The first record of *Diacrisia metelkana* (Lederer, 1861) for Kazakhstan with notes on its bionomics and distribution (Lepidoptera, Erebidae, Arctiinae, Arctiini)

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**Abstract**

The Amphipalaearctic tiger moth species *Diacrisia metelkana* (Lederer, 1861) is reported for Kazakhstan for the first time. Data on species’ bionomics in Kazakhstan and general distribution are provided. Species' habitats in Kazakhstan are illustrated.

**Key words**: distribution, new record, biogeography, geomorphology, bionomics, Pavlodar Region.

**Introduction**

To this day, there is no paper generalizing data on the Arctiini fauna of Kazakhstan. Nevertheless, data on Kazakhstan tiger moths can be found in some separated publications devoted to regional or local faunas and taxonomy of various groups (Dubatolov 1996; Dubatolov & de Vos 2010; Gorbunov 2011; Witt et al. 2011; Knyazev 2015; Knyazev & Zuban’ 2016; Titov et al 2017). The Noctuoidea fauna of North East Kazakhstan is studied more or less satisfactorily, the summarizing paper has been published two years ago (Titov et al 2017). In this paper, the authors report 480 Noctuoidea species including 20 species of the tribe Arctiini. However, since then, new finds keep coming. During field works in the Zhelezinka District of Pavlodar Region of Kazakhstan, the first author of the present paper has collected two specimens of *Diacrisia metelkana* (Lederer, 1861) (Figs 1–3). One additional specimen has been found among unsorted materials collected in the Uspenka District in 2016.

*Diacrisia metelkana* has previously been considered to be a member of the genus *Rhyparioides* Butler, 1877 (Dubatolov 2009; Dubatolov & de Vos 2010; Witt et al. 2011), which has been synonymised with *Diacrisia* Hübner, [1819] by Rönkä *et al*. (2016). This group comprises four species, three of which, namely *D. amurensis* (Bremer, 1861), *D. nebulosa* Butler, 1877 and *D. subvaria* (Walker, 1855) are distributed in the Pacific Region. *Diacrisia metelkana* has the Amphipalaearctic disjunctive range interrupted...
into three clusters: Europe (including European part of Russia), West Siberian Plain and the Pacific Region including Russian Far East, Korean Peninsula, northern and eastern China and Japan. In West Siberian Plain this species was known from Novosibirsk and Omsk Regions of Russia (Dubatolov 1985; Knyazev et al. 2019). The southernmost find in Pavlodar Region (Osolodochnoe Lake shore) extends the Siberian cluster of species’ range by 50 km to the south only, but this is the first record for Kazakhstan fauna.

Material and methods

Abbreviations used: MCK = coll. M. Černila (Kamnik, Slovenia); MWM/ZSM = Museum Witt Munich / the Bavarian State Collection of Zoology (Museum Witt München / Zoologische Staatssammlung München, Munich, Germany); STP = coll. S.V. Titov (Pavlodar, Kazakhstan).

Moths were collected using mercury lamps Osram HWL (MBFT) 250 W and Yalas traps equipped with UV lamps Sylvania F15w/350bl Black light and Philips TL 8W/05. The genitalia were dissected and mounted in euparal on glass slides. The photos of genitalia where taken using the camera Nikon D3100 attached to a microscope with an LM-scope adapter. All pictures were processed using the Adobe Photoshop CC 2018® software. A quadrocopter DJI Phantom 4 PRO was used to shoot biotopes from a height. Ground photography including alive specimens was carried out by the camera Canon EOS 5D Mark II equipped with SIGMA 24-70MM and Canon EF 100 мм f/2.8L Macro USM lenses. The set specimen was photographed by the camera Nikon D850 equipped with Micro-Nikkor 60mm f/2.8D lens.

