1861), *Larerannis orthogrammaria* Wehrli, 1927, *Alsophila japonensis* (Warren, 1894), *Inurois asahinai* Inoue, 1974, *Inurois fumosa* Inoue, 1944, *Operophtera brunnea* Nakajima, 1991 and *Operophtera relegata* Prout, 1908. Taxonomic notes on *Erannis jacobsoni* and *Operophtera brunnea* are provided. The ecological characteristics of the flight of imago of 'winter' geometrid moths on Kunashir Island are discussed briefly.



***Keywords:*** Lepidoptera, Geometridae, fauna, new records, Russia, Kuril Islands, Kunashir

# Первое сообщение о позднеосенних пяденицах (Lepidoptera: Geometridae) с острова Кунашир (Россия, Южные Курилы)

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***Аннотация.*** В данной работе представлен первые сведения о позднеосенней фауне (середина октября – конец ноября) пядениц (Lepidoptera: Geometridae) Курильских островов, Дальний Восток России. Всего на острове Кунашир было выявлено 22 вида, в том числе два новых для России: *Alsophila inouei* Nakajima, 1989 и *Inurois punctigera* (Prout, 1915). Кроме того, для острова Кунашир впервые отмечены девять видов: *Erannis golda* Djakonov, 1929, *Erannis jacobsoni* (Djakonov, 1926), *Pachyerannis obliquaria* (Motschulsky, 1861), *Larerannis orthogrammaria* Wehrli, 1927), *Alsophila japonensis* (Warren, 1894), *Inurois asahinai* Inoue, 1974, *Inurois fumosa* Inoue, 1944, *Operophtera brunnea* Nakajima, 1991 и *Operophtera* relegata Prout, 1908. Даны таксономические заметки по *Erannis jacobsoni* и *Operophtera brunnea*. Кратко рассмотрены экологические особенности лёта имаго «зимних» пядениц на острове Кунашир.

***Ключевые слова:*** Lepidoptera, Geometridae, фауна, новые находки, Россия, Курильские острова, Кунашир

## Introduction

This report continues our investigation of the autumn fauna of geometrid moths in the Kunashir Island, which was previously almost completely unknown in the Kuril Islands as a whole. The materials for this study were collected by Vladimir V. Dubatolov and Vadim K. Zinchenko during an expedition to Kunashir Island from 13 October to 24 November 2023. This collection period covers later dates than the expedition in 2022, which took place from September 13 to October 25 (Beljaev et al. 2023), overlapping with the latter by 13 days in mid-October.

The objective of this publication is to provide a complete list of the collected species of geometrid moth, annotated by the specimen data, species distribution, ecological observations, and taxonomic notes where necessary.

## Material and methods

The moth collections were made at the following main localities:

**Kaldernyi Cordon** (43°51′31″ N, 145°30′47″ E) - a house, located within the Golovin volcano caldera, near Goryachee lake, surrounded by *Sasa* meadows with sparse oak, alder, birch, elm, rowan, and dwarf pine trees.

**Andreevskii Cordon** (Fig. 1) (43°53′16″ N, 145°37′29″ E) - a group of buildings, situated on the eastern side of Kunashir Island adjacent to the forest edge on a mountain slope and to a meadow near the ocean shore. In this location, moths were collected at the external

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**Fig. 1.** Andreevskii Cordon, 29 October 2024 . Early 'deep autumn' subseason. Photo by V. V. Dubatolov

**Рис. 1.** Андреевский кордон, 29 октября 2024 г. Начало подсезона «глубокая осень». Фото В. В. Дубатолова

illumination of the cordon house, which was powered by a centralized electric grid.

Near the Andreevskii Cordon, moths were collected in automatic light traps and manually with bait traps and net in the following locations:

**Ridge** (43°53′16″ N, 145°37′29″ E) – a ridge to the east of the cordon on the right bank of the Andreevka River, covered with a mixed forest consisting mainly of alder, birch, fir, and spruce.

**Plateau** (43°53′22″ N, 145°37′13–16″ E) – a mountain plateau on the left bank of the Andreevka River. The traps were located in a remote mixed forest with oaks and *Sasa* clearings.

Small additional moth collections were carried out in the following locations:

**Yuzhno-Kurilsk** (44°02′24″ N, 145°51′37″ E) – the Kurilsky Nature Reserve central office on the northern outskirts of the Yuzhno-Kurilsk town. Moths were collected using a DRV lamp on the office territory, planted with a small number of various trees and shrubs, which adjoins to a coastal wasteland with meadow plots.

**Sernovodka River** (43°54′ N, 145°38′ E) – a site located 23 km south-west of Yuzhno-Kurilsk at the mouth of the Sernovodka River on the place of the former Sernovodsk village.

**Lesnaya River** (44°00′49″ N, 145°46′22″ E) – a site located 7 km west from Yuzhno-Kurilsk on the valley of Lesnaya River near the point '9th km' of the road Yuzhno-Kurilsk – airport Mendeleevo, covered by mixed forest with fir and yew.

Moths were collected at light using a 160-watt DRV lamp powered by a portable gasoline generator and a light trap featuring 10-watt LED-lamps powered by a 12-volt battery (Fig. 2). In addition, moths were manually collected with a net at night under the illumination of a headlamp. Also, two types of bait traps were employed. The first type is a mixture of Kagor wine and sugar, applied to gauze bandages placed on tree branches. Attracted by the smell, the moths freely sat on or near the bandage. The second type is a fermented

**Fig. 2.** Light trap in the forest on the right bank of the Andreevka River. Photo by V. V. Dubatolov

**Рис. 2.** Светоловушка в лесу на правом берегу реки Андреевка. Фото В. В. Дубатолова

liquid made from sour beer and Kagor wine, poured into the bottom of a wide plastic bottle. Moths, along with other insects, drowned in the liquid, coming in the bottle through the side openings. The Materials section refers to moths captured using the first type of traps to as 'at bait traps', and moths captured using the second type of traps as 'in bottle'.

The sequence of taxa follows Beljaev and Mironov (Beljaev, Mironov 2019). Species distributions are presented from west to east and from north to south, with additional details provided for East Asia. Distribution data for Russia are based on Beljaev, Mironov (Beljaev, Mironov 2023), for Japan on Nakajima (Nakajima 2011), Nakajima, Yazaki (Nakajima Yazaki 2011), and Sato (Sato 2011), for Korea on Kim et al. (Kim et al. 2001) and Kim et al. (Kim et al. 2016), and for general distribution primarily on Beljaev (Beljaev 2016), with some clarifications when necessary.

Species new to Russia are marked with double asterisks (**), while species new to Kunashir Island are marked with a single asterisk (*).

Most of the collected moths are deposited in Institute of Systematics and Ecology of Animals, Novosibirsk, and some of them are stored in the Federal Scientific Center of the East Asia Terrestrial Biodiversity, Vladivostok.

