

Checklist of Butterflies (Papilionoidea) of the Mongolian Altai Mountains, including descriptions of new taxa

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Received May 2011; reviews returned 3 October 2011; accepted 7 February 2012.
Subject Editor: Jadranka Rota.

Abstract. A checklist of Papilionoidea of the Mongolian Altai is presented. Several new taxa (*Neolycaena sapozhnikovii* sp. n., *Plebejus germani* sp. n., *P. anikini* sp. n., *P. idas shadzgat* ssp. n., *Erebia przhevalskii* sp. n., *E. chastilovi nomada* ssp. n., *Hyponephele lycaon dmitrievae* ssp. n., and *H. lycaon kerzhneri* ssp. n.) are described. Zoogeographical demarcation of the Mongolian Altai (within the limits of Mongolia) is presented.

Introduction

The Mongolian Altai is a mountain system in Mongolia and China. It stretches approximately 1000 km from the northwest to the southeast and its width varies from 300 km in the northwest to 150 km in the southeast. It reaches altitude of 4362 m (Mt. Munkh-Khajrkhan-Ula) and consists of several parallel ridges, separated by longitudinal tectonic valleys. The summits are mostly plateau-like, with cirque and cornice glaciers (the largest one being Potanin Glacier) on their crests. The Mongolian Altai is made up of Palaeozoic schists, porphyries, and granites. Southwestern slopes receive more precipitation than the northeastern ones, and they consist of richer forest-meadow landscapes (with spruce and larch prevailing in forests), changing into steppes in lowlands and alpine meadows. Steppes and semi-deserts dominate on northeastern slopes, while semi-deserts prevail between the Mountains. The mountain system of the Mongolian Altai reaches the uplands of the Altai Republic (Russia) in the north, borders with deserts and semi-deserts of Dzhungaria and Gobi towards south and west, and semi-deserts of the Great Lakes Depression in the northeastern area of the system. The Alag-Nuur Depression in the east of the Mongolian Altai separates it from the lower Gobi Altai (Kamelin 2005).

The history of the study of butterflies from the Mongolian Altai

The study of butterflies of the Mongolian Altai is relatively recent. First specimens were collected in the Mongolian Altai by a professor of the Tomsk University, Vasilij V. Sapozhnikov [W. Sapojnikof] (from December 9 (December 21), 1861 to August 11, 1924) (Fig. 1). This outstanding Russian geographer was an enthusiastic collector of plants and insects in the southeastern Russian Altai, Western Mongolia, and northwestern China¹. Based on fieldwork data, the excellently written monograph (1911) was pub-



Fig. 1. Prof. V.V. Sapozhkinov [W.W. Sapozhnikof] (1861–1924).

lished with rather short notes on the Lepidoptera collected by him. V. V. Sapozhnikov has the undoubted credit in entomology of being the first to collect the extended material from various regions of the Mongolian Altai including its Chinese area. The material was processed by A. A. Meinhard (1910a, b), an entomologist at the Tomsk University. Appendices and descriptions of some new forms were added by W. Wnukowsky (1927, 1929, 1930).

In 1960–70s Soviet, Hungarian, and German entomologists were actively researching the territory of Mongolia, but Mongolian Altai remained relatively unexplored. Some butterflies were collected by Hungarian entomologists working under Dr. Z. Kaszab and described in a number of publications (Forster 1965, 1967, 1968, 1972; Balint 1987, 1988a, b, 1989a, b, 1990, 1996; Balint et al. 2006). Russian and German scientists presented their findings in several articles (Korshunov & Soljanikov 1976; Korshunov 1977; Grosser 1981). Dr. Izyaslav M. Kerzhner, a Russian entomologist, also collected some butterflies in the Mongolian Altai. Hungarian specialists continued their research on the territory of Western Mongolia; the article describing findings from their last expedition was published by Bálint et al. (2006).

Three professional entomologists (Dr. Petr Ustjuzhanin, Dr. Vasilij Kovtunovich, and myself) and one amateur (Nikolaj Zhigulin) made a short expedition to the Mongolian Altai in 1999. Despite demanding working conditions, a new species of Lycaenidae was found and described in 2001 (Zhdanko & Yakovlev 2001). Later the research continued, mostly through joint botanical-zoological expeditions, organized by the South Siberian Botanical Garden of the Altai University. During the next seven expeditions, I worked together with entomologists Prof. V. Anikin, Dr. E. Guskova, and V. Doroshkin. Expeditions were held in all three aimaks (provinces) where the mountain system is situated: Ulegei (Bayan-Ulegei), Hovd, and Gobi-Altai aimaks, as well as in some localities never before explored by entomologists. Material from these expeditions and museum data provided the basis for a number of publications (Yakovlev 2002, 2003a, b, c, 2004, 2006, 2007a, b; Dubatolov et al. 2005; Kolesnichenko 2005; Yakovlev et al. 2005, 2006, 2009).

¹ V. V. Sapozhnikov visited the Mongolian Altai in 1905, 1906, 1908 and 1909. On June 26, 1905 he was the first to cross the Mongolian border. For four years he had been studying the geography and biota of the Mongolian Altai. Dozens of glaciers were found, mountain ranges and the river network of Western Mongolia were described, Mongolian vegetation was carefully studied, and many herbarium specimens and zoological collections were made. It is noteworthy that V. V. Sapozhnikov managed to combine his work as a rector of the Tomsk University, his scientific activity, and his fieldwork, all at the same time.

Japanese entomologists also collected in the region (Yazaki 2000, 2001, 2002, 2004; Suwa et al. 2008) and described a significant new species, *Erebia tsengelensis* Suwa et al., 2008. In the Chinese part of the Mongolian Altai only limited research has taken place (Huang & Murayama 1992).

At the same time Sergej Churkin (Russia) was involved in three longterm expeditions across Mongolia and spent most of the time in the Mongolian and Gobi Altai. The material he collected enabled description of many new taxa and provided interesting data on distribution, systematics and biology of butterflies. These data were presented in a series of publications (Churkin 2003a, b, c, d, 2004a, b, c, d, e, 2005a, b, c, d, 2006; Churkin & Bogdanov 2003; Churkin & Kolesnichenko 2003a, b, 2005a, b; Churkin & Tuzov 2005; Churkin & Zhdanko 2003; Dantchenko & Churkin 2003). Churkin and myself also published several articles on butterfly systematics (Churkin & Yakovlev 2005a, b, 2006; Churkin et al. 2004; Yakovlev & Churkin 2003). After all this material was processed, the number of known butterfly species for the Mongolian Altai rose by nearly 40%, and some species new to science were discovered.

An important moment for the study of butterflies of Mongolia was the publication of the book 'Butterflies of Mongolia' (Tshikolovets et al. 2009). The cooperation of book's co-authors resolved many problems concerning faunistic data and taxonomy, but some remained, and in this paper I resolve some of them.

Material

I collected over 15,000 butterfly specimens during numerous expeditions to different regions of Western Mongolia in the last 11 years (Fig. 2). Specimens from several private and state collections in Russia, Ukraine, Hungary, and Germany were also studied. In the species list months in which the insect was recorded on the wing are represented by Roman numerals.

Abbreviations

- LT Locus typicus
RYB Roman Yakovlev (Barnaul, Russia)
ZISP Zoological Institute of Russian Academy of Science (St. Petersburg, Russia)

Zoogeographical demarcation of the Mongolian Altai (Mongolian part)

The Mongolian Altai is the southeastern part of the Altai mountain region. Orographic scheme is presented in Fig. 3. Relief elements 55–79 and 83 belong to the Mongolian Altai. Phytogeographic demarcation of the Altai Mountain region has already been described (Yakovlev 2003b, 2006). Lepidoptera of the southwestern (Dzungarian) slopes of Mongolian Altai are very different from those of the northeastern slopes. That has been documented in several publications (Sergeev 1986, Kryzhanovskij 2002).

The main ridge of the Mongolian Altai divides the biota of the Altai mountain region into two biological provinces: Altai-Dzungarian (western) and Western Mongolian (eastern). Zoogeographical structure of the Mongolian Altai could not be subdivided



Fig. 2. Collecting localities by author in the Mongolian Altai.

more precisely until recently because of insufficient data. A tentative opinion on the zoogeographical structure of Mongolian Altai based on its butterfly fauna is provided in Fig. 4.

Eastern slopes of the Mongolian Altai are very dry and cold in its northern part, and hot and dry to the south of the Great Lakes Depression. Butterflies are scarce all along the ridge. That suggests that Western Mongolian province should be divided into two regions: Ulegei and Kobdo-Darvijn-Nuruu.

The fauna of the Ulegei region (Fig. 5) is similar to that of the well-studied Chuya Valley in the southeast of the Russian Altai. The well-known Altaian mountain-steppe and tundra species *Colias mongola* Alphéraky (Pieridae),

Coenonympha amaryllis (Stoll), *Boeberia parmenio* (Boeber), *Pseudochazara pallida* (Staudinger) (Nymphalidae) including the Mongolian endemics *Erebia tsengelensis*, *E. przhivalskii* sp. n., *Melitaea didymina* (Staudinger) (Nymphalidae) occur in the region.

Kobdo-Darvijn-Nuruu region, on the other hand, is mostly inhabited with desert and semi-desert species: *Neolycaena davidi namkhaidorzhi* Churkin, 2004, *Tongeia bisudu* Zhdanko & Yakovlev, *Aricia chinensis* (Murray), *Plebejus argyrognomon anceps* Churkin, and *Centrarctia mongolica* (Alphéraky) (Erebidae: Arctiinae).