*Diacrisia metelkana* (Lederer, 1861)
(Figs 1–3)

*Nemophila metelkana* Lederer, 1861, *Wiener entomologische Monatschrift* 5 (5): 162, pl. 3, fig. 12 (Type locality: [Hungary] “in Alsó-Dabas bei Felső-Dabas in Ungarn”).

**Material examined.** 1 male, 18.VII.2016, NE Kazakhstan, Pavlodar Region, Uspenka District, NE shore of Osolodochnoe Lake, ruins of uninhabited village Vesely Klin, 53°16'39.92''N 77°53'20.91''E, 107 meters above sea level, mercury lamp, leg. S. Titov (coll. STP); 1 male, 15.VII.2018, NE Kazakhstan, Pavlodar Region, Zhelezinka District, Zolotaya griva, Ala-Akuly Lake 54°12’29.06’’N 76°5’49.51’’E, 98 meters above sea level, UV light trap, leg. S. Titov (coll. MCK); 1 male, 16.VII.2018, NE Kazakhstan, Pavlodar Region, Zhelezinka District, Temirbaysor Lake, 54°10’50.92’’N 76°9’44.25’’E, 99 meters above sea level, mercury lamp, leg. S. Titov, slide AV4901 Volynkin (coll. STP).

**Additional material examined.** Series of specimens of both sexes from France, Hungary, Romania, Ukraine (Kherson Region), European Part of Russia (Rostov Region), West Siberia (Novosibirsk Region), Russian Far East (Jewish Autonomous, Khabarovsk and Primorye Regions) and China (Jiangxi, Hubei, Hunan, Fujian and Zhejiang Provinces) (coll. MWM/ZSM).

**Figures 1–3.** *Diacrisia metelkana*. 1, male adult in nature, shore of Temirbaysor Lake, 16.VII.2018 (photo by S.V. Titov); 2, male adult, Temirbaysor Lake, 16.VII.2018 (photo by O. Belyalov); 3, male genitalia, Temirbaysor Lake, slide AV4901 Volynkin (photo by A.V. Volynkin).
**Figure 4.** The habitat of *Diacrisia metelkana*: NE Kazakhstan, Pavlodar Region, Uspenka District, NE shore of Osolodochnoe Lake, ruins of uninhabited village Vesely Klin, 53°16′39.92″N 77°53′20.91″E, 18.VII.2016 (photo by S.V. Titov).

**Figure 5.** The habitat of *Diacrisia metelkana*: NE Kazakhstan, Pavlodar Region, Zhelezinka District, Zolotaya griva, Ala-Akuly Lake 54°12′29.06″N 76°5′49.51″E, 15.VII.2018 (photo by T. Aylybayev).

**Figure 6.** The habitat of *Diacrisia metelkana*: NE Kazakhstan, Pavlodar Region, Zhelezinka District, Temirbaysor Lake, 54°10′50.92″N 76°9′44.25″E, 16.VII.2018 (photo by T. Aylybayev).
Bionomics

In North East Kazakhstan, *D. metelkana* is found in the endorheic basin of fresh and brackish lakes situated in the south-west of West Siberian Plain between the crests of Baraba and Kurubmel’ Steppes. The crests are low and narrow elevations of aeolian origin, which arose during the humid periods of the late Pleistocene-Holocene (Osintseva 2017).

In the Uspenka District, the species is found in Baraba Steppe on the shore of lake (Fig. 4) surrounded by meadows and fescue-feather grass steppes dominated by *Stipa zalesskii, S. lessingiana, S. korshinskii, Phlomoides tuberosa, Salvia stepposa, Seseli ledebourii, Medicago romanica, Peucedanum morisonii, Artemisia marschalliana, Potentilla glaucescens, Helichrysum arenarium* and *Centarea marschalliana*. Some depressions of this area are occupied by small local birch (*Betula pendula*) forests with shrub and herbaceous layers dominated by *Salix* spp. and *Carex* spp. respectively (Lavrenko 1947).