Abbreviations: AO — Autonomous Oblast, E — east, eastern, ibid. — ibidem, ind. — individual(s), Kr. — Krai, N — northern, NE — north-east, northeastern, NW — north-west, Obl. — Oblast, Pen. — Peninsula, RFE — Russian Far East, S — southern, SW — southwestern, VO — visual observation, W — west. In the standard geographical names of countries and regions, words denoting cardinal directions are not abbreviated.

## List of species

### Family GEOMETRIDAE

### Subfamily Ennominae

***Colotois pennaria*** (Linnaeus, 1761)

**Material.** Andreevskii Cordon, 18–30.10. – 1–9.11.2023, + VO (every night) – 68♂♂, 13♀♀; ibid., plateau, in light trap,

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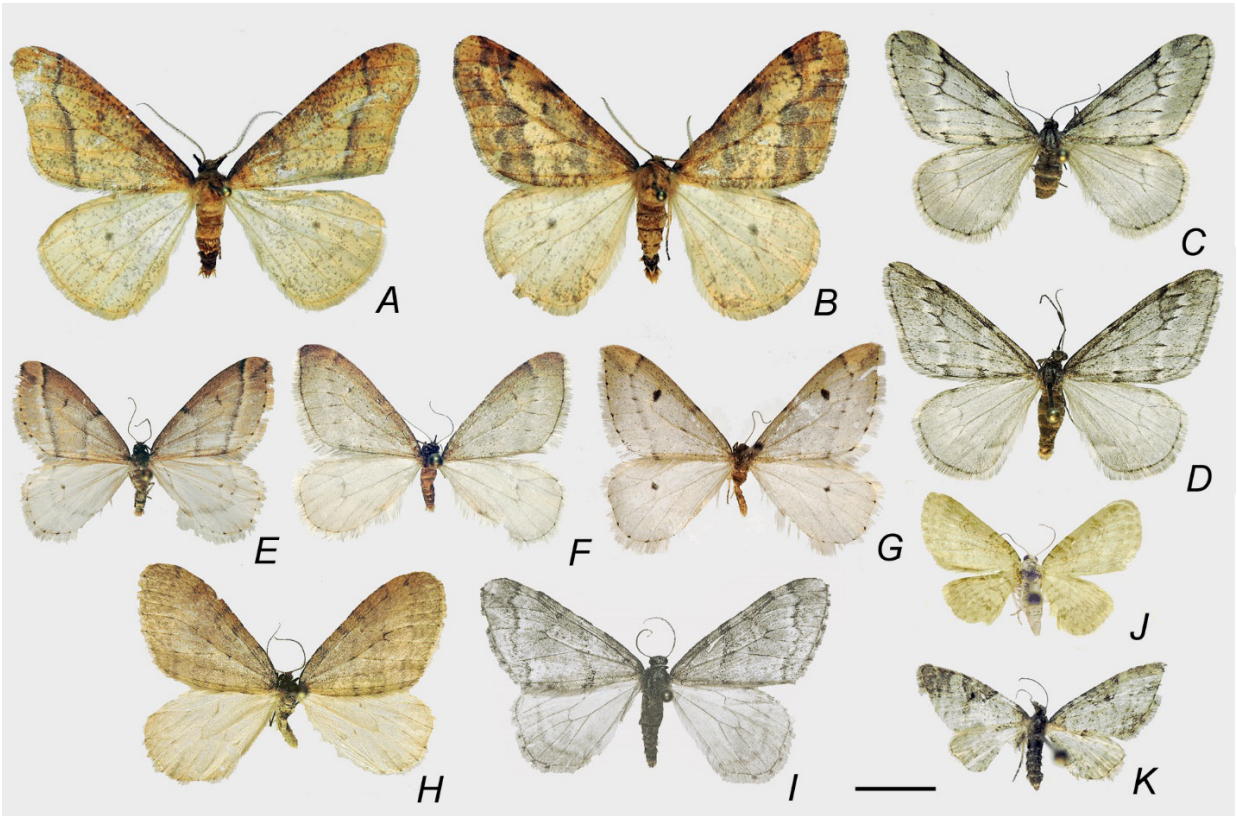


**Fig. 3.** Geometrid moths (Geomtridae) from Kunashir Island: *A — Erannis golda,* male; *B — Erannis jacobsoni*, male; *C — Alsophila inouei*, male; *D — Alsophila japonensis*, male; *E — Inurois asahinai*, male; *F — Inurois fumosa*, male; *G — Inurois punctigera*, male; *H — Operophtera brunnea*, male; *I — Operophtera relegata*, male; *J — Eupithecia scribai*, female; *K — Eupithecia daemionata*, female. Scale bar: 10 mm

**Рис. 3.** Пяденицы (Geomtridae) с острова Кунашир: *A — Erannis golda,* самец; *B — Erannis jacobsoni*, самец; *C — Alsophila inouei*, самец; *D — Alsophila japonensis*, самец; *E — Inurois asahinai*, самец; *F — Inurois fumosa*, самец; *G — Inurois punctigera*, самец; *H — Operophtera brunnea*, самец; *I — Operophtera relegata*, самец; *J — Eupithecia scribai*, самка; *K — Eupithecia daemionata*, самка. Масштабная линейка — 10 мм

23–24.10.2023 – 5♂; ibid., ridge, in bottle, 24–25.10.2023 – 1♂ (Zinchenko); Kaldernyi Cordon, at light, 30–31.10.2023 – 7♂; ibid., 31.10–1.11.2023 – 2♂ + VO.

**Distribution.** Russia (European part, Crimea, Urals, S RFE: Amur Obl., Jewish A.O., S Khabarovsk Kr., Primorsky Kr., Sakhalin, S Kurils – Kunashir); Europe, North Africa, Turkey, Transcaucasia, Turkmenistan, Northeast China, South Korea, Japan (Hokkaido, Honshu, Shikoku, Kyushu), North America (introduced?).

**Remarks.** This species is represented by the East Asian subspecies *C. pennaria ussuriensis* O. Bang-Haas, 1927. Flight period of this species on Kunashir Island extends from mid-October to early November, considering the previous data (Beljaev et al. 2023). In the continental part of the RFE, moths are typically observed from mid-September to the end of October. The larvae feed on a various leaved woody plants.

***Gigantalcis flavolinearia*** (Leech, 1891)

**Material.** Andreevskii Cordon: 13–14.10.2023 – 1♀, 15–16.10.2023 – 1♂, 16–17.10.2023 – 2♂, 1♀, 19–20.10.2023 – 2♀ + VO, 20–21.10.2023 – 1♀.

**Distribution.** Russia (S RFE: SW Sakhalin, S Kurils — Kunashir; Japan (Hokkaido, Honshu, Shikoku, Kyushu).

**Remarks.** Flight period of *G. flavolinearia* on Kunashir Island extends from the second week of September to the end of October, considering the previous data (Rybalkin 2020;

Beljaev et al. 2023). On Sakhalin Island, the species is observed during the first half of September (Beljaev, Titova 2023). In Japan, the larvae feed on woody Rosaceae species (Sato 2011).