According to data on Lepidoptera (Yakovlev 2003b), the South Mongolian Province of the Altai Mountain Country (I-3 in Fig. 4) (Fig. 6), established by R. V. Kamelin, hardly deserves to be considered as a different region. Its fauna is not very different from that of the region westward from the Mongolian Altai and is more related to the fauna of the Altai-Dzugarian region. Common to them are such narrowly distributed species as *Neolycaena musa* Zhdanko & Yakovlev (Lycaenidae) and *Gobibatyr ustyuzhanini* Yakovlev (Cossidae). Isolation is reduced because of the lower altitudes of the main ridges (it decreases the isolating capacity of southern spurs in the Mountain Altai). The region is surely isolated but its fauna can be described as belonging to a larger biogeographical subregion included in the Western Mongolian province of the Altai Mountain Country. Highlands of the central Gobi-Altai aimak, for example the Khan-Tajshiryn-Nuruu Mountains, the Khara-Adzgarajtyn-Nuruu Mountains, and the Khasagt-Khairkhan Mountains (the main regional ridges), are rather unique and have been well studied (Churkin 2003a, b; Yakovlev 2006, 2007). Several endemic forms were described from there (*Oeneis temujin* Churkin, *Erebia chastilovi* Churkin, *Agrodiaetus mediator* Dantchenko & Churkin, *Agriades glandon ustyuzhanini* Yakovlev & Churkin). The lowland fauna of this region is generally not very specific and it is similar to the fauna of the southern slopes of Khangai and desert regions eastwards and southwards from the Mongolian Altai. For instance, *Polyommatus kashgharensis szabokyi* Balint (Lycaenidae) is common there. Isolated and poorly studied highlands Adzh-Bogdo (Fig. 7) in spite of great expectations, the



Fig. 3. Orography of Altai Mountain Country (by R.V. Kamelin). Ridges: 1: Abakanskij; 2: Bijskaya Griva; 3: Altyn-Tau; 4: Sumul'tinkij; 5: Iolgo; 6: Cherginskij; 7: Anujskij; 8: Baschelakskij; 9: Tigirezskij; 9a: Kolyvanskij Kryazh; 10: Korgonskij; 11: Koksujskij; 12: Ubinskij; 13: Ivanovskij; 14: Ul'binskij; 15: Kholzun; 16: Listvyaga; 17: Terektinskij; 18: Seminskij; 19: Ajgulakskij; 20: Karlygan; 21: Dzhebashskij; 22: Saldzhur; 23: Shapshal'skij; 24: Sayanskij; 25: Khemchikskij; 26: Western Tannu-Ola; 27: Tsagan-Shibetu; 28: Kurajskij; 29: Shavlin'skij; 30: Northern-Tchuya Alps; 31: Southern-Tchuya Alps; 32: Katun'skij; 33: Sarymsakty (including small Tarbagataj); 34: Narymskij; 35: Kurchumskij; 36: Kalbinskij; 37: Airtau; 38: Southern Altai; 39: Asutau; 40: Kabinskij; 41: Saur; 42: Monrak; 43: Semistaj; 44: Tarbagataj; 45: Okpekty; 46: Zharminsko-Ayaguzskij; 47: Verkhnecharskij; 48: Tabyn-Bogdo-Ula; 49: Sajlyugem; 50: Talduair; 51: Chikhacheva; 52: Mongun-Taiga; 53: Turgen-Ula; 54: Kharkhiraa; 55: Mongolian Altai (general); 56: Bayan-Ula; 57: Kujten-Ula; 58: Tsengel-Ula; 59: Zast-Ula; 60: Munkh-Kairkhan; 61: Chingil'skij; 62: Bulugun'skij; 63: Batar-Khairkhan; 64: Sutaj-Ula; 65: Darvijn-Nura; 66: Alag-Khairkhan; 67: Uirten-Khuren-Ula; 68: Burkhan-Budaj-Ula; 69: Gichigenijn-Nuru; 70: Khasagt-Khairkhan; 71: Khan-Tajshiryn-Nuru; 72: Sarkh-Ula; 73: Adzh-Bogdo; 74: Alag-Nuru; 75: Takhijn-Shar-Nuru; 76: Khavatijn-Nuru; 77: Bajtag-Bogdo; 78: Altan-Khukhijn; 79: Bumbat-Ula; Plateaus: 80: Alashskoe; 81: Chulyshmanskoe; 82: Ukok; 83: Ulgiskoe.

fauna was impoverished, with components typical for the southeastern Mongolian Altai. Endemics have not been detected there. Most likely many species of Siberian Lepidoptera are likely to find their distribution limit in the Khara-AdzgarajtyNuruu and Khasgt-Khairkhan Mountains, with data on Cossidae, Noctuidae and butterflies supporting this (Churkin 2003b, 2005d; Yakovlev 2004; Volynkin pers. comm.). For example, the southeastern (for mountains of Altai) distribution limit for *Larix sibirica* Ledebour, 1833 is in this region as well. The Alag-Khairkhan Mountains should be considered as the eastern border of the region.

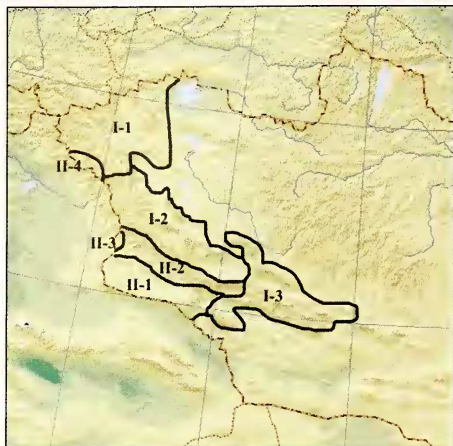


Fig. 4. Zoogeographical demarcation of the Mongolian Altai (within the limits of Mongolia).

It appears that the entomofauna of the south-western slope of the Mongolian Altai is more variable. Fieldwork in this region is subject to a number of difficulties, not least of which is that most of the western prongs of the Mongolian Altai are inaccessible to many entomologists as they are within Chinese territory. The Mongolian part is very small and almost completely restricted to the frontier zone.

The idea of the western part of the Mongolian Altai as very dry Dzungaria (Sergeev 1986; Kamelin 2005) with a large number of songorian and eastern Palaearctic faunistic elements seems to be partially true and can be applied to Barun-Khuraj Depression, Adzh-Bogdo lowlands, and mountain massifs of the main divided ridge of the Mongolian Altai facing the

Dzungarian and Transaltian Gobi. These regions are rather poor faunistically, although they are very unique, taking into account the desert element of western Palaearctic and middle Asian origin.

The river valleys of the Uenchin-Gol, the Bodonchin-Gol and, in particular, the Bulugun (Bulgan-Gol) from their upper reaches to their middle course reveal a unique fauna complex with western Palaearctic species prevailing (Yakovlev 2003b, 2006); however, many species of Siberian origin occur as well (Tshikolovets et al. 2009), especially in the upper reaches of eastern tributaries of the Bulugun. In the highlands and uplands of Shadzgat-Nuruu Mountains, as well as in the upper reaches of the River Ulyastain-Gol, the fauna is mainly Siberian, almost identical on the subspecific level (Tshikolovets et al. 2009). A similar situation occurs in the valley of the River Bidzhijn-Gol (Tshikolovets et al. 2009).

One of the well-studied massifs is the Arshantyn-Nuruu Mountains, located to the southwest of the small western tributary of the Bulugun, the Bayan-Gol River. The unique entomofauna is strongly correlated with the singularity of the flora. Several endemics of this interesting massif were described: *Pseudophilotes svetlana* Yakovlev, *Tongeia arata* Yakovlev, *Neolycaena sapozhnikovi* sp. n. (Lycaenidae), *Melitaea yakovlevi* Kolesnichenko, *M. elena* Yakovlev (Nymphalidae), as well as many of the original western Palaearctic elements such as *Gobibatyr colossus* (Staudinger) (Cossidae), *Hemaris ducalis* (Staudinger) (Sphingidae), *Carcharodus flocciferus* (Zeller) and *Muschampia antonia* (Speyer) (Hesperiidae), *Arethusana arethusana* (Dennis & Schiffermüller) and *Chazara enervata* (Staudinger) (Nymphalidae), and *Agrodiaetus rippartii* (Freyer) (Lycaenidae) (Yakovlev 2002, 2007c; Yakovlev & Doroshkin 2004; Yakovlev et al. 2005; Tshikolovets et al. 2009).

Another similar 'oasis' on the western slope of the Mongolian Altai (within Outer Mongolia) is the Elt-Gol river valley (southwest of the Bayan-Ulegei aimak), which is one of the Black Irtysh head rivers, as distinct from the huge closed water bodies of



Fig. 5. Ulegei region, Bayan-Ulegei aimak, Durbet-Daba pass, 2650 m, June 2009 (photo by R. Yakovlev).

Outer Mongolia. The explored territory surely belongs to the so-called ‘damp Altai’. With its landscapes it resembles separate regions of the Central (Chuy Alps, etc.) and Chinese Altai. The analyses of collected entomological and botanic materials (Kamelin 2006, Yakovlev & Doroshkin 2006) indicate a great faunistic similarity with the Central and, probably, Chinese Altai. It is of interest that a number of species of Siberian and western Palaearctic faunas in the territory of the region (most probably in some areas of the Chinese Altai) are represented by clearly differentiated subspecies (Yakovlev & Doroshkin 2006). In addition to typical ‘Siberians’ *Erebia theano* (Tauscher), *E. jeniseiensis* Trybom, *Oeneis magna* Graeser, *Boloria altaica* (Grum-Grshimailo), *B. frigidalis* Warren, *Melitaea latonigena* Eversmann (Nymphalidae), *Pieris euorientis* Verity (Pieridae), etc., with unexpected species for the given faunistic complex such as *Colias erate* (Esper) (Pieridae) and *Polygonia interposita* (Staudinger) (Nymphalidae) were found (Gus’kova & Yakovlev 2011).

Therefore, western and southwestern slopes of the Mongolian Altai can be divided into four regions: 1. Barun-Khuraj – Adzh-Bogdo region (II-1 in Fig. 4) (Fig. 8); 2. Bulgun-Bidzhijn-Gol region (II-2 in Fig. 4) (Figs 9, 11); 3. Arshantyn region (II-3 in Fig. 4) (Fig. 10); 4. Kara-Irtysh region (II-4 in Fig. 4). The latter two probably extend into Chinese territory; however, it might be too early to discuss zoogeography (and even the checklist) of butterflies in the Chinese part of the Mongolian Altai). Besides, a series of large massifs are still poorly studied in the Mongolian part of the Mongolian Altai, e.g. Bajtag-Bogdo and some lower ridges to the east. Highlands of the Adzh-Bogdo Mountains are almost unknown. The general tendency of the butterfly fauna might be



Fig. 6. Southern-Mongolian region, Gobi-Altai aimak, Khasagt-Khairkhan Mountains, 2500 m, July 2010 (photo by V. Anikin).



