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Record of *Borearctia menetriesii* (Eversmann, 1846) (Lepidoptera, Erebidae, Arctiinae) larva on *Aconitum rubicundum* Fischer (Ranunculaceae) in Eastern Siberia

Oleg E. Berlov[1], Ivan N. Bolotov[2]

1 *The State Nature Reserve «Baikalo-Lensky», Ministry of Natural Resources and Environment of the Russian Federation, Baikalskaya 291-B, 664050 Irkutsk, Russian Federation; olegberlov@narod.ru*

2 *Institute of Ecological Problems of the North, the Ural Branch of the Russian Academy of Sciences, Severnoy Dviny Emb., 23, 163000 Arkhangelsk, Russian Federation; inepras@yandex.ru*

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Abstract. In this note we report the first record of *Borearctia menetriesii* (Eversmann, 1846) (Erebidae: Arctiinae) larva on a native host plant, *Aconitum rubicundum* Fischer (Ranunculaceae). This aconite species is a close relative of *A. lycoctonum*, which is widespread across Eurasia, but has a scattered distribution in Fennoscandia. The majority of *B. menetriesii* localities are situated within the distribution range of *A. lycoctonum* and other aconite taxa, which are diverse and widespread in the Eastern Palaearctic. However, only two of the six westernmost *B. menetriesii* localities in Finland are in accordance with sporadic records of *A. lycoctonum*. Our record confirms that *B. menetriesii* is a polyphagous species like most other boreal Arctiinae. We have expanded the list of a few Lepidoptera species which can use *Aconitum* spp. as suitable host plants despite the fact that they are poisonous for insects because of high alkaloid content.

Introduction

The Menetries's tiger moth *Borearctia menetriesii* (Eversmann, 1846) (Erebidae: Arctiinae) is the most enigmatic representative among the Palaearctic arctiine moths. The biology of this large and colorful species is poorly known because of its extremely low abundance throughout its distribution range (Lappi et al. 2004; Dubatolov 2010; Bolotov et al. 2013). Only single specimens were found in the majority of known localities, and sometimes the records are separated from each other by many decades (Bolotov et al. 2013).

Krogerus (1944) experimentally identified three available host plants in Finland, including *Taraxacum* spp. (Asteraceae), *Plantago* ssp. (Plantaginaceae) and *Polygonum* ssp. (Polygonaceae). In a preliminary report on the food preference of the larvae, Saarenmaa (2014) lists 15 plant species which *B. menetriesii* larvae preferred or accepted during experiments, including *Larix* spp. (Pinaceae), *Rubus chamaemorus* L., *R. idaeus* L., *R. saxatilis* L. and *Potentilla palustris* (L.) Scop. (Rosaceae), *Menyanthes trifoliata* L. (Menyanthaceae), *Rumex crispus* L., *Polygonum persicaria* L. and *P. lapathifolium* L. (Polygonaceae), *Plantago major* L. (Plantaginaceae), *Ribes rubrum* L. (Grossulariaceae), *Salix phylicifolia* L. (Salicaceae), *Taraxacum officinale* Weber (Asteraceae), *Vaccinium uliginosum* L. (Ericaceae) and *Viola riviniana* Rchb. (Violaceae). He noted that the larch species might be a significant food plant over the majority of the *B. menetriesii* range. However, all those data are based exclusively on these laboratory experiments. There is

Figure 1. The last instar larva of *B. menetriesii* on *Aconitum rubicundum* Fischer, Baikalo-Lensky Nature Reserve, 9.viii.2013 (photo: O. E. Berlov).

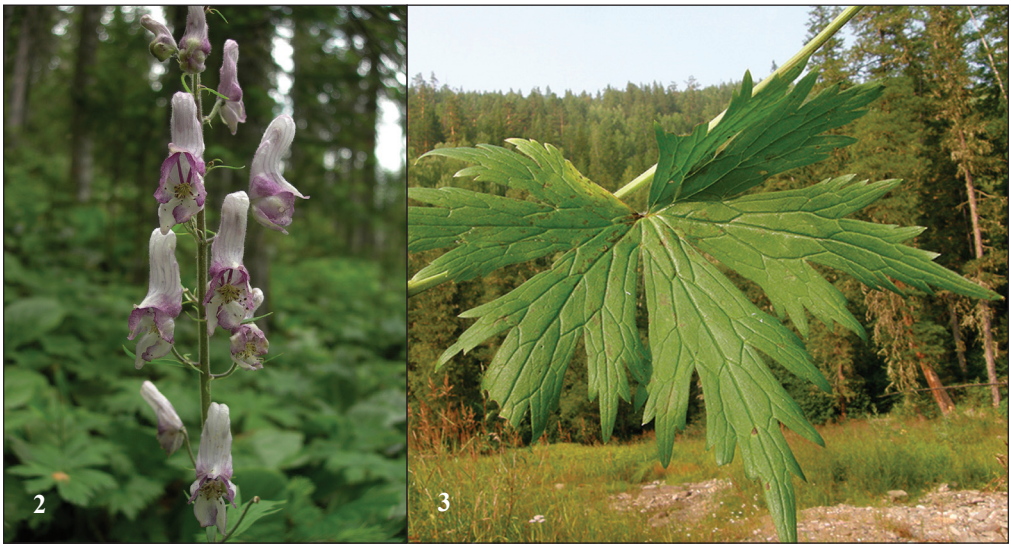
the unique observation in natural habitat in Finland in June 1920 of a larva having climbed a spruce trunk (Krogerus 1944). Here we report the first record of a feeding larva on a native host plant in the Baikalo-Lensky State Nature Reserve, Eastern Siberia.