***Erannis golda*** Djakonov, 1929 (Figs 3*A*, 4*A*)

**Material.** Andreevskii Cordon: 26–27.10. 2023 – 1♂, 1–23.11.2023 (every night) – 103♂; ibid., plateau: 5–6.11., 8–11.11., 13–15.11., 16–21.11. 2023, in various localities of mixed forest – 96 ♂♂. Manual collection with a net: right bank of the river Andreyevka, road in alder forest, 21.11.2023 – 1♂; ibid., plateau, birch forest, 21.11.2023 (Zinchenko) – 1♂; ibid., climb to plateau and plateau, evening catch, 22.11.2023 (Dubatolov, Zinchenko) – 3♂; Andreevskii Cordon, ibid., ridge and *Sasa* meadow on plateau, 16.11.2023 (Zinchenko) – 3♂; ibid., plateau, mixed forest, at night, 18.11.2023 (Zinchenko) – 2♂; ibid., plateau, birch forest, 19.11.2023 (Zinchenko) – 1♂; near Andreevskii Cordon, by net, 16.11.2023 (Zinchenko) – 3♂; ibid., plateau, mixed forest, at night, 13.11.2023 (Zinchenko) – 4♂.

**Distribution.** Russia (S Buryatia, ? S Irkutskaya Obl., S Amur Obl., Jewish A.O., S Khabarovsk Kr., Primorsky Kr., Sakhalin, S Kurils – Kunashir); Japan (Hokkaido, Honshu, Shikoku, Kyushu, Okinawa Island), South Korea, China (Central, Taiwan Island).

**Remarks.** This species, new for the Kuril Islands, was observed on Kunashir from late October to mid-November. In Japan, moths appear from early November to late December (Sato 2011). In the continental part of the RFE, fly of the species is observed from late September to late October (Beljaev 1996). The larvae feed on various leaved woody plants.

***Erannis jacobsoni*** (Djakonov, 1926) (Fig. 3*B*)

**Material.** Kaldernyi Cordon, at light (near the morning), 31.10–1.11.2023 – 1♂.

**Distribution.** Russia (Altai, Tyva, Irkutskaya Obl., Buryatia, RFE: Amur Obl., Jewish A.O., Khabarovsk Kr., Primorsky Kr., Sakhalin, S Kurils – Kunashir); E Kazakhstan, Mongolia, Northeast China, North Korea, Japan (Hokkaido, Honshu, Shikoku).

**Remarks.** This species, newly recorded for the Kuril Islands, is represented on Kunashir by the subspecies *E. jacobsoni giganthea* Inoue, 1955, also found in Sakhalin and Japan. In Japan, the moths appear from late October to late November. In Hokkaido it is commonly found in large numbers in larch forests and is sometimes considered a pest (Sato 2011). In the continental part of the RFE, moths are observed from late September to late October (Beljaev 1996). The larvae feed on a variety of coniferous species (Pinaceae).

The status of the taxon *giganthea* has been subject to debate. Initially Inoue described it as a valid species. In the description he noted that it is "very close related to *jacobsoni* Djakonov from the Central Altai …, but larger in size and it appears in autumn while *jacobsoni* … wing in spring" (Inoue 1955: 76). Later, *gigantea* was downgraded to a subspecies of *Erannis defoliaria* (Clerck, 1759), based on the similarities in the appearance of moths and in the shape of the valva in the male genitalia (Inoue 1982). This view has been widely accepted in Japanese literature and on the Internet sites (Nakajima 1998; Niwakagamania et al. 2024). In contrast, Beljaev (Beljaev 1996) proposed recognizing *gigantea* as a subspecies of *Erannis jacobsoni* (Djakonov, 1926), based on the almost complete similarity of the wing pattern and coloration with the Far Eastern subspecies *Erannis jacobsoni sichotenaria* Kurentzov, 1937. This approach has been adopted in Russian literature, including taxonomic catalogs (Mironov et al. 2008; Beljaev 2016; Beljaev, Mironov 2019). Nakajima (Nakajima 2010) restored *gigantea* to the species rank, based on a comparison of the male genitalia of Japanese specimens with the European *E. defoliaria* only, without comparing them to *E. jacobsoni*. He questioned the Beljaev's decisions, citing the fact that he had not examined the type specimen of *E. jacobsoni*, and that moths of the later emerge in spring.

According to the original description, the type series of *E. jacobsoni* (described in ‡*Hibernia*, a misspelling of *Hybernia* Berthold, 1827) consist of three males and one female. The holotype is not designated. The male genitalia of one syntype were depicted in the original description of the species (Djakonov 1926),

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and the photo of the other male syntype was published later (Djakonov 1929). These data confirm the identity of *E. jacobsoni*. However, the published collection date of the type specimens — 30 June 1898, which was one of the reasons for the misinterpretation of *giganthea*, — does not correspond to the real time of emerge of moths of *E. jacobsoni*, which occurs in autumn. Since The type series includes one male and one female, reared from larvae. Therefore, the date is likely to refer to the larvae collection date, which is quite real, and not the capture of adult moths.

A comparison of the male genitalia of *E. jacobsoni jacobsoni* from Altai (Djakonov 1926) and Buryatia (Beljaev 1996; Makhov 2021), *E. jacobsoni sichotenaria* from Primorsky Kr. (Beljaev 1996) and North Korea (Tóth 2017), and *gigantea* from Japan (Nakajima 1998; Nakajima 2010) shows their structural similarities, making it impossible to distinguish morphologically the latter taxon as a separate species. Therefore, at this stage of research, it is most appropriate to retain the status of *gigantea* as a subspecies of *E. jacobsoni*.

The Online Taxonomic Facility of Geometridae (Rajaei et al. 2022) recognizes the taxon *E. jacobsoni gigantea*, while the Global Biodiversity Information Facility lists it as both *E. gigantea* (*Erannis gigantea* … 2024), and as *E. jacobsoni* subsp. *gigantea* (*Erannis jacobsoni* … 2024).

***Pachyerannis obliquaria*** (Motschulsky, 1861)

**Material.** Kaldernyi Cordon, in the daytime: 30.10.2023 – 3♂, 31.10.2023 – 7♂, 1.11.2023 – 3♂ (Dubatolov, Zinchenko); ibid., at light, 30–31.10.2023 – 2♂, 31.10–1.11.2023 – 1♂; Andreevskii Cordon, at light: 1–2.11.2023 – 1♂, 3–4.11.2023 – 3♂, 4–5.11.2023 – 2♂, 5–6.11.2023 – 2♂, 6–7.11.2023 – 1♂ + VO, 7–8.11.2023 – 1♂; ibid., plateau, mixed forest, in the daytime, 18.11.2023 (Zinchenko) – 1♂.