Fig. 7. Southern-Mongolian region, Gobi-Altai aimak, Adzh-Bogdo Mountains, Il-gol Valley, 2800 m, July 2009 (photo by R. Yakovlev).



Fig. 8. Barun-Khurai-Adzh-Bogdo region, Khovd aimak, Dzhungarian Gobi, 15 km S of Bulgan, 1050 m, July 2007 (photo by V. Anikin).



Fig. 9. Bulugun-Bidzhijn-Gol region, Khovd aimak, Valley of Uenchin-Gol river, 1400 m, July 2005 (photo by D. Ryzhkov).



Fig. 10. Arshantynskij region, Khovd aimak, Bayan-Gol Valley, Arshantyn-Nuruu Mountains, 2100 m, June 2005 (photo by D. Ryzhkov).

lower richness in the highlands and uplands in southern and southeastern regions of the Mongolian Altai. For example, under similar conditions the Russian Altai (the Kurai Mountains) has three species of *Boloria* Moore, 1900 (one in the Khasagt-Khairkhan Mountains, Mongolian Altai), eight species of *Oeneis* (two in the Mongolian Altai), and seven species of *Parnassius* (one in the Mongolian Altai), etc. (Tshikolovets et al. 2009).

Annotated list of species (taxonomy by Korshunov 2002 and Tshikolovets et al. 2009)
A species recorded as possible for the fauna of the Mongolian Altai is marked with *.

Family Hesperiiidae Latreille, 1809

* *Erynnis tages* (Linnaeus, 1758)

Chuya valley in the Altai Republic (Russia) (Elwes 1899; Tshikolovets et al. 2009).

Spialia orbifer (Hübner, 1823)

Spialia orbifer ssp. *pseudolugens* P. Gorbunov, 1995.

Arshantyn-Nuruu Mountains, Valley of Bulgan-Gol River. vi–vii.

Spialia struvei (Püngeler, 1914)

Dzungarian Gobi desert in the southern parts of Hovd and Gobi-Altai aimaks (Dubatolov et al. 2005). Very rare. vi–vii.

***Muschampia cribrellum* (Eversmann, 1841)**

Muschampia cribrellum ssp. *obscurior*
(Staudinger, 1892)

Hovd (Kobdo) (Meinhard 1910) and Horgo-Nuur lake in the Bayan-Ulegei aimak (Yazaki 2004). vi–vii.

***Muschampia tessellum* (Hübner, 1803)**

Muschampia tessellum ssp. *dilutior* (Rühl, 1895)

Munkh-Khairkhan Mt. in the Bayan-Ulegei aimak (Balint et al. 2006). vi–vii.

***Muschampia protheon* (Rambur, 1858)**

Arshantyn-Nuruu Mountains and Valley of Bulgan-Gol river. Rare. vi–vii.

***Muschampia staudingeri* (Speyer, 1879)**

Dzungarian Gobi desert (Uvkhod-Ula Mt.). Very rare. vi–vii.

***Muschampia antonia* (Rambur, 1858)**

Arshantyn-Nuruu Mountains. Very rare. vi–vii.

***Pyrgus malvae* (Linnaeus, 1758)**

Elt-Gol Valley, Shadzat-Nuruu Mountains. Rare. vi–vii.

***Pyrgus alveus* (Hübner, 1803)**

Pyrgus alveus sifanicus (Grum-Grshimailo, 1891)

Arshantyn-Nuruu, Khasgt-Khirkhan Mountains. Common. vi–vii.

***Pyrgus serratulae* (Rambur, 1839)**

Pyrgus serratulae uralensis (Warren, 1926)

Different parts of the Mongolian Altai. Common. v–vii.

*** *Pyrgus sibirica* (Reverdin, 1911)**

Very common in the Russian Altai, probably in highlands of the northern part of the Mongolian Altai. vi–vii.

***Pyrgus centaureae* (Rambur, 1839)**

Elt-Gol Valley. Very rare. vii.

***Carcharodus flocciferus* (Zeller, 1847)**

Arshantyn-Nuruu Mountains. Common. v–vii.

***Carterocephalus palaemon* (Pallas, 1771)**

Carterocephalus palaemon albigitata (Christoph, 1893)

Elt-Gol Valley. Very rare. vii.



Fig. 11. Bulgun-Bidzhijn-Gol region, Khovd aimak, Valley of Bulgan-Gol river, 1500 m, July 2005 (photo by D. Ryzhkov).

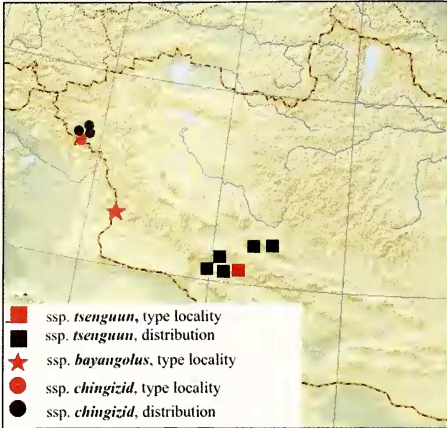


Fig. 12. Distribution of *Parnassius phoebus* in the Mongolian part of the Mongolian Altai.

***Carterocephalus silvicola* (Meigen, 1829)**

Probably mistakenly recorded for Kobdo (Meinhard, 1910).

***Carterocephalus argyrostigma* (Eversmann, 1851)**

Northeastern slope of the Central part of the Mongolian Altai, near Kobdo. Rare. vi–vii.

***Thymelicus lineola* (Ochsenheimer, 1808)**

Arshantyn-Nuruu Mountains. Very local. vi–vii.

***Hesperia comma* (Linnaeus, 1758)**

Different parts of the Mongolian Altai. Common. vi–vii. Subspecies' membership is not accurately identified yet.

Family Papilionidae Latreille, 1802

***Parnassius phoebus* (Fabricius, 1793)**

The species is very local in the Mongolian Altai. Three subspecies have been described: *chingizid* Yakovlev, 2006, *bajangolus* Yakovlev, 2006, and *tsenguun* Churkin, 2003. Their distribution is given in Fig. 12. *Parnassius phoebus chingizid* occurs in the north-western highlands of the Mongolian Altai (Elt-Gol Valley). It is very similar to the nominate subspecies and to ssp. *halasicus* Huang & Murayama, 1992 described from the Chinese part of the Mongolian Altai. *P. phoebus bajangolus*, a very unique subspecies, is tiny, brightly coloured, externally different from ssp. *tsenguun* with a very characteristic pattern. This subspecies is distinguished by the following characters: the dentate internal margin of the marginal band on the forewing (males), the very small red spots on the hindwing (males), clearly defined black postdiscal band on the forewing (males); the very small spots in Sc + R₁/R_s and M₁/M₂ on the hindwing (males); well-defined submarginal row of dark spots on the hindwing (males); well-defined white crescent-shaped submarginal spots on the forewing (females); and the well-defined row of submarginal white lunules on the hindwing (females). *P. phoebus bajangolus* is found in uplands of the Arshantyn-Nuruu Mountains, and *P. phoebus tsenguun* is widespread in the southeastern highlands of the Mongolian Altai.

***Parnassius nomion* Fischer de Waldheim, 1823**

Parnassius nomion saldaitisi Churkin, 2005

The only population of this species in the territory of the Mongolian Altai was found by Churkin in the Khan-Tajshiryn-Nuruu Mountains. Very local and rare. vii.

***Parnassius apollo* (Linnaeus, 1758)**

Ulasty-Gol, Sara-Syumbe, Bolshoi Ku-Irtyz (Meinhard 1910). Very local and rare. vii.

***Parnassius evermanni* Ménériés in Siemaschko, 1850**

A small population was found in the region of the Potanin glacier on the southern slopes of the Tabyn-Bogdo-Uul Mountains. vii.

***Papilio machaon* Linnaeus, 1758**

Common species. v–vii. Ssp. *orientis* Verity, 1911 is found in the backbone of the Mongolian Altai. Specimens from southern slopes of the Mongolian Altai and deserts of the Dzhungarian Gobi belong to the ssp. *centralis* Staudinger, 1886.

Family Pieridae Duponchel, 1835***Leptidea sinapis* – *reali* group**

Meinhard (1910) noted *L. sinapis* (L.) in the north of the Chinese part of the Mongolian Altai (Krana Valley, near Sara-Syumbe). As there are no specimens of this species group in the Zoological Museum of Tomsk University, and as examination of genitalia is necessary for more accurate identification, this list only includes the species group.

***Euchloe ausonia* (Hübner, 1804)**

Only a few specimens were found in the river valley of the Bulgan-Gol. v.

***Euchloe ochracea* (Trybom, 1877)**

Euchloe ochracea naina Kozhantschikov, 1923

The species occurs in a number of places in the backbone of the Mongolian Altai (Shadzgat-Nuruu Mountains). Very rare. vi–vii.

***Euchloe creusa* (Doubleday, 1847)**

Euchloe creusa orientalis (Bremer, 1864)

The species occurs in a number of places along the ridge of Mongolian Altai (upper river Kobdo-Gol, Shadzgat-Nuruu Mountains, Elt-Gol Valley, Arshantyn-Nuruu Mountains). Rare. v–vii.

***Aporia crataegi* (Linnaeus, 1758)**

Northern part of Mongolian Altai. Rare. vi–vii.

***Pontia chloridice* (Hüner, 1813)**

Steppe, semi-desert and desert zones all along the Mongolian Altai. Common. Two generations occur in the south.

***Pontia edusa* (Fabricius, 1777)**

Different parts of the Mongolian Altai. Common. V–viii. Two generations occur in the south.

***Pontia callidice* (Hübner, 1800)**

Different parts of the Mongolian Altai. Very rare. vi–vii.

***Pieris bryoniae* (Hübner, 1806)**

Pieris bryoniae mihon Yakovlev, 2006

Forest belt. Detected in different areas. Rare and local. vi–vii.

***Pieris rapae* (Linnaeus, 1758)**

Very common for uplands and valleys of the Mongolian Altai. v–vii.