In the Zhelezinka District, the species is found in Kurumbel’ Steppe, where it inhabits lake shores (Figs 5, 6) surrounded by rich grass-forb meadow steppes and steppe meadows dominated by *Stipa pennata, S. tirska, S. zalesskii, Festuca valesiaca, Elytrigia repens, Calamagrostis epigeios, Bromopsis inermis, Poa angustifolia, Phleum phleoides, Agrostis canina, Medicago falcata, Onobrychis sibirica, Phlomoides tuberosa, Salvia stepposa, Scabiosa ochroleuca*; interspersed with *Betula* spp. and *Populus tremula* groves and halophilous steppes dominated by *Festuca valesiaca, Stipa zalesskii, Artemisia nitrosa* and *Gallatella subglabra*. The lake shores vegetation is represented by rich emerged communities of *Typha angustifolia, Phragmites australis* and *Scolochloa festucacea* and terrestrial halophilous communities of *Salicornia europaea, Artemisia nitrosa, Limonium gmelinii* and *Halimione verrucifera* (Lavrenko 1947).

All three specimens were collected between 22:00 and 23:00 o’clock in light rain with a wind of 3–4 meters per second, a temperature of 20–22 °C and atmospheric pressure 738–750 mm Hg.

The host plants of the species in West Siberian Plain are unknown. In Europe, caterpillars feed mostly *Caltha palustris, Euphorbia palustris* and *Mentha aquatica* (König 1983; Witt et al. 2011; Vig 2016).

Distribution

The species is known from France, Belgium, Germany, Poland, Slovakia, Hungary, Italy, Croatia, Romania, Serbia, Bulgaria, Belarus, Ukraine, European part of Russia (Rostov, Samara, Voronezh and Krasnodar Regions), North-East Caucasus (Daghestan Republic), southern part of West Siberian Plain (Novosibirsk and Omsk Regions of Russia and Pavlodar Region of Kazakhstan), Russian Far East (Jewish Autonomous, Amur, Khabarovsk and Primorye Regions), Korea, Japan, China (Jiangxi, Jilin, Liaoning, Heilongjiang, Jiangsu, Dunbei, Nei Mongol, Hebei, Shandong, Zhejiang and Hunan Provinces) (Dubatolov 1985; 1996; 2004; Beshkov 1992; Dubatolov & de Vos 2010; Witt et al. 2011; Kučinić et al. 2014; Vajgand 2015; Kulak 2017; Jpmoth 2018; Sachkov 2018; Knazev et al. 2019) (Fig. 7). At present the populations from France, Belgium, Germany and Slovakia are extinct (Kulak 2017).