**Distribution.** Russia (S RFE: S Amur Obl., Jewish A.O., S Khabarovsk Kr., Primorsky Kr., SW Sakhalin, S Kurils – Kunashir); Japan (Hokkaido, Honshu, Shikoku, Kyushu), North Korea, South Korea.

**Remarks.** The flight period of moths of *P. obliquaria* on Kunashir was observed from late October to mid-November, while on Sakhalin they were noted earlier, in the last ten days of October (Beljaev, Titova 2023). In Japan, the moths appear from late October to late December, depending on the region, and the species is usually numerous in various habitats (Sato 2011). In the continental part of the RFE, the moths are observed throughout October (Beljaev 1996). The larvae feed on various leaved woody plants, with a preference for species of *Quercus* (Fagaceae).

***Larerannis orthogrammaria*** (Wehrli, 1927) (Fig. 4*B*)

**Material.** Kaldernyi Cordon, at light: 30–31.10.2023 – 1♂, 31.10–1.11.2023 – 1♂; Andreevskii Cordon: 3–4.11.2023 – 1♂, 7–8.11.2023 – 1♂, 13–14.11.2023 – 3♂, 14–15.11.2023 – 4♂, 16–17.011.2023 – 6♂, 18–19.11.2023 – 2♂; 2♂, 19–20.11.2023 – 2♂; ibid., plateau, different localities, in light trap: 8–9.11.2023 – 6♂, 13–14.11.2023 – 4♂, 16–17.11.2023 – 2♂, 17–18.11.2023 – 1♂, 20–21.11.2023 – 1♂; ibid., ridge, at night, 13.11.2023 (Zinchenko) – 1♂; ibid., plateau, in the nearby forest at night, by the mowing on the grass layer, 18.11.2023 (Zinchenko) – 1♀.

**Distribution.** Russia (European Part (Moskovskaya Obl., introduced), S RFE: S Amur Obl., Jewish A.O., S Khabarovsk Kr., Primorsky Kr., SW Sakhalin, S Kurils – Kunashir), Japan (Hokkaido, Honshu), South Korea, ?North China.

**Remarks.** This species is reported for the first time from the Kuril Islands. On Kunashir, the moths were observed from late October to mid-November, while on Sakhalin, there was only one moth recorded in mid-October (Beljaev, Titova 2023). In Hokkaido, *L. orthogrammaria* flies during October (Sato 2011). In the continental part of the RFE, the moths are observed also throughout October (Beljaev 1996). The larvae feed on various leaved woody plants.

### Subfamily Desmobathrinae

***Alsophila inouei*** Nakajima, 1989 (Fig. 3*C*)

**Material.** Andreevskii Cordon, 5–6.11.2023 – 1♂.

**Distribution.** Russia (S RFE: S Kurils – Kunashir); Japan (Hokkaido, Honshu).


**Fig. 4.** Geometrid moths (Geomtridae) from Kunashir Island in nature: *A* — *Erannis golda*, male; *B* — *Larerannis orthogrammaria*, male; *C* — *Alsophila japonensis*, male; *D*, *E* — *Inurois asahinai*: *D* — male, *E* — female; *F* — *Inurois fumosa*, male; *G*, *H* — *Operophtera brunnea*, males; *I* — *Operophtera relegata*, male. *A*–*C*, *E*, *G*–*I* — photos by V. V. Dubatolov; *D*, *F* — photos by S. Yu. Stefanov

**Рис. 4.** Пяденицы (Geomtridae) с острова Кунашир в природе: *A* — *Erannis golda*, самец; *B* — *Larerannis orthogrammaria*, самец; *C* — *Alsophila japonensis*, самец; *D*, *E* — *Inurois asahinai*: *D* — самец, *E* — самка; *F* — *Inurois fumosa*, самец; *G*, *H* — *Operophtera brunnea*, самец; *I* — *Operophtera relegata*, самец. *A*–*C*, *E*, *G*–*I* — фотографии В. В. Дубатолова; *D*, *F* — фотографии С. Ю. Стефанова

**Remarks.** This species is newly recorded for both the Kuril Islands and Russia as a whole. In Japan in Honshu, in the Kanto region, the species is distributed in the mountains between 700 and 1000 m a. s. l., where moths appear from late November to early December. The species coexists with *Alsophila japonensis*, but habitat of *A. inouei* is restricted to a narrow range of high altitudes, and its flight period is short (Nakajima 2011).

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Larvae of *A. inouei* has been observed feeding on *Alnus hirsuta* (Betulaceae) (Nakajima 2011), though it is likely to be polyphagous on various leaved woody plants.

****Alsophila japonensis*** (Warren, 1894) (Figs 3*D*, 4*C*)

**Material.** Andreevskii Cordon, at light: 10–11.11.2023 – 3♂, 13–14.11.2023 – 9♂, 15–16.11.2023 – 4♂, 16–17.11.2023 – 1♂, 18–19.11.2023 – 11♂, 19–20.11.2023 – 4♂, 20–21.11.2023 – 1♂, 21–22.11.2023 – 2♂, 22–23.11.2023 – 1♂; ibid., road and nearby forest on the plateau, at night, 15.11.2023 – 1♂ (Dubatolov, Zinchenko); ibid., plateau, in light trap: 16–17.11.2023 – 5♂, 18–19.11.202 – 32♂; ibid., plateau, 15.11.2023 (Dubatolov, Zinchenko) – 1♂; ibid., road and nearby forest on the plateau, at night, 19.11.2023 (Zinchenko) – 1♂.

**Distribution.** Russia (S RFE: S Khabarovsk Kr., Primorsky Kr., SW Sakhalin, S Kurils – Kunashir); Japan (Hokkaido, Honshu, Shikoku, Kyushu, Tsushima, Yakushima), South Korea, China (Northeast, Central: Jiangsu).

**Remarks.** The species is new for the Kuril Islands. The collected specimens belong to the nominate Japanese subspecies *A. japonensis japonensis*, which is also found on Sakhalin. On Kunashir, the moths fly from the second week until the end of November, whereas on Sakhalin, the species was recorded from the mid- to late October (Beljaev, Titova 2023). In Japan, *A. japonensis* emerges in Hokkaido and in mountains of Honshu from late October to mid-November, and in plains of the latter island from December to early February (Nakajima 2011). In the continental part of the RFE, the moths are observed from mid-October to the first part of November (Beljaev 1996). The larvae feed on various leaved woody plants.