***Pieris krueperi* Staudinger, 1860**

Pieris krueperi devta (de Nicéville, 1884)

Only one specimen was collected 30 km north of Bulgan somon (Bulgan-Gol Valley).

***Colias erate* (Esper, 1805)**

Common for steppe, semi-desert, and desert belts, sporadic in the meadows of the northern part (Elt-Gol valley) (Yakovlev & Doroshkin 2006). v–viii.

***Colias hyale* (Linnaeus, 1758)**

Meadows in the north. Rare. vi–vii.

***Colias mongola* Alphéraky, 1897**

Elt-Gol, Shadzgat-Nuruu, Khan-Tajshiryin-Nuruu, Khara-Adzgarajtyin-Nuruu and Khasgt-Khairkhan Mountains. Rare. vi–vii.

***Colias tyche* (Boeber, 1812)**

Rare, Elt-Gol, Shadzgat-Nuruu, etc. Rare. vi–vii.

***Colias chrysotheme* (Esper, 1781)**

Colias chrysotheme elena P. Gorbunov, 1995

Different parts of the Mongolian Altai. Common. vi–vii.

***Colias thisoa* (Ménétriés, 1832)**

Colias thisoa cryptochrysa Yakovlev, 2006

Elt-Gol and Tsagduultai Valleys. Very rare. vi–vii.

Family Lycaenidae Leach, 1815***Neolycaena davidi* (Oberthür, 1881)****(Figs 13a–d)***Neolycaena davidi namkhaidorji* Churkin, 2004

The species is widespread in bushes to the north and in depressions near Biger-somon. Common. vi–vii.

Neolycaena musa* Zhdanko & Jakovlev, 2001*(Figs 13e–h)**

Widespread. Common. vi–vii.

Neolycaena chimaera* Churkin, 2004*(Figs 13i–l)**

The species has been confirmed at the type locality (Sutai-Ula Mountain). The distinction of this species from *N. musa* is obvious in female genitalia morphology (Churkin 2004). Very rare and local. vii.

Neolycaena sapozhnikov* sp. n.*(Figs 13m–p, 14)**

Material. Holotype ♂, W. Mongolia, Hovd aimak, Bulgan-gol basin, Bayan-gol basin, middle stream Ulyastain-Sala river, 1600–1800 m, 21–23.vi.2004, V. Doroshkin, R. Yakovlev, & D. Ryzhkov leg. (ZISP). – Paratypes: 18 ♂♂, 10 ♀♀, same data (SZMN, RYB).

Description. Forewing length 13.5–15 mm. Antenna clavate, red apically. Forewing upperside pitch black, patternless, with black fringe; underside greyish brown with a dense suffusion of pale grey scales (better defined basally, along costa and in hindwing), with a V-shaped streak near apex of discal cell, apically directed towards outer wing margin, with an irregular row of white streaks in submarginal area; streaks slightly curved, crescent-shaped in cells R_{4+5} – M_1 , M_1 – M_2 , M_2 – M_3 and straight in cells M_3 – Cu_1 and Cu_{1-2} ; obscure submarginal black dots increasing from medial to cubital area; spots in medial area ringed with obscure white circles; forewing border white, slender. Hindwing with a white V-shaped streak near apex of discal cell and an irregular row of crescent-shaped white spots in postdiscal area, underlined distally with black streaks; submarginal area with small red dots with incomplete black rings, typical for congeners; with a slender white border.

Male genitalia: Consistent with general characteristics of the genus. Uncus quite reduced, fused with tegumen; fusion area obscure. Gnathal arms long, hook-shaped, apically acute. Valvae short, lanceolate, with an almost straight costal margin and a slightly curved lower one. Saccus small, with an acute apex protruding backwards. Phallus long (ca. $2 \times$ of valval length), slightly curved in basal third, with a pair of baculate cornuti.

Female genitalia: Ovipositor lobes making broad semi-circle. Apophyses posteriores $4 \times$ longer than ovipositor lobes. Apophyses anteriores not developed. Antrum funnel-shaped, wide and truncate, strongly sclerotized basally. Ductus bursae very short; corpus strongly sclerotized basally, globe-shaped, with a pair of small claw-shaped signa lateralally.

Habitat. The species occurs on dry slopes with bushes, overgrown with several *Cara-gana* Fabr. (Fabaceae) species.

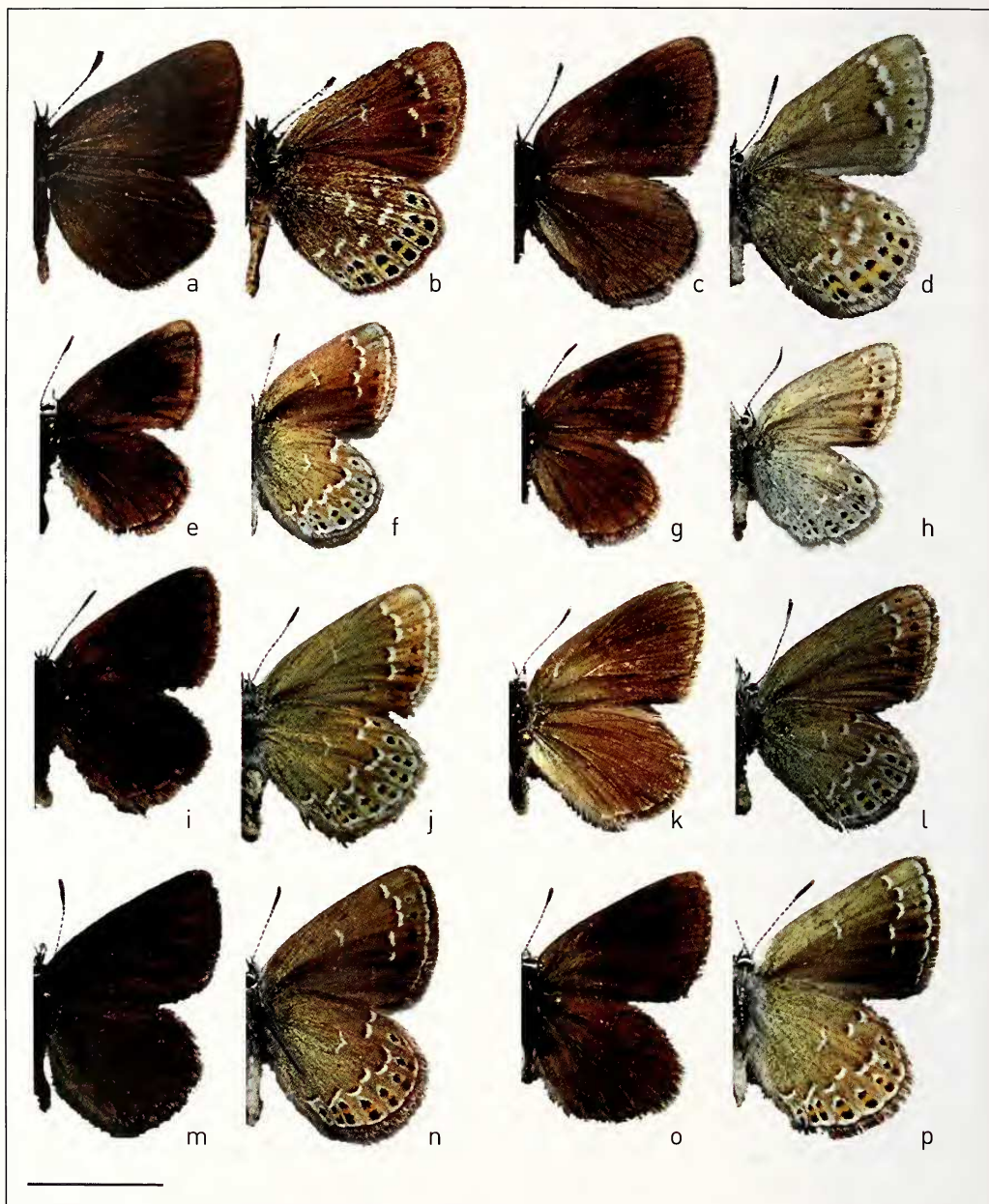


Fig. 13. *Neolycaena*: **a:** *davidi namkhaidorji* Churkin, 2004, ♂ (upperside), Khovd aimak, near Stanok-Khongo, 2000 m, 18.06.2003, R. Yakovlev (RYB), **b:** *davidi namkhaidorji* Churkin, 2004, ♂ (underside), **c:** *davidi namkhaidorji* Churkin, 2004, ♀ (upperside), same locality (RYB), **d:** *davidi namkhaidorji* Churkin, 2004, ♀ (underside), **e:** *musa* Zhdanko & Jakovlev, 2001, ♂, (upperside) Khovd aimak, 50 km S of Mankhan somon, 2200 m, 21.06.2003, R. Yakovlev leg. (RYB), **f:** *musa* Zhdanko & Jakovlev, 2001, ♂, (underside), **g:** *musa* Zhdanko & Jakovlev, 2001, ♀, (upperside), same locality (RYB), **h:** *musa* Zhdanko & Jakovlev, 2001, ♀, (underside), **i:** *chimaera* Churkin, 2004, ♀, paratype (upperside), Khovd aimak, Sutai-Ula Mountains (RYB), **j:** *chimaera* Churkin, 2004, ♀, paratype (underside), **k:** *chimaera* Churkin, 2004, ♀, paratype (upperside), Khovd aimak, Sutai-Ula Mountains (RYB), **l:** *chimaera* Churkin, 2004, ♀, paratype (underside), **m:** *sapozhnikovi* sp. n., ♂, holotype (upperside), **n:** *sapozhnikovi* sp. n., ♂, holotype (underside), **o:** *sapozhnikovi* sp. n., ♀, paratype (upperside), **p:** *sapozhnikovi* sp. n., ♀, paratype (underside). Scale bar = 1 cm.

Diagnosis. The new species belongs to the subgenus *Rhymnaria* Zhdanko, 1983. It appears to be closely related to *Neolycaena chimaera* Churkin, 2004 and *N. submontana saurica* Zhdanko, 1998 (bona fida species?), but it can be easily distinguished from these species in having a distinct V-shaped white streak on the underside of the forewing, stronger sclerotization of the corpus bursae basally, wider globe-shaped corpus bursae, and the poorly curved phallus.