Observations

Locality: Eastern Siberia, the Baikal Lake Area, the Bolshoy Anay River terrace, 53°56'19"N, 107°24'35"E, ca 770 m alt., mixed coniferous taiga forest with herb-*Equisetum*-moss plant cover (locality description and photo: Suppl. material 1: Table S1, Fig. S1). A last instar larva of *B. menetriesii* was collected alive on *Aconitum rubicundum* Fischer (Ranunculaceae) 9.viii.2013 (Figs 1–3) and was placed in a cage that was taken to the Irkutsk city. In captivity, the larva had a daytime feeding activity and consumed only fresh *A. rubicundum* leaves which we had collected from the same locality as the larva. The leaves were completely eaten by 15.viii.2013. Unfortunately, we could not find any aconite species in the city surroundings. The larva did not accept *Taraxacum* spp. and *Plantago* spp. leaves which we placed in the cage and it was found dead on 22.viii.2013. An additional larva was captured dead in a pitfall trap at the same locality on 10.viii.2013. The collected larvae were 32–35 mm long.

Discussion

The observed host plant, *A. rubicundum*, is distributed in Central and Eastern Siberia, and is closely related to the widespread Eurasian *A. lycoctonum* (Malyschev and Pechkova 1993) and might even represent its eastern subspecies (Ivanova 1978). These two species (or subspecies)



Figures 2–3. *Aconitum rubicundum* Fischer, the host plant of *B. menetriesii*, Baikalo-Lensky Nature Reserve. **2.** An inflorescence, upstream of the Pravaya Kirenga River, 14.vii.2006 (photo: N.V. Stepantsova). **3.** A leaf at the *B. menetriesii* locality, 9.viii.2013 (photo: O. E. Berlov).

were separated on minor diagnostic features, particularly the location and density of hairs on the stem and leaf blade; both have identical chromosome number (2n = 16) (Malyschev and Pechkova 1993). All Russian *B. menetriesii* localities are situated within the distribution range of *A. lycoctonum* and other aconite taxa, which are especially diverse and widespread in the Eastern Palaearctic, including 26 species in Siberia and 37 species in the Russian Far East (Jalas and Suominen 1989; Malyschev and Pechkova 1993; Kharkevich 1995; Bolotov et al. 2013). In boreal Russia, various aconite species are abundant in the plant cover of river valleys and humid alpine meadows (Peshkova 1985; Malyschev and Pechkova 1993; Kharkevich 1995) where *B. menetriesii* most frequently occurs (Bolotov et al. 2013). For example, *A. lycoctonum* is one of the dominant plant species in the *B. menetriesii* habitat in the Sotka River Valley, Arkhangelsk Region (Bolotov et al. 2013). However, *A. lycoctonum* has a scattered distribution in Finland (Jalas and Suominen 1989; Lampinen et al. 2014), and only two of the six Finnish *B. menetriesii* localities are near sites where this plant species was recorded (Suppl. material 1: Fig. 2S).

Aconite species have a strong insecticidal activity (Yuan et al. 2012) because of their high alkaloid content (Azimova and Yunusov 2013). Eighteen alkaloids were isolated from *A. lycoctonum* (Azimova and Yunusov 2013). *A. rubicundum* contains at least nine diterpenoid alkaloids (Nishanov et al. 1991).

The HOSTS database (Robinson et al. 2010) listed only 16 Lepidoptera species feeding on *Aconitum* spp. The majority of these species are polyphagous (12 of them), including *Euproctis similis* (Fuessly, 1775), a unique Erebidae representative. According to other sources (Vorbrodt and Müller-Rutz 1914; Freina and Witt 1987; Bellmann 2003), there are two Arctiinae species recorded on *Aconitum* spp., *Arctia flavia* (Fuessly, 1779) on *A. lycoctonum* ssp. *vulparia* (Rchb.) Nyman and *Diaphora sordida* (Hübner, 1803) on *A. napellus* Linnaeus.

Our record confirms that *B. menetriesii* is a polyphagous species like most other boreal Arctiinae (Dubatolov 1990), but additional experiments are needed for an appropriate evaluation of the role of *Aconitum* spp. as a host plant for European populations of *B. menetriesii*.