****Inurois asahinai*** Inoue, 1974 (Figs 3*E*, 4*D*, 4*E*)

**Material.** Surroundings of Andreevskii Cordon, road on a slope, on alder bark, 18.11.2023 – 1♂, 1♀ in copula; Andreevskii Cordon, at light, between 1 and 2 am, 19–20.11.2023 – 1♂; ibid., 21–22.11.2023 – 1♂; ibid., 22–23.11.2023 – 1♂; ibid., the beginning of the trailway near the cordon, alder forest, 20.11.2023 (Zinchenko) – 1♂; ibid., road on a slope, alder forest, 21.11.2023 – 6♂; ibid., plateau, nearby mixed forest, at night, 18.11.2023 – 1♂; ibid., 19.11.2023 (Zinchenko) – 2♂; ibid., 21.11.2023 (Zinchenko) – 3♂; ibid., ridge, mixed forest, 19.11.2023 – 2♂ (Zinchenko); ibid., plateau, at night, 22.11.2023 (Dubatolov, Zinchenko) – 91♂; ibid., plateau, in the daytime, 22.11.2023 (Dubatolov, Zinchenko) – 28♂. Photo of moths: Yuzhno-Kurilsk, 27–29.11.2023 (Linnik). Video of moths: 23 km NE of Yuzhno-Kurilsk, Filatovka river, 44°11'47" N, 146°01'09" E, 30.11.2023 (Linnik). Photos of moths: 6 km NW of Yuzhno-Kurilsk, Lake Lagunnoe, 44°03′46″ N, 145°45′36″ E, 2.12.2023 (Stefanov).

**Distribution.** Russia (S RFE: SW Sakhalin, S Kurils – Kunashir), Japan (Hokkaido, Honshu, Shikoku, Kyushu).

**Remarks.** The species is new for the Kuril Islands. On Kunashir, the moths flied from the second half of November to early December and were most numerous in forests in late November. The female (Fig. 4E) was found together with a male on the trunk of an alder tree on 18 November. On Sakhalin, moths of this species were recorded earlier, during the first half of November (Beljaev, Titova 2023). In Japan, *I. asahinai* inhabits the plains on Hokkaido and mountainous areas on Honshu to Kyushu. In the Kanto region, it appears from mid-November to December, with the peak flight period occurring around mid-November (Nakajima 2011). The larvae are believed to be feeding on various leaved woody plants, similar to other species of *Inurois*. In 2024, in the Prozrachny Stream valley (9 km north of Yuzhno-Kurilsk, 44°11'47" N, 146°01'09" E), Mikhail Ragimov observed a mass flight of *I. asahinai* ("thousands of moths") on 20 November shortly after the first snowfall.

****Inurois fumosa*** Inoue, 1944 (Figs 3*F*, 4*F*)

**Material.** Andreevskii Cordon, at light, 21.11.2023 – 1♂; ibid., 22–23.11.2023 – 3♂; ibid., road on a slope, alder forest, at evening by net, 21.11.2023 – 2♂; ibid., plateau, birch forest, at night, 21.11.2023 (Zinchenko) – 6♂; ibid., at night, 22.11.2023 – 25♂ (Dubatolov,

Zinchenko). Photos of moths: 6 km NW of Yuzhno-Kurilsk, Lagunnoe Lake, 44°03′46″ N, 145°45′36″ E, 2.12.2023 (Stefanov).

**Distribution.** Russia (S RFE: S Amur Obl., Jewish A.O., S Khabarovsk Kr., Primorsky Kr., S Kurils – Kunashir); South Korea, Japan (Hokkaido, Honshu, Shikoku, Kyushu), China (Shaanxi, ?Sichuan, Taiwan Island) (for the details see Beljaev 2022).

**Remarks.** The species is new for the Kuril Islands. On Kunashir, the moths were observed in the last third of November and early December, appearing later than other winter geometrids, with the exception of *Inurois punctigera*. In Japan, in the plains and low mountain areas of the Kanto region (Honshu Island) *I. fumosa* appears from late December to late January, with a peak flight in mid-January, whereas in mountains it flies from mid-November to early December (Nakajima 2011). In the continental part of the RFE, the moths are observed from early October (in the north of its range and in mountains) to mid-November (in south) (Beljaev 1996). The larvae feed on various leaved woody plants.

*****Inurois punctigera*** (Prout, 1915) (Fig. 3*G*)

**Material.** Plateau, birch and broad-leaved forest, at night, 21.11.2023 (Zinchenko) – 8♂; ibid., plateau, birch and broad-leaved forest, evening catch, 22.11.2023 (Zinchenko) – 10♂; plateau, broad-leaved forest, at late evening, 23.11.2023 – 3♂.

**Distribution.** Russia (S RFE: S Kurils – Kunashir); Japan (Hokkaido, Honshu, Shikoku, Kyushu, Tsushima), South Korea.

**Remarks.** It is a new species for both the Kuril Islands and Russia as a whole. On Kunashir, the moths were observed in the last third of November, alongside *I. fumosa*. In Japan, *I. punctigera* is vertically distributed from plains to the lower subalpine zones. Around the Kanto region, moths of this species appear from late December to March in the plains. In mountainous areas, it has two flight periods: first, from mid-November to early December, and second, from late April to early May, separated by the snow season (Nakajima 1998, 2011 [as *Inurois membranaria*]; Yamamoto, Sota 2009). The larvae feed on various leaved woody plants. It should be noted that most Japanese authors, starting with Inoue (Inoue 1986), have erroneously identified *Inurois punctigera* as *Inurois membranaria* (nec Christoph, 1881). For further details, see Beljaev (Beljaev 2022).

**Subfamily Larentiinae**

***Orthonama obstipata*** (Fabricius, 1794)

**Material.** Andreevskii Cordon, 7–8.11.2023 – 1♀; ibid., alder forest, at bait traps, 7.11.2023 – 1♂, 1♀; ibid., plateau, mixed forest, on birch, 7–8.11.2023 (Zinchenko) – 1♂.

**Distribution.** Russia (European part, N Caucasus, Urals, South Siberia, S RFE: Amur Obl., Khabarovsk Kr., Primorsky Kr., Sakhalin, S Kurils — Kunashir); almost cosmopolitan, except most northern and most southern territories, and Australia. Migrant.

**Remarks.** This is the first record of *O. obstipata* in November, later than its previous record in Kunashir in October (Beljaev et al. 2023), and also the latest for the entire Russian Far East. In Japan, it is distributed almost throughout the country, being common in various habitats from plains to mountains. It appears around the Kanto region from late March to early November, and is thought to be polyvoltine (Nakajima, Yazaki 2011). The larvae are polyphagous, feeding on herbs, shrubs, and trees.

***Photoscotosia lucicolens*** (Butler, 1878)

**Material.** Andreevskii Cordon, at bait traps, 18.10.2023 – 1♀; ibid., at light, 22–23.10.2023 – 1♀; ibid., plateau, birch forest, in bottle, 24–25.10.2023 (Zinchenko) – 2♀.

**Distribution.** Distribution. Russia (S RFE: SW Primorsky Kr., S Kurils — Kunashir); Northeast China (Jilin), South Korea, Japan (Hokkaido, Honshu, Shikoku, Kyushu, Yakushima).