Etymology. The species is named after a well-known Russian geographer – Prof. V. Sapozhnikov (1861–1924).

***Callophrys rubi* (Linnaeus, 1758)**

Arshantyn-Nuruu Mountains. Very rare. v–vii.

***Callophrys suaveola* (Staudinger, 1881)**

Arshantyn-Nuruu Mountains. Very rare. v. New for Mongolian fauna.

***Cigaritis epargyros* (Eversmann, 1854)**

Alag-Nuur Lake. Very rare. vi–vii. New for the Mongolian Altai.

***Lycaena phlaeas* (Linnaeus, 1761)**

Elt-Gol, Shadzgat-Nuruu. Rare. vi–vii.

***Thersamolycaena dabrerai* (Bálint, 1996)**

Southern slopes of the Mongolian Altai and in Dzhungarian Gobi desert. Very rare. vi–vii.

***Thersamolycaena adbayar* Churkin, 2004**

Endemic species of Khan-Tajshiryn-Nuruu Mountains. Locally common. vii.

***Thersamolycaena violacea* (Staudinger, 1884)**

Khara-Belchir-Daba pass (Khovd aimak). Very rare. vii.

***Thersamolycaena dispar* (Haworth, 1803)**

Thersamolycaena dispar rutila (Werneburg, 1864)

Chinese part of Mongolian Altai (Bala-Irtsis). Very local. vii.

***Heodes hippothoe* (Linnaeus, 1758)**

Chinese part of Mongolian Altai, Dzhangiz-Agach Valley (Meinhard, 1910). Very local. vii.

***Heodes alciphron* (Rottemburg, 1775)**

Chinese part of Mongolian Altai, Kurty river Valley (Meinhard, 1910), Arshantyn-Nuruu Mountains. Very local. vi–vii.

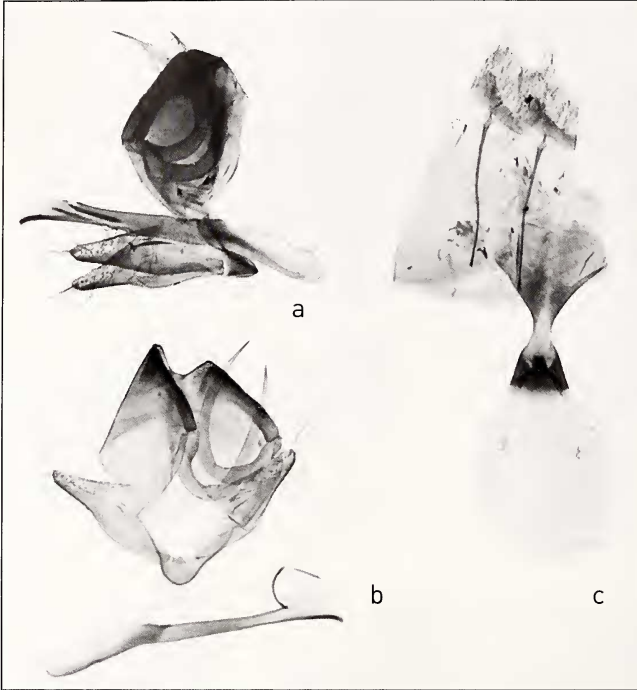


Fig. 14. Genitalia of *Neolycaena sa-pozhnikovi* sp. n.: **a:** male genitalia (lateral projection), **b:** male genitalia (ventral projection), **c:** female genitalia.

***Heodes virgaureae* (Linnaeus, 1758)**

Different parts of the region (Bulgan-Gol Valley, Kobdo-Gol Valley). Local. vii.

***Athamanthia dimorphus* (Staudinger, 1881)**

(Figs 15a–d)

Athamanthia dimorphus mongoliana Churkin, 2006

Widespread in southern parts, on the territory of Hovd and Gobi-Altai aimaks. Rare. vi–vii.

***Athamanthia athamantis* (Eversmann, 1854)**

This species is very localised in deserts and semi-deserts in the south (Fig. 16). Two subspecies are described: *bulganica* Churkin & Yakovlev, 2006 (LT: Hovd aimak, Dzungarian Gobi Des., 15 km E of Bulgan-somon) (Figs 15e–h); ssp. *pletnevi* Churkin 2004 (LT: Gobi-Altai aimak, 30 km SE Bugat somon) (Figs 15i–l). Both populations are strictly isolated, and although these butterflies are easily distinguished, their status requires further research. Populations with transitional characters may occur in vast plain areas of Dzungarian Gobi. Despite very little available material, both taxa are here considered valid subspecies.

***Everes argiades* (Pallas, 1771)**

Recorded in different places of the southern slope (Bodonchin-Gol and Bulgan-Gol Valleys) (Alberti 1971). vii.

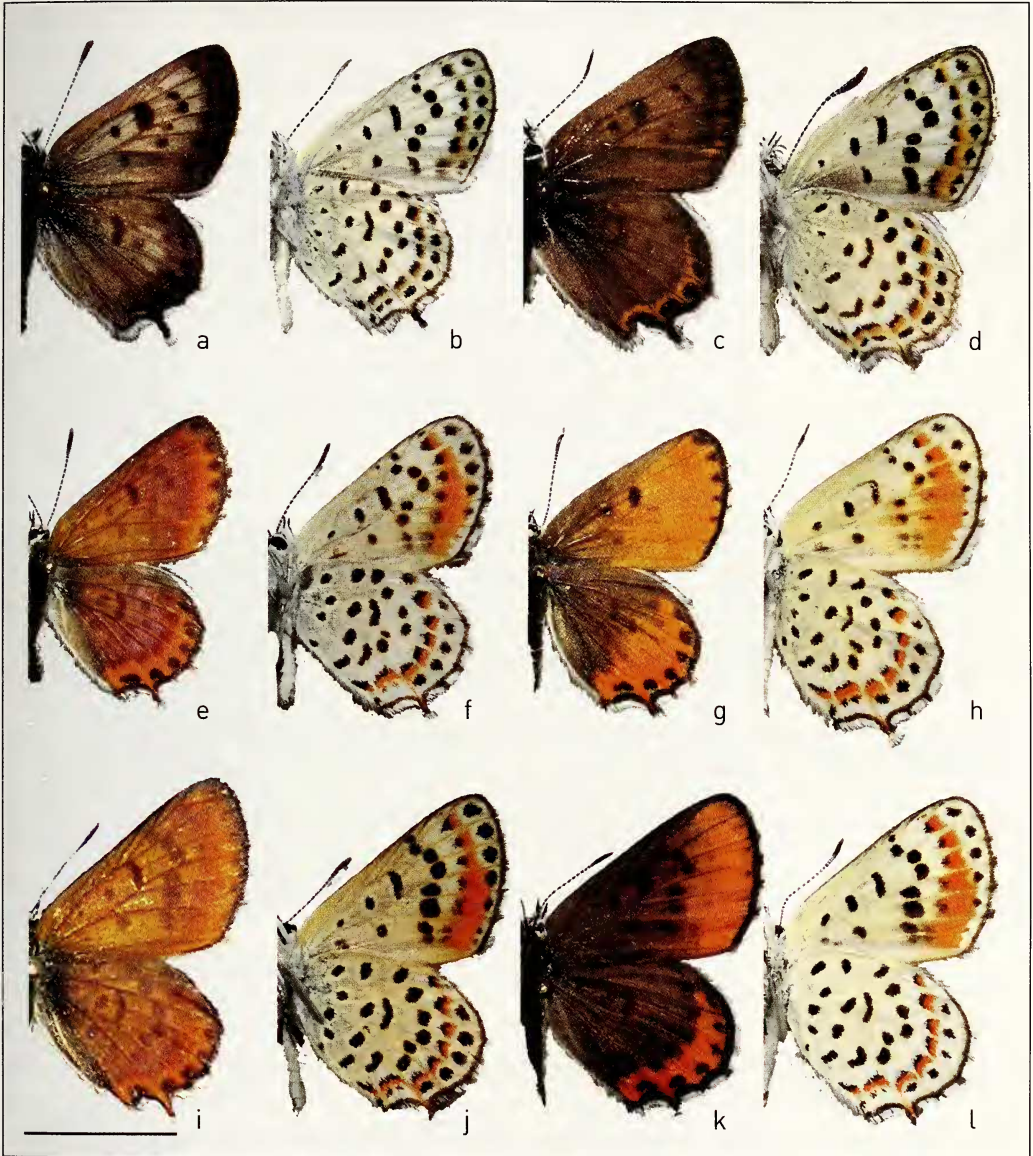


Fig. 15. *Athamanthia*: **a:** *dimorphus mongoliana* Churkin, 2006, ♂ (upperside) W. Mongolia, Hovd aimak, Bulgan-gol basin, Arshantyn-Nuruu Mountains, 1700 m, 19.07.2009, E. Guskova & R. Yakovlev leg. (RYB), **b:** *dimorphus mongoliana* Churkin, 2006, ♂ (underside), **c:** *dimorphus mongoliana* Churkin, 2006, ♀ (upperside), same locality (RYB), **d:** *dimorphus mongoliana* Churkin, 2006, ♀ (underside), **e:** *athamantis bulganica* Churkin & Yakovlev, 2006, ♂, paratype (underside) (RYB), **f:** *athamantis bulganica* Churkin & Yakovlev, 2006, ♀, paratype (upperside) (RYB), **g:** *athamantis bulganica* Churkin & Yakovlev, 2006, ♀, paratype (underside) (RYB), **h:** *athamantis bulganica* Churkin & Yakovlev, 2006, ♀, paratype (underside) (RYB), **i:** *athamantis pletnevi* Churkin 2004, ♂, topotype (upperside) (RYB), **j:** *athamantis pletnevi* Churkin 2004, ♂ (underside), **k:** *athamantis pletnevi* Churkin 2004, ♀, topotype (upperside) (RYB), **l:** *athamantis pletnevi* Churkin 2004, ♀ (underside). Scale bar = 1 cm.

Tongeia fischeri (Eversmann, 1843)

Elt-Gol Valley (Yakovlev & Doroshkin 2006). Very local. vii.