Figure 7. The distribution map of *Diacrisia metelkana*. Green spots: previously known localities; red spots: new localities in Kazakhstan.
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References
Beshkow, S. (1992) Faunistic advances on Bulgarian Lepidoptera. Bollettino dell’Associazione Romana di Entomologia, 46, 37–56.
Dubatolov, V.V. (1985) Rhyparioides metelkana (Lederer, 1861) (Lepidoptera, Arctiidae) in Sibera. Vestnik Zoologii, 5, 7. [in Russian]
Dubatolov V.V. (1996) A list of the Arctiinae of the territory of the former U.S.S.R. (Lepidoptera, Arctiidae). Neue entomologische Nachrichten, 37, 39–87.
Dubatolov V.V. (2004) Database on tiger moths (Insecta, Lepidoptera, Arctiidae) of Palaeartic. Siberian Branch of the Russian Academy of Sciences, Novosibirsk. Available from: http://www-sbras.nsc.ru/win/elbib/atlas/list.dhtml?Arctiidae (Accessed on 14 October 2019).
Dubatolov, V.V. (2009) Development of a phylogenetic model for the tribe Micrarctiini (Lepidoptera, Arctiidae) by the SYNAP method. Entomological Review, 89, 306–313.
Dubatolov, V.V. & Vos, R. de (2010) Tiger-moths of Eurasia (Lepidoptera, Arctiidae). Neue entomologische Nachrichten, 65, 1–106.
Gorbunov, P.Yu. (2011) Macrolepidoptera of deserts and southern steppes of West Kazakhstan. The fauna review. Lisitsyna, Ekaterinburg, 192 pp. [in Russian]
Jpmoth (2018). Available from: http://www.jpmoth.org (Accessed on 2 November 2019). [in Japanese]
Knyazev, S.A. (2015) A list of lepidopterans (Insecta, Lepidoptera) of North Kazakhstan. Amurian zoological journal, 7 (4), 325–331. [in Russian]
Knyazev, S.A., & Zuban’, I.A. (2016) A list of lepidopterans (Insecta, Lepidoptera) of North Kazakhstan. Part 2. Amurian zoological journal, 8 (3), 199–208. [in Russian]
Knyazev S. A., Ivonin V. V., Ustjuzhanin P. Ya., Vasilenko S. V., Rogalyov V. V. (2019) New data on Lepidoptera of West Siberian Plain, Russia. Far Eastern Entomologist, 386, 8–20. https://doi.org/10.25221/fee.386.2
König, F. (1983) Date noi privind biologia speciei Diacrisia (Rhyparioides) metelkana Led. (Lepidoptera, Arctiidae). In: Delta Dunarii. II. Studii și comunicari de entomologie. Tulcea, 1985. 87–90. [in Romanian]
Kučinić, M., Matešić, M., Koren, T., Mrnjavčić Vojvoda, A., Vajdić, M., Pelić, D.F., Bukvić, V. & Perović, F. (2014) First check list of the subfamily Arctiinae (Lepidoptera, Erebidae) in Croatia, with the finding of Rhyparioides metelkana (Lederer, 1861), new species in Croatian fauna from the valley of the Neretva River. Natura Croatica, 23 (1), 67–87.
Kulak, A.V. (2017) Biological peculiarities of Rhyparioides metelkana (Lederer, 1861) divering its territorial sedentary. Actual problems of zoological science in Belarus, 2, 193–203. [in Russian, with English summary]
Lavrenko, E.M. (1947) Yevraziatskaya stepnaya oblast’ [Eurasian steppe region]. In: Lavrenko, E.M. (Ed.), Geobotanical zoning of USSR. Moscow & Leningrad, pp. 95–110 [in Russian]
Osintseva N.V. (2017) Morphology and aggression of the grilled relief of the southern part of the West Siberian Plain (Sargat Priirtyshie). Geosphere Research, 3, 26–32.
Rönkä, K., Mappes, J., Kaila, L. & Wahlberg, N. (2016) Putting Parasemia in its phylogenetic place: a molecular analysis of the subtribe Arctiina (Lepidoptera). Systematic Entomology, 41, 844–853. https://doi.org/10.1111/syen.12194
Sachkov S.A. (2018) Modern record of *Rhyparioides metelkana* (Lederer, 1861) (Lepidoptera, Erebidae, Arctiinae) in Volga Region with comments of the new system of subtribe Arctiina. *Entomological and parasitological researches in Volga Region*, 15, 18–21. [in Russian]

Titov, S.V., Volynkin, A.V., Dubatolov, V.V., Černila, M., Reznichenko, S.M. & Bychkov, V.S. (2017) Noctuoid moths (Lepidoptera: Erebidae, Nolidae, Noctuidae) of North-East Kazakhstan (Pavlodar Region). *Ukrainian Journal of Ecology*, 7 (2), 142–164.

Vajgand, D. (2015) Prilog poznavanju noćnih leptira (Lepidoptera) Celareva (Vojvodina, Srbija). *X symposium of entomologists of Serbia*, 2015, 9. [in Serbian]

Vig, K. (2016) Metelka Ferenc élete és leghíresebb felfedezése, a Metelka-medvelepke, *Rhyparioides metelkana* (Lederer, 1861). *Savaria*, 38, 51–68. [in Hungarian]