**Remarks.** This species was first recorded for the Kuril Islands by Beljaev et al. (Beljaev et al. 2023) based on a single female collected at the same location at approximately the same time, i.e., 18–19 October 2022. In most of Japan *Ph. lucicolens* develops in two generations, moths fly in June and July, and in October, and very common in many places (Nakajima, Yazaki 2011). It cannot be ruled

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out that the collected females migrated from Hokkaido Island, as moths of the first generation have never been recorded on the Kuril Islands. The larvae feed on various species of *Quercus* (Fagaceae).

***Hydriomena impluviata*** ([Denis & Schiffermüller], 1775)

**Material.** Andreevskii Cordon, mixed forest, on birch, 19.11.2023 (Zinchenko) – 1♀.

**Distribution.** Russia (European part, N Caucasus, Urals, West Siberia, South Siberia, S Jakutia, RFE: Magadanskaya Obl., Kamchatka Pen., Amur Obl., Jewish A.O., Khabarovsk Kr., Primorsky Kr., Sakhalin, S Kurils – Kunashir); Japan (Hokkaido, Honshu, Shikoku, Kyushu), North Korea, South Korea, China, N Mongolia, Kazakhstan, ?Kyrgyzstan, Turkey, Europe.

**Remarks.** In East Asia, this species is represented by the subspecies *H. impluviata extremata* Bryk, 1942 (= *H. impluviata insulata* Inoue, 1953), described from Kunashir Island (Bryk 1942). The specimen collected on Kunashir was discovered at a time that is atypical for the flight of moths of this species. In the continental territories of the Far East at the same latitudes, this species typically flies in one generation from the end of May to mid-July. In Japan, *H. impluviata* inhabits mountainous areas up to the alpine zone and is usually seen from July to August, supposedly having a univoltine life cycle. In some regions, however, it can appear from May to June or July to August, exhibiting bivoltine life cycles (Nakajima, Yazaki 2011). Therefore, the specimen from Kunashir is likely an accidentally hatched individual from the wintering generation. The larvae feed on various leaved woody plants, preferring Betulaceae and Salicaceae.

***Dysstroma citrata*** (Linnaeus, 1761)

**Material.** Surroundings of Andreevskii Cordon, at night in the forest, 17.10.2023 – 1♀; Andreevskii Cordon, 19–20.10.2023 – 1♀; ibid., 28–29.10.2023 – 1 ind. VO.

**Distribution.** Russia (European part, N Caucasus, Urals, West Siberia, South Siberia, Jakutia, RFE: Kamchatka Pen., Commander Islands, Amur Obl., S Khabarovsk Kr., Primorsky Kr., Sakhalin, Kurils – Shumshu, Paramushir, Simushir, Urup, Iturup, Kunashir, Shikotan); Europe, Turkey, Transcaucasia, N Kazakhstan, Mongolia, China, North Korea, South Korea, Japan, N India, North America.

**Remarks.** The taxonomic status of East Asian populations of *Dysstroma*, currently associated with *D. citrata*, needs to be revised. For more information see Beljaev (Beljaev 2016), and Beljaev, Titova (Beljaev, Titova 2023).

***Pennithera comis*** (Butler, 1879)

**Material.** Andreevskii Cordon, at light, 16–17.10.2023 – 1♀.

**Distribution.** Russia (S RFE: S Khabarovsk Kr., Primorsky Kr., S Sakhalin, S Kurils – Kunashir); ?South-West China (Sichuan, Yunnan), South Korea, Japan (Hokkaido, Honshu, Shikoku, Kyushu, Tsushima).

**Remarks.** The moth was collected within the period of its previous registration on Kunashir in 2022 — from 20 September to 22 October (Beljaev et al. 2023). The flight period of *P. comis* on Kunashir is similar to that on Sakhalin (Beljaev, Titova 2023). In Japan, the species is relatively common from low mountain areas to alpine zones. It appears in low mountain areas from October to November and in mountain and subalpine zones from late August to September (Nakajima, Yazaki 2011). The larvae feed on various species of *Abies* (Pinaceae).

***Epirrita autumnata*** (Borkhausen, 1794)

**Material.** Andreevskii Cordon, at light, 16–30.10. – 1–20.11.2023 (every night) – 96♂, 25♀, + numerous VO; ibid., plateau, in light trap: 23–24.10.2023 – 1♂, 23–24.10.2023 – 11♂; Andreevskii Cordon, mixed forest on the high right bank of the Andreevka river, in light trap, 26–27.10.2023 – 1♂; Lesnaya river, coniferous forest, 22.10.2023 – 1♂; Andreevskii Cordon, at bait traps, 23.10.2023 – 2♂ + VO; ibid., at bait traps, 5.11.2023 – 1♀, 10.11.2023 – 1♂; ibid., plateau, alder forest, at bait traps, 10.11.2023 – 7♂; ibid., plateau, birch forest, in bottle: 21–22.10.2023 – 2♂, 22–23.10.2023 – 2♂, 23–24.10.2023 – 2♂, 24–25.10.2023 – 5♂, 28–29.10.2023 – 1♂, 29–30.10.2023 – 1♂, 3–4.11.2023 – 1♂

(Zinchenko); ibid., plateau, spruce forest, in bottle, 7–8.11.2023 – 1♂ (Zinchenko); mixed forest on the high right bank of the Andreevka river, in bottle, 7–8.11.2023 – 2♂ (Zinchenko); Kaldernyi Cordon: at light – 30–31.10.2023 – 4♂, in light trap – 30♂, 35♀; ibid., 31.10–1.11.2023 – >50 ind.; surroundings of Kaldernyi Cordon, road, in light trap, 30–31.10.2023 – 4♂; ibid., at bait traps, 31.10–1.11.2023 – 3♂ (Zinchenko); Kaldernyi Cordon, at bait traps, 30–31.10.2023 – 1♂.

**Distribution.** Russia (European part, N Caucasus, Urals, West Siberia, South Siberia, Jakutia, RFE: Magadan Obl., Kamchatka Pen., Amur Obl., Jewish A.O., Khabarovsk Kr., Primorsky Kr., Sakhalin, S Kurils — Urup, Iturup and Kunashir); Europe, Turkey, Transcaucasia, N Kazakhstan, Mongolia, China (E Inner Mongolia), South Korea, Japan (Hokkaido, Honshu, Shikoku, Kyushu), ?North America.

**Remarks.** In East Asia, the subspecies *E. autumnata autumnus* (Bryk, 1942), described from Iturup (Bryk 1942), is distributed. The investigation of this species in 2023 reveals its long flight period on Kunashir, from mid-October up to the second half of November. In Japan, it appears in October (Nakajima, Yazaki 2011). In the same-latitude continental part of the RFE, the moths are observed from the mid-September to mid-October, in mountains from early September (Beljaev 1996). The larvae feed on various trees and shrubs, with a preference for species of Betulaceae and Salicaceae.