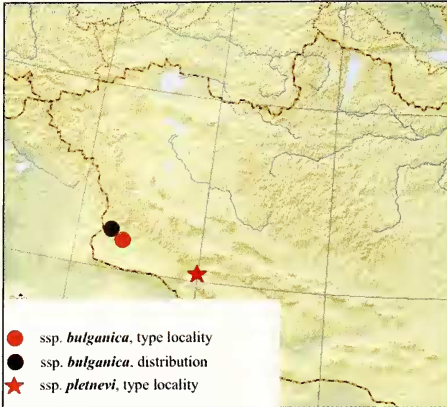


Fig. 16. Distribution of *Athamanthia athamanthis* (Eversmann, 1854) in the Mongolian Altai.



Fig. 17. Distribution of *Tongeia bisudu* Zhdanko & Jakovlev, 2001.



Fig. 18. Distribution of subgenus *Inderskia* Korshunov, 2000.

Tongeia bisudu Zhdanko & Jakovlev, 2001

The species is endemic to the Mongolian Altai. Different subspecies are present in different areas, and their status requires further investigation. The nominate subspecies is known from the Gobi Altai aimak, 15 km S Altai (1800 m); ssp. *burte* Churkin, 2003 is also known from the Gobi Altai aimak, but from 30 km W Tsogt somon (1800–1900 m); ssp. *germani* Yakovlev, 2004 is known from the eastern part of Dzungarian Gobi desert, Uvkhod-Ula Mountains (1100–1300 m). Thus, the subspecies populations are isolated from each other (Fig. 17).

Tongeia arata Yakovlev, 2009

Arshantyn-Nuruu Mountains. Endemic, very rare. vi–vii.

Cupido prosecusa (Erschoff, 1874)

Dzungarian-Gobi, Alag-Nuur Valley. Very local. v–vii. Bivoltine.

***Cupido minimus* (Fuessly, 1775)**

Elt-Gol Valley – nominate ssp., Arshantyn-Nuruu Mountains – ssp. *tusovi* Lukhtanov, 1994, Khan-Taisharyn-Nuruu Mountains – ssp. *lhagvajavi* Churkin, 2004. The status needs further investigations. Very local. vi–vii.

***Celastrina argiolus* (Linnaeus, 1758)**

Recorded in Bulgan-Gol Valley (Grosser, 1981).

***Paleophilotes svetlana* (Yakovlev, 2003)**

Endemic. Arshantyn-Nuruu Mountains. v. Very local and rare. At present, the complex of species belonging to subgenus *Inderskia* Korshunov, 2000 (Zhdanko 2004) is represented with the following species *P. panope* (Eversmann, 1851) (Northwestern Kazakhstan), *P. marina* Zhdanko, 2004 (Eastern Kazakhstan, Arkaly Mountains), and *P. svetlana* (Yakovlev, 2003) (Western Mongolia) (Fig. 18). It should be noted that all species share the same host plant, *Astragalus lasiophyllus* Ledebur (Fabaceae).

***Scolitantides orion* (Pallas, 1771)**

Chinese part of the Mongolian Altai (Sara-Syumbe), Elt-Gol Valley, Arshantyn-Nuruu Mountains, Shadzgat-Nuruu Mountains. Local. vi–vii.

***Glaucopsyche argali* (Elwes, 1899)**

Glaucopsyche argali chingiz Churkin, 2005

Hovd aimak, Khazhigijn-Nuruu Mountains. Very local and rare. vi.

***Plebejus argus* (Linnaeus, 1758)**

Arshantyn-Nuruu Mountains, Tsagan-Gol. Local. vi–vii.

***Plebejus argyrognomon* (Bergsträsser, 1779)**

This species is common in the lowlands and uplands of the Mongolian Altai. Its subspecific structure is difficult to determine. The described subspecies are as follows: *chalcha* Korshunov, 1982 (slopes of the Mongolian Altai facing the Great Lakes Valley), *gobianus* Churkin, 2004 and *gabrielii* Bálint, 1989) (southern slopes of the southeastern part of the Mongolian Altai). The status of the subspecies *anceps* Churkin, 2004 needs closer scrutiny. The taxon description is based on a restricted series of smaller specimens, collected in the Sutai-Ula Mountains (Hovd aimak) and sympatric with the typical larger *chalcha* Korshunov, 1982. The noticeable hiatus and absence of transitional forms have been used as the basis for the description of the subspecies (Churkin 2004). Churkin (2004) explained the sympatric habitation of the two subspecies by the presence of an ecological barrier between the two populations (with different flight periods of imagos, different host plants, etc.). The intergradation area between the two subspecies in the given region (Sutai-Ula Mt.) is unlikely.

Plebeius idas (Linnaeus, 1761) group

Most publications on Northern Asia (Tuzov et al. 2000, Churkin & Zhdanko 2003, Tshikolovets et al. 2009) treat *idas* as a complex of species, semispecies or subspecies. Strong geographic variation and slightly differentiated morphological forms lead to strongly differing views on the taxonomy. Churkin & Zhdanko (2003) thoroughly examined the eastern Palearctic *idas*. It appears that the Mongolian populations of *idas* should be considered as well differentiated subspecies. At present the Mongolian Altai *idas* can be subdivided into four easily differentiated subspecies based on the external characters (they have not as yet been found as sympatric populations): *Plebeius idas sailjugemicus* Zhdanko & Samodurov in Zhdanko, 1999 (LT: Russia, SE Altai, Kosh-Agach distr., Sailjugem Mountains, Dzhumaly river), *P. idas munkhbayar* Churkin & Zhdanko, 2003 (LT: Mongolia, Gobi-Altai aimak, 30 km S Biger somon), *P. idas belchir* Churkin & Yakovlev, 2005 (LT: Hovd aimak, 10 km N Khara-Belchir-Daba pass) and *P. idas shadzgat* Yakovlev, **ssp. n.**

Plebeius idas sailjugemicus Zhdanko & Samodurov in Zhdanko, 1999 (Figs 19a–d)

This highland subspecies is common in regions of the Russian Altai, bordering Mongolia (Sailjugem Mountains, Ukok Plateau, South-Chuya Mountains, Chikhaceva Mountains), and in the north of the Mongolian Altai (alpine zone of the Bayan Ulgijsky aimak). Southward in the backbone of the Mongolian Altai.

Plebeius idas shadzgat **ssp. n.**

(Figs 19e–h)

This subspecies is described because the population of *idas* located southward of the *P. idas sailjugemicus* population, in the Shadzgat-Nuru Mountains is very different externally from the other *idas* populations.

Material. Holotype ♂, W. Mongolia, Hovd aimak, Bulgan-Gol basin, Uljastyin-Gol Valley, Shadzgat-Nuruu Mountains, 2500–3000 m, 25–26.vi.2004, R. Yakovlev & D. Ryzhkov leg. (ZISP). – Paratypes: 22 ♂♂, 6 ♀♀, same data (SZMN, RYB).

Description. Forewing length 12.5–14 mm (male), 14–15 mm (female). *Male:* Forewing upperside bright blue, with a black border of medium width and white fringe; underside pale grey, with a small suffusion of bluish scales basally; underside with a small black semi-oval spot near apex of discal cell, surrounded with a narrow white border, and an S-shaped row of black round dots, edged with white narrow rings in postdiscal area; submarginal orange spots, underlined with black streaks laterally and proximally, increasing in size towards tornus; slender black wing border. Hindwing underside with a row of small black dots basally, a slender black, white-bordered streak at apex of discal cell, and a strongly curved row of black dots postdiscally; orange submarginal lunules well-defined, underlined with expressed dashes of lustrous turquoise scales laterally and crescent-shaped black dashes proximally; area between postdiscal and submarginal rows dots lunules mainly white; wing border slender, black. *Female:* Forewing upperside greyish brown, with a rather well-defined blue area in discal zone; hindwing with an intensive blue area, better defined in discal zone and occupying approximately half of wing's area; underside of both wings pale brown, with a pattern similar to that of the male.



Fig. 19. *Plebeius idas* (Linnaeus, 1761) group: **a:** *ssp. sailjugemicus* Zhdanko & Samodurov in Zhdanko, 1999, ♂ (upperside), Bayan-Ulegei aimak, Kobdo-gol Valley, 20 km SW Tsengel, 1800 m, 26–30.07.2009, E.V. Guskova & R.V. Yakovlev leg. (RYB), **b:** *ssp. sailjugemicus* Zhdanko & Samodurov in Zhdanko, 1999, ♂ (underside), **c:** *ssp. sailjugemicus* Zhdanko & Samodurov in Zhdanko, 1999, ♀ (upperside), same locality (RYB), **d:** *ssp. sailjugemicus* Zhdanko & Samodurov in Zhdanko, 1999, ♀ (underside), **e:** *ssp. shadzgat* **ssp. n.**, holotype, ♂, (upperside), **f:** *ssp. shadzgat* **ssp. n.**, holotype, ♂, (underside), **g:** *ssp. shadzgat* **ssp. n.**, paratype, ♀, (upperside), same locality (RYB), **h:** *ssp. shadzgat* **ssp. n.**, paratype, ♀, (underside), **i:** *ssp. belchir* Churkin & Yakovlev, 2005, ♂, paratype (upperside) (RYB), **j:** *ssp. belchir* Churkin & Yakovlev, 2005, ♂, paratype (underside), **k:** *ssp. belchir* Churkin & Yakovlev, 2005, ♀, paratype (upperside) (RYB), **l:** *ssp. belchir* Churkin & Yakovlev, 2005, ♀, paratype (underside), **m:** *munchbajar* Churkin & Zhdanko, 2003, ♂, paratype (upperside) (RYB), **n:** *munchbajar* Churkin & Zhdanko, 2003, ♂, paratype (underside), **o:** *munchbajar* Churkin & Zhdanko, 2003, ♀, paratype (upperside), **p:** *munchbajar* Churkin & Zhdanko, 2003, ♀, paratype (underside). Scale bar = 1 cm.

Habitat. The butterflies were collected in the forest zone (*Larix sibirica*, Pinaceae), generally near water bodies.