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References

Azimova SS, Yunusov MS (2013) Natural Compounds: Alkaloids. Springer, New York, 80 pp. doi: 10.1007/978-1-4614-0560-3

Bellmann H (2003) Der neue Kosmos Schmetterlingsführer – Schmetterlinge, Raupen und Futterpflanzen. Kosmos, Auflage, 448 pp.

Bolotov IN, Gofarov MY, Kolosova YS, Frolov AA (2013) Occurrence of *Borearctia menetriesii* (Eversmann, 1846) (Erebidae: Arctiinae) in Northern European Russia: a new locality in a disjunct species range. Nota lepidopterologica 36(1): 65–75.

Dubatolov VV (1990) Tiger moths (Lepidoptera, Arctiidae: Arctiinae) of South Siberian mountains (report 2). In Zolotarenko GS (Ed.) Arthropods and helminths, Fauna of Siberia Series. Nauka Publisher, Novosibirsk, 139–169. [In Russian]

Dubatolov VV (2010) Tiger–moths of Eurasia (Lepidoptera, Arctiidae) (Nyctemerini by R. de Vos & V. V. Dubatolov). Neue Entomologische Nachrichten 65: 1–106.

Freina dJJ, Witt TJ (1987) Die Bombyces und Sphinges der Westpalearktis (Bd. 1-2). Forschung & Wissenschaft Verlag GmbH, München, 708 pp.

Ivanova MM (1978) Flora of the Upper Angara Valley. In: Malyshev LI, Peshkova GA (Eds) Flora of the Transbaikalia. Nauka, Novosibirsk, 174–242. [In Russian]

Jalas J, Suominen J (1989) Atlas Florae Europaeae – Distribution of vascular plants in Europe (Vol. 8.) Nymphaeaceae to Ranunculaceae. The Committee for Mapping the Flora of Europe and Societas Biologica Fennica Vanamo, Helsinki, 261 pp.

Kharkevich SS (1995) Plantae Vascularis Orientis Extremi Sovietici (Vol. 7). Nauka, Saint Petersburg, 395 pp. [In Russian]

Krogerus H (1944) Das Vorkommen von *Callimorpha menetriesi* Ev. in Fennoskandien, nebst Beschreibungen der verschiedenen Entwicklungsstadien. Notulae Entomologicae 24 (3–4): 79–86.

Lampinen R, Lahti T, Heikkinen M (2014) Kasviatlas 2013 [Atlas of the distribution of vascular plants in Finland 2013]. Helsingin Yliopisto, Luonnontieteellinen keskusmuseo, Helsinki, http://www.luomus.fi/kasviatlas [accessed 21.xi.2014]

Lappi E, Mikkola K, Ryynänen J (2004) Idänsiilikäs *Borearctia menetriesii*, tervetuloa takaisin! [Welcome back *Borearctia menetriesii*]. Baptria 29 (1): 28–29.

Malyschev LI, Pechkova GA (1993) Flora Sibiriae (Vol. 6) – Portulacaceae – Ranunculaceae. Nauka, Novosibirsk, 310 pp. [In Russian]

Nishanov AA, Sultankhodzhaev MN, Yunusov MS, Kondrat'ev VG (1991) Alkaloids of *Aconitum rubricundum*. Chemistry of Natural Compounds 27(3): 349–352. doi: 10.1007/BF00630324

Pakkanen P, Wettenhovi J (2014) *Borearctia menetriesii* in Finland. http://perhoset.nettitieto.fi/historia/arctiinae/bor-menetriesi.htm [accessed 21.xi.2014]

Peshkova GA (1985) The plant cover of Siberia (the Baikal area and Transbaikalia). Nauka, Novosibirsk, 145 pp. [In Russian]

Robinson GS, Ackery PR, Kitching IJ, Beccaloni GW, Hernández LM (2010) HOSTS – A Database of the World's Lepidopteran Hostplants. Natural History Museum, London. http://www.nhm.ac.uk/hosts [Accessed 20.xi.2014]

Saarenmaa H (2014) Conservation ecology of *Borearctia menetriesii*. http://bormene.myspecies.info [Accessed 22.xi.2014]

Vorbrodt vK, Müller-Rutz J (1914) Die Schmetterlinge der Schweiz (Bd. 2). Druck and Verlag von K.J. Wyss, Bern, 726 pp.

Yuan CL, Wang XL, Yang DS (2012) Insecticidal bioactivity of diterpenoid alkaloids from *Aconitum sinomontanum* Nakai. Modern Agrochemicals 3: 40–43.

Supplementary material 1

The collection locality of *Borearctia menetriesii* larvae in Eastern Siberia and records of *Aconitum lycoctonum* and *Borearctia menetriesii* in Finland.

Authors: Oleg E. Berlov, Ivan N. Bolotov

Explanation note: Table S1, Figs S1–S2.

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