****Operophtera brunnea*** Nakajima, 1991 (=*Operophtera variabilis* Nakajima, 1991) (Figs 3*H*, 4*G*, 4*H*)

**Material.** Kaldernyi Cordon, at light, 30–31.10.2023 – 1♂, 31.10–1.11.2023 – 1♂; surroundings of Kaldernyi Cordon, road, in light trap, 30–31.10.2023 – 1♂; Andreevskii Cordon, 3–23.11.2023 – 270♂; ibid., road on a slope, alder forest, 5.11.2023 – 1♂, 7.11.2023 – 1♂, 10.11.2023 – 2♂, 13.11.2023 – 1♂; 21.11.2023 – 4♂; ibid., plateau, distant forest, in light trap: , 8–9.11.2023 – 7♂, 12–13.11.2023 – 7♂, 16–17.11.2023 – 6♂; 18–19.11.2023 – 2♂; ibid., plateau, nearby mixed forest, at night: 13.11.2023 – 24♂, 18.11.2023 – 14♂, 19.11.2023 – 3♂, 21.11.2023 – 7♂ (Zinchenko); ibid., 22.11.2023 – 21♂ (Dubatolov, Zinchenko); ibid., plateau, nearby birch forest, in light trap, 20–21.11.2023 – 6♂; mixed forest on the high right bank of the Andreevka river, in light trap, 5–6.11.2023 – 1♂; ibid., at night, manual collection: 13.11.2023 – 15♂ (Zinchenko), 14.11.2023 – 1♂ (Dubatolov), 15.11.2023 – 22♂ (Dubatolov, Zinchenko); Andreevskii Cordon, in the mixed forest, on bark near bait traps, 10.11.2023 (Dubatolov) – 2♂; Sernovodka river, 8.11.2023 (Zinchenko) – 1♂; Yuzhno-Kurilsk, office of the Kurilsky Nature Reserve, in a spider's web, 24.11.2023 – 1♂.

**Distribution.** Russia (S Amur Obl., Jewish A.O., S Khabarovsk Kr., Primorsky Kr., Sakhalin, S Kurils – Kunashir); Japan (Hokkaido, Honshu, Izu Oshima, Shikoku, Kyushu), South Korea, China (Northeast, Central and Taiwan Island).

**Remarks.** The species is newly recorded for the Kuril Islands. The Kunashir population belongs to the nominative Japanese subspecies *O. brunnea brunnea*, also found on Sakhalin. On Kunashir, the moths were observed from the end of October up to the end of November. In Japan, the species is widespread across the country, from the plains to the lower subalpine zone, with moths appearing from late November to mid-February depending on the locality (Nakajima, Yazaki 2011). On the continental part of the RFE, the moths are observed from the beginning of October to the beginning of November (Beljaev 1996). The larvae feed on various leaved woody plants. It should be noted that while the synonymy of *O, brunnea* and *O, variabilis* was reasonably proposed by Nakajima back in 2010, it has not yet been adopted by major biodiversity and taxonomy databases, where the species are still listed as separate (Rajaei et al. 2022; *Operophtera variabilis* … 2024; Taxonomy browser … 2024; Niwakagamania et al. 2024).

****Operophtera relegata*** Prout, 1908 (Figs. 3*I*, 4*I*)

**Material.** Andreevskii Cordon: 6–7.11.2023 – 2♂, 7–8.11.2023 – 10♂,

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8–9.11.2023 – 3♂, 10–11.11.2023 – 3♂, 11–12.11.2023 – 3♂, 13–14.11.2023 – 7♂, 14–15.011.2023 – 1♂, 18–19.11.2023 – 2♂.

**Distribution.** Russia (S Amur Obl., Jewish A.O., S Khabarovsk Kr., Primorsky Kr., S Sakhalin, S Kurils – Kunashir); Japan (Hokkaido, Honshu, Shikoku, Kyushu, Tsushima), South Korea, North-East and Central China.

**Remarks.** The species is newly recorded for the Kuril Islands. On Kunashir, the moths were observed from the first to the third week of November. In Japan, *O. relegata* is widely distributed from plains to subalpine areas, being common in many places. Depending on the locality, moths are found from early November to mid-January (Nakajima, Yazaki 2011). In the continental part of the RFE, the moths are observed throughout October (Beljaev 1996). The larvae feeding on various leaved woody plants.

***Pasiphila excisa*** (Butler, 1878)

**Material.** Andreevskii Cordon, 22–23.10.2023 – 2♂, 26–27.10.2023 – VO, 27–28.10.2023 – VO, ibid., alder forest, 23–24.10.2023 – 1♂, 1♀; ibid., plateau, mixed forest, on grass, 28–29.10.2023 (Zinchenko) – 1♂; Andreevskii Cordon, 1–2.11.2023 – 1♂; ibid., ridge, birch forest, in bottle, 23–24.10.2023 – 1 ind.

**Distribution.** Russia (S RFE: SE Khabarovsk Kr., Primorsky Kr., S Sakhalin, S Kurils — Kunashir); South Korea, Japan (Hokkaido, Honshu, Izu Islands, Shikoku, Kyushu, Tsushima, Yakushima).

**Remarks.** On Kunashir, *P. excisa* is occasionally observed from the second half of May (Rybalkin, Beljaev 2023) to early November. In Japan, the species is common in various regions from May to October, and develops in two or three generations per year. The larvae are known to develop on flowers of various Ericaceae, as well as on *Quercus glauca* (Fagaceae) and *Euonymus japonicus* (Celastraceae) (Nakajima, Yazaki 2011).

***Eupithecia scribai*** Prout, 1938 (Fig. 3*J*)

**Material.** Andreevskii Cordon, 15–16, 19–20, 26–27.10.2023 – 1♂, 2♀; ibid.: 1–2.11.2023 – 1♀, 3–4.11.2023 – 2♀, 6–7.11.2023 – 1♂, 1♀.

**Distribution.** Russia (S RFE: Khabarovsk Kr., Primorsky Kr., Sakhalin, S Kurils – Iturup, Kunashir, Shikotan); Japan (Hokkaido, Honshu – north of Chubu region), South Korea.

**Remarks.** Previously, *E. scribai* was observed on Kunashir only in July and August (Vasilenko 1992; *Eupithecia scribai* … 2024). In the Chubu region of Honshu, the species occurs in the mountainous areas above 1500 m a. s. l. and its moths appear in July and August (Nakajima, Yazaki 2011). The moths collected on Kunashir in late October and early November are likely from an accidentally hatched wintering generation. V. G. Mironov of the Zoological Institute (Saint Petersburg, Russia) suggests that these specimens represent an anomalous 'deadlock' generation (personal communication). The host plant of the larvae remains unknown.