Diagnosis. It can be differentiated from all other subspecies by the better defined turquoise spots on the hindwing underside and the brightly coloured wing upperside in the female (the presence of the wide blue area on the upperside of both wings).

Etymology. Named after the type locality – Shadzgat-Nuruu Mountains.

***Plebejus idas munkhbajar* Churkin & Zhdanko, 2003 (Figs 19m–p)**

Common on slopes of the southern and southwestern exposure of the Mongolian Altai. Common. vi–vii.

***Plebejus idas belchir* Churkin & Yakovlev, 2005**

Backbone area of the Mongolian Altai and the northern exposure (southward from Mankhan somon, Hovd aimak) (LT: Hovd aimak, 10 km N Khara-Belchir-Daba pass) (Figs 19i–l). It is characterized by the reduction of the pattern on the underside of the wing.

* ***Plebejus sharga* Churkin, 2004**

Recorded only in the valley of Sharga somon, not in the Mongolian Altai.

***Plebejus chrystophi* (Staudinger, 1874) group**

A thorough review of the species group resulted in a division into two subgroups according to host plants (Zhdanko & Churkin 2001): subgroup *chrystophi* (host plant *Alhagi* (Fabaceae)) and subgroup *samudra* (host plant *Hippophaea*, Elaeagnaceae). Taking into account opinion (Zhdanko & Churkin 2001) that allopatric populations represent infant species, these taxa are described below as separate species: *P. anikini* **sp. n.** (*P. chrystophi* subgroup) and *P. germani* **sp. n.** (*P. samudra* subgroup).

***Plebejus anikini* sp. n. (Figs 20a–d, 21a)**

Material. Holotype: ♂, SW Mongolia, Gobi-Altai aimak, Dzhungarian Gobi, Alag-Nuur lake, near Ajlyn-Tsagan-Khuduk, 9–10.vii.2010, 1300 m, 45°09'N, 94°30'E; R. Yakovlev, E. Guskova & V. Doroshkin (ZISP). Paratypes: 30 ♂♂, 22 ♀♀, same data (ZISP, SZMN, RYB, VDC).

Description. Forewing length 13–14 mm. *Male:* Wing upperside light blue, lusterless, forewing with a black slender obscure border, hindwing with a wider border and a row of small obscure black dots submarginally; fringe white. Wing underside pale grey, with a dense suffusion of silver scales, an S-shaped row of tiny black dots postdiscally and very small obscure grey dots underlined with an obscure pale area submarginally; border very slender, black. *Female:* Slightly larger. Forewing dark brown, with bluish-grey streaks between veins in discal area and a well-defined suffusion of bluish scales basally; small obscure bluish streaks present between veins submarginally; broad black border, broken at veins. Hindwing upperside with a well-defined suffusion of blue scales basally, a row of black dots on outer margin, surrounded with red obscure rings; border black, rather broad; fringe white. Male genitalia: Uncus medium-sized, fastigated apically; gnathal

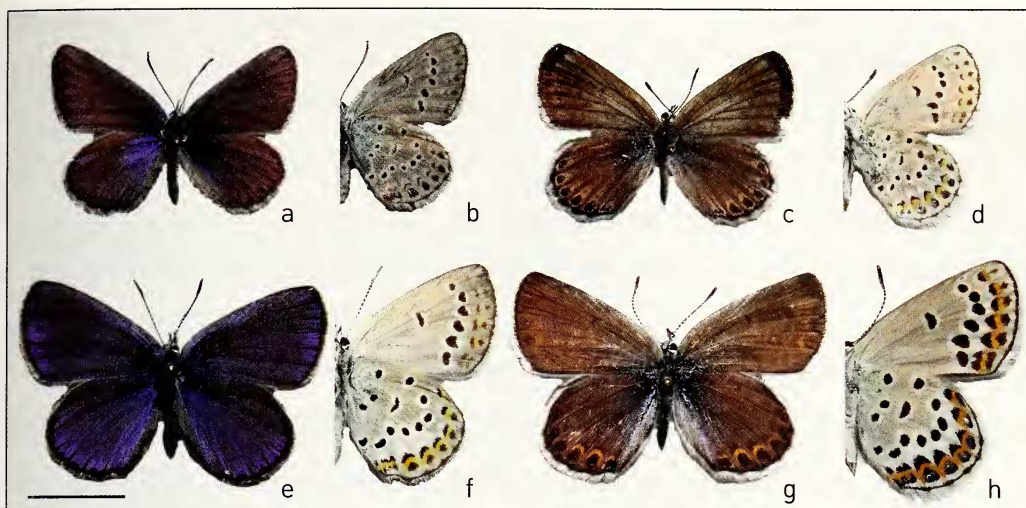


Fig. 20. *Plebejus chrystophi* (Staudinger, 1874) group in the Mongolian Altai: **a:** *anikini* sp. n., ♂, holotype (upperside) (ZISP), **b:** *anikini* sp. n., ♂, holotype (underside), **c:** *anikini* sp. n., ♀, paratype (upperside) (ZISP), **d:** *anikini* sp. n., ♀, paratype (underside), **e:** *germani* sp. n., ♂, holotype (upperside) (ZISP), **f:** *germani* sp. n., ♂, holotype (underside), **g:** *germani* sp. n., ♀, paratype (upperside) (ZISP), **h:** *germani* sp. n., ♀, paratype (underside).

arms of medium length; valva gradually rounded on costal margin and almost smooth ventrally (with a small hollow in the middle third) and distally divided into two parts with a shallow hollow; costal process semicircle apically, more strongly protruding forwards than the ventral process, which is shorter and smaller; juxta U-shaped; aedeagus shorter than valva, of medium thickness, gradually narrowing apically, slightly curved.

Habitat. Found locally in the desert near a well (fountain, Khuduk). Presumed host plant is *Alhagi* (Fabaceae).

Diagnosis. The species is similar to *P. chrystophi* (Staudinger, 1874) differing by the dark coloring of females, and short and thick phallus in the male.

Etymology. The new species is named after the professor of Entomology and lepidopterist Vasilij Anikin of Saratov.

Plebejus germani sp. n.

(Figs 20e–h, 21b)

Material. Holotype ♂, SW Mongolia, Khovd aimak, 30 km NNW of Bulgan, 1500 m, 11–13.vii.2003, R. Yakovlev & D. German (ZISP). – Paratypes: 4 ♂♂, same data (RYB); 6 ♂♂, 4 ♀♀, SW Mongolia, Khovd aimak, 15 km S of Bulgan, 1100 m, 10.vii.2007, R. Yakovlev & E. Gus'kova; 6 ♂♂, 5 ♀♀, SW Mongolia, Khovd aimak, 50 km N Uench, 1500 m, 6.vii.2007, R. Yakovlev & E. Gus'kova (ZISP, RYB).

Description. Forewing length 15–17 mm. *Male:* Wing upperside blue, with a slender black border on outer margin; underside cream, with a sparse suffusion of bluish scales basally. Forewing with an elongate spot of medium size, narrow-bordered with white, near apex of discal cell and with an S-shaped row of rather large black round dots, edged with narrow white rings; red submarginal spots poorly defined, obscure, underlined with black streaks proximally and distally; border very slender, black. Hindwing with a row of large black dots basally, a black C-shaped white-bordered streak

in discal cell (near to apex), a strongly curved row of black dots postdiscally; and red submarginal lunules, well defined and underlined with crescent-shaped black dashes proximally; area between postdiscal dots and submarginal lunules pale; border black, slender. *Female*: Wing upperside brown, with an admixture of blue scales from base to discal area in anal margin of hindwing; underside pattern similar to that of male, but red lunules better defined.

Dianosis. This species resembles *P. churkini* Zhdanko, 2001 but can be easily separated by the suberect costal process on the apex of the valva and a less smooth ventral margin of the valve in male genitalia.

Habitat. River valleys. 15 km S of Bulgan specimens were collected at *Hippophaea* bushes (Elaeagnaceae).

Etymology. The new species bears the name of the well-known botanist, Brassicaceae specialist, Dr. Dmitriy German of Barnaul.

***Plebejus lucifera* (Staudinger, 1867)**

Common species in different locations. vi–vii.

***Plebejus pylaon* (Fischer von Waldheim, 1832)**

Elt-Gol Valley, vii, very rare. In the Mongolian Altai ssp. *katunensis* Bálint & Lukhtanov, 1990.

***Eumedonia eumedon* (Esper, 1780)**

Different locations. Common. vi–vii.

***Aricia artaxerxes* (Fabricius, 1793)**

Arshantyn-Nuruu Mountains, Elt-Gol Valley. Common. vi–vii.

***Aricia agestis* (Denis & Schiffermüller, 1775)**

Bayan-Ulegei aimak, Monk-Khairkhan Uul Mountains (Balint et al. 2006). Very rare.

***Aricia chinensis* (Murray, 1874)**

Hovd aimak, slopes facing the Great Lakes Valley. Rare. vi.

***Aricia nicias* (Meigen, 1830)**

Aricia nicias borsippa (Fruhstorfer, 1915)

Arshantyn-Nuruu Mountains, upper stream of the Bulgan-Gol River, slopes facing the Great Lakes Valley. Very rare and local. vii.

***Agriades glandon* (de Prunner, 1798)**

Geographic variability is described in detail by Churkin (2005). Two subspecies are present, *ustjuzhanini* Yakovlev & Churkin, 2003 (Khan-Taicharyn-Ula Mountains) and *batchimeg* Churkin, 2005 (along the main ridge). Local. vi–vii.

***Albulina orbitulus* (de Prunner, 1798)**

Two subspecies are present: *jugnei* Churkin, 2004 (Khan-Taicharyn-Ula Mountains) and *sajana* (Heyne, 1895) (along the main ridge). Local. vi–vii.

***Cyaniris semiargus* (Rottemburg, 1775)**

Cyaniris semiargus altaiana Tutt, 1909

Bulgan-gol basin, Elt-Gol Valley, Local. vi–vii.

***Rimisia miris* (Staudinger, 1881)**

Khovd aimak, 15 km E of Bulgan somon. Very rare and local. vii.

***Plebejidea cyane* (Eversmann, 1837)**

Plebejidea cyane kozhantshikovi Sheljuzhko, 1928

Different parts. Local all over. vi–vii.

***Polyommatus amandus* (Schneider, 1792)**

Dzungarian Gobi, Bulgan-Gol basin. Very rare. vii.

***Polyommatus erotides* (Staudinger, 1892)**

Polyommatus erotides kaabaki Korb, 2000

Bayan-Ulegei and northern part of Hovd aimaks. Local. vii.

***Polyommatus aloisi* Bálint, 1988**

Polyommatus aloisi dividus Churkin, 2003

Species related to the previous one, spread in the south. Common. vi–vii.

***Polyommatus icarus* (Rottemburg, 1775)**

Widespread. The geographical variability in Mongolia is poorly studied. Two subspecies: nominate (north) and *szabokyi* Balint, 1990 (Dzungarian part). Populations from the southern part of Mongolia are bivoltine.

***Agrodiaetus damon* (Denis & Schiffermüller, 1775)**

Agrodiaetus damon mongolensis (Koçak, 1980)

Recorded only in the Chinese part (Kurty river valley). Very rare. vii.

***Agrodiaetus mediator* Dantchenko & Churkin, 2003**

Endemic in southern parts. vii, very local. Two subspecies are present: *mediator* (Taycharyn-Ula, Hara-Adzragyn-Nuru, Khasagt-Khairkhan Mountains) and *habievi* Yakov-

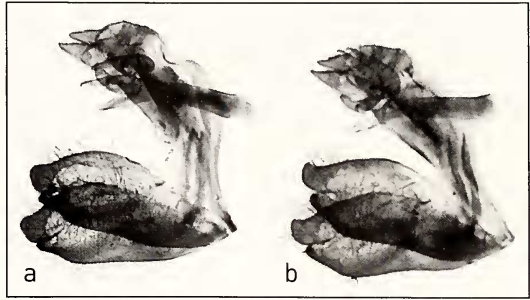


Fig. 21. Genitalia of males (lateral projection): **a:** *Plebejus anikini* sp. n., **b:** *Plebejus germani* sp. n.

lev, 2004 (southern slopes). The placement of *habievi* has been controversial. Yakovlev (2004) described the subspecies *A. mediator habievi*. Later on, this taxon was considered as a subspecies of a different species, *A. damone habievi* (Tshikolovets et al. 2009). However, the original decision to describe *habievi* as a subspecies of *A. mediator* resulted from a study of the mitochondrial DNA sequence (Vodolazhsky et al. 2011) and the view that this is a valid taxon is here maintained.

***Agrodiaetus damone* (Eversmann, 1841)**

Two subspecies are present: *altaica* Elwes, 1899 and *bogdoolensis* Dantchenko & Lukhtanov, 1997. Very local. vii.

***Agrodiaetus ripartii* (Freyer, 1830)**

Arshantyn-Nuruu Mountains. Very rare and local. vii.

Family Nymphalidae Swainson, 1827

***Melanargia russiae* (Esper, 1783)**

Sporadic specimens in the Chinese part (Kurty and Kairty rivers) and the Arshantyn-Nuruu Mountains. Very rare and local. vii.

***Boeberia parmenio* (Boeber, 1809)**

Different part of Mongolian Altai. Rare. vi–vii.

***Lasiommata maera* (Linnaeus, 1758)**

Chikertey and Arshantyn-Nuruu Mountains. Very local and rare. vii.

***Coenonympha tullia* (Müller, 1764)**

The species is local in the alpine belt up to highlands of the Gobi-Altai aimak in the south-east. Populations belong to ssp. *elwesi* Davenport, 1941, described from the Russian Altai. Populations to the south from the Munkh-Khairkhan Mountains require further study.

***Coenonympha glycerion* (Borkhausen, 1788)**

Coenonympha glycerion iphicles Staudinger, 1892

Recorded in the northern part. Local. vi–vii.

***Coenonympha amaryllis* (Stoll in Cramer, 1782)**

Very common in different parts. vi–vii.

***Coenonympha pamphilus* (Linnaeus, 1758)**

Chinese part of the Mongolian Altai (Sara-Syumbe) and Arshantyn-Nuruu Mountains. Rare. vi.

***Lyela myops* (Staudinger, 1881)**

Single specimen collected in the western part of Dzungarian Gobi, Uvkhod-Ula Mt. Very rare. v.

***Triphysa dohrnii* Zeller, 1850**

Local and rare (Tsagan-Kol lake, Kobdo-Gol river Valley, Arshantyn-Nuruu, Shadzat-Nuruu Mountains), vi–vii.

***Proterebia afra* (Fabricius, 1787)**

Arshantyn-Nuruu Mountains. Rare and local. V. New to the Mongolian fauna.

***Erebia jeniseiensis* Trybom, 1877**

Erebia jeniseiensis ryzhkovi Yakovlev, 2006

Elt-Gol Valley. Very local. vii.

***Erebia kefersteini* (Eversmann, 1851)**

Tabyn-Bogdo Mountains in the north. Very rare and local. vii.

***Erebia kindermanni* Staudinger, 1881**

Elt-Gol Valley and Tsagan-Gol lake. Very local. vii.

***Erebia tsengelensis* Suwa, Hirano & Hirano, 2002**

Chinese part of Mongolian Altai, Kobdo-Gol Valley, Arshantyn-Nuruu Mountains, upper stream of Bulgan-Gol, Alag-Khairhan Mountain. Local. vii. Endemic species. Two subspecies: nominate (northern part of the Mongolian Altai) and *alag* Churkin, 2005 (Alag-Khairhan Mountains). Local. vii.

***Erebia theano* (Tauscher, 1806)**

Erebia theano dyachenkoi Yakovlev, 2006

Chinese part of Mongolian Altai, Elt-Gol Valley, Khoton-Nuur lake. Local. vii.

*** *Erebia rossi* (Curtis in Ross, 1834)**

Only in border regions of Russian part of Altai (Ukok plateau, Sailjugem Mountains, Talduair Mountains etc.), not found in the Mongolian Altai

***Erebia callias* Edwards, 1871 group**

The Asian taxa of this species group have been recently revised (Bogdanov 2008). The material collected in Southern Siberia, Eastern Kazakhstan and Mongolia confirms the presence of three valid species.

* *Erebia callias* Edwards, 1871

Recorded in border regions of Russian part of Altai (Ukok plateau, Tashanta etc.), not found in the Mongolian Altai. In Russian Altai, ssp. *altajana* Staudinger, 1901 (Figs 22a–b, 23a, 25). In 2003 *Erebia callias chastilovi* Churkin, 2003 from the Khan-Taycharyn-Ula Mountains and the Tsakhir-Khalygyn-Nuruu Mountains was described as a subspecies that is very different externally from the typical Altaian, Sayan, and Pribaikal species populations. Considerable distinguishing characters have been revealed in the genitalia morphology, which helps establish its specific rank and establish a new status *Erebia chastilovi* Churkin, 2003, **stat. n.**

Erebia przhhevskii sp. n. (Figs 22e–h, 23b, 24 a–d, 25)

Material. Holotype ♂, W. Mongolia, Hovd aimak, Bulgan-Gol basin, Uljastyin-Gol Valley, Shadzgat-Nuruu Mountains, 2800–3000 m, 25–26.vi.2004, R. Yakovlev & D. Ryzhkov leg. (ZISP). – Paratypes: 40 ♂♂, 5 ♀♀, same data; 5 ♂♂, 3 ♀♀, W. Mongolia, Bayan-Ulegei aimak, Kobdo-gol Valley, 20 km SW Tsengel, 2400 m, 48°49'N; 88°59'E, 25–27.vii.2010, E.V. Guskova & R.V. Yakovlev leg (SZMN, RYB).

Description. Forewing length 16.5–17.5 mm. *Male:* Wings wide, rounded apically, with a semicircle on outer margin; upperside dark brown. Forewing with an ochreous area postdiscally, a double black ocellus near apex, centered with a pair of white pupils; underside with a broad ochreous zone medially, greyish areas marginally, a double black ocellus apically, centered with a pair of white pupils. Hindwing in half of specimens with small ochreous dashes submarginally and 1–3 small black ocelli; underside pale grey, with a broad band rough at margins in discal area, narrowing towards tornus. A number of specimens bearing 1–3 black ocelli submarginally. *Female:* Externally similar to male, with a better defined ochreous pattern on forewing upperside; hindwing underside marmorate, patterned with very small brownish streaks.

Male genitalia. Uncus long, hook-shaped; gnathal arms acute apically, shorter than uncus. Tegumen medium-sized. Valva long, strongly narrowing apically, with a long acute process on costal margin (in its middle third), upward and forward directed, with 1–2 smaller acute denticles, directed backward and forward, on the narrow end of valva distally. Saccus small. Phallus short, thick, straight.

Female genitalia. Ovipositor lobes semicircle apically. Apophyses posteriores short, poorly sclerotized. Antevaginal plate U-shaped, very small, broad basally, with very small lateral processes. Ductus bursae short; corpus bursae more or less round, with a pair of ribbon-like signa.

Habitat. The butterflies are found in humid tundra associations with *Cobresia* (Cyperaceae) prevailing.

Diagnosis. The new species is very different from the known taxa of the group in the shape of the valva – the abrupt narrowing towards the apex and specific upward and forward directed denticles on the costal margin, where the larger denticle is the most proximal. The female genitalia differ in having a tiny antevaginal plate.

Etymology. The species is named after a well-known Russian geographer N. Przhhevsky (1839–1888).



Fig. 22. Genitalia of males (lateral projection) of *Erebia callias* group: **a:** *Erebia callias altajana*, Russia, Altai, Aktash, **b:** *Erebia callias altajana*, Russia, Altai, Ukok plateau, Maipak, **c:** *Erebia callias sibirica*, E. Kazakhstan, Saur Mountains, Tas Mt., **d:** *Erebia callias simulata*, Russia, Irkutsk region, Khamar-Daban Mountains, **e–h:** *Erebia przhevalskii* sp. n., holotype (e) and paratypes (f–h), **i–k:** *Erebia chastilovi* Churkin, 2003, Gobi-Altai aimak, Khasagt-Khairkhan Mountains, 2700 m, **l–n:** *Erebia chastilovi nomada* ssp. n