***Eupithecia daemionata*** **Dietze, 1904** (Fig. 3*K*)

**Material.** Andreevskii Cordon, 1–2.11.2023 – 1♀.

**Distribution.** Russia (Amur Obl., Khabarovsk Kr., Primorsky Kr., Sakhalin, S Kurils – Kunashir,), Japan (Hokkaido, Honshu, Shikoku, Kyushu, Tsushima), South Korea,

China (Northeast, Taiwan Island).

**Remarks.** Previously, *E. daemionata* was found on the Kuril Islands during the usual flight period of moths from late May to early June (Rybalkin, Beljaev 2023). In Japan, the moths are numerous in March and April in various areas, from plains to mountains (Nakajima, Yazaki 2011). The present specimen collected in November is likely an accidentally hatched individual of the wintering generation. The host plants of the larvae remain unknown.

## Discussion

The autumn fauna of geometrid moths on Kuril Islands was largely unknown until recently. The initial investigation on Kunashir conducted from 13 September to 25 October 2022 (Beljaev et al. 2023) covered the period of the end of the phenological sub-season 'summer recession' (*спад лета*), the entire subseason 'early autumn' (*первоосенье*) and the

beginning of the sub-season 'deep autumn' (*глубокая осень*) (Eremenko, Barkalov 2009). The 2022 study identified 32 species of geometrids with two species new to Russia, and eight species reported from the Kurils for the first time. New faunal finds accounted for about a third (31.25%) of all geometrid species collected at that time.

The new study conducted from 13 October to 24 November 2023 covered the end of 'early autumn' and entire 'deep autumn' sub-seasons. According to Eremenko and Barkalov (Eremenko, Barkalov 2009) the 'deep autumn' subseason starts when average daily temperatures drop below 10 °C, in this period average daily temperature is 4.6 °C, but night frosts, however, are quite common. On the Pacific coast of Kunashir, the 'deep autumn' tend to last on average from 23 October to 22 November. Most trees, shrubs, and lianas acquire mass autumn leaf coloring at the beginning of this sub-season. Phenological indicators of the transition to 'deep autumn' include start showing mass leaf color changes of *Betula ermanii* and *Actinidia kolomikta*. During this sub-season leaf fall occurs in broad-laved trees, including *Quercus crispula*. In late November (the end of 'deep autumn') deciduous trees and shrubs become completely bare. Sub-season 'post-autumn' (*послеосенье*) starts on the date when minimum air temperatures drop below 0 °C.

At the Andreevsky cordon on 25 October, at the start of our research in 2023, the oaks were in the phase of beginning leaf coloring, and birches were almost bare. By October 29, the main color of the tree foliage had become yellow-brown, and many trees were bare (Fig. 1). In the mornings of November 13 and 14, a cold snap with abundant hoarfrost occurred, and the first snow fell on November 25.

In 2023, 22 geometrid species were collected, with two species being new to Russia (*Alsophila inouei* and *Inurois punctigera*), and nine species were reported from Kunashir for the first time (*Erannis golda*, *Erannis jacobsoni*, *Pachyerannis obliquaria*, *Larerannis orthogrammaria*, *Alsophila japonensis*, *Inurois asahinai*, *Inurois fumosa*, *Operophtera brunnea* and *Operophtera relegata*). These findings corroborated predictions that moths from these genera could be found on Kunashir in November (Beljaev et al. 2023). The new faunal finds accounted for 50.0% of the geometrid species collected.

All newly discovered species belong to the morpho-ecological group of 'winter' geometrids, characterized by a specific set of features, including wingless or short-winged flightless females (Beljaev 1996). On Kunashir, the appearance of most "winter" geometers began at the turn of October and November, and species of *Alsophila* about a week later. Moths of the genus *Inurois* emerged later than all other species of this group after the first frosts on November 18–21. Geometers of this group appear on the island at about the same time as in the north and in the mountains of Japan, but 1–3 weeks later than on Sakhalin and 2–4 weeks later than in same-latitude continental regions of the Far East.

The finish of the flight period of 'winter' geometrids on Kunashir remains unknown, but it obviously extends until late November or early December. Thus, six species (*Erannis golda*, *Alsophila japonensis*, *Inurois asahinai*, *Inurois fumosa*, *Inurois punctigera*, and *Operophtera brunnea*) were observed on November 22/23 — the last night of our stay at the Andreevskii Cordon. In other places of the island, moths of *Inurois asahinai* and *Inurois fumosa* were observed up to December 2, vanishing after heavy snowfalls. This is the latest date to observe 'winter' geometrid moths on the Russian Far East, which in the continental part of the region do not occur after mid-November.

An unusual number of geometrid species were observed at atypical flight periods, producing 'dead-end' generations, unable to continue normal development. In 2022, anomalous time of emergence was exhibited by single individuals of *Cusiala stipitaria* and *Hemithea aestivaria* (Beljaev et al. 2023), while in 2023, this phenomenon was shown by *Hydriomena impluviata*, *Eupithecia daemionata*, *Eupithecia scribai*, and *Pasiphila excisa*, with the last two species observed in several specimens. This anomaly may be attributed to an unusu-

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ally long, relatively cool autumn on Kunashir, with episodic sharp temperature drops, which could trigger the premature emergence of moths from their wintering pupae.

Most geometrids were collected at light, and a few were captured by a net during excursions. Bait traps were not an effective attractant for geometrids, but some specimens of *Colotois pennaria*, *Orthonama obstipata*, *Photoscotosia* lucicolens, *Epirrita autumnata* and *Pasiphila excisa* were collected using method. Of these, only *Epirrita autumnata* was collected in large numbers, and *Photoscotosia lucicolens* was collected exclusively through this technique.

## Conclusion

The conducted research significantly enhanced the knowledge of the geometrid moth fauna on Kunashir Island, adding 11 new species. The majority of the studied geometrid species belong to the 'winter' morpho-ecological group. Their emergence on Kunashir was observed 1–2 weeks later than on Sakhalin and 2–4 weeks later than at similar latitudes of continental Far East territories. The unusually high number of autumn appearances of summer and even spring moths outside their typical flight periods is noteworthy.

With the inclusion of present publication and most recent studies (Rybalkin, Beljaev 2023, + 8 species; Spitsyna et al. 2024, + 1 species), the total number of geometrid species recorded on the island has reached 251 (excluding those that require confirmation), an increase from the previous count of 231 species (Beljaev et al. 2023). Compared with neighboring same-latitude continental territories, the richness of the geometer fauna on Kunashir Island is slightly inferior to that on Sakhalin Island (279 species) (Beljaev, Titova 2023) and more than twice as inferior to that in the continental Primorsky Krai (534 species) (Beljaev, Mironov 2024). Apparently, the determination of the species diversity of geometrid moths on Kunashir Island is close to completion in all seasons, with the exception of spring. Until now, collections of nocturnal lepidopterans before mid-May remain scarce (Spitsyna et al., 2024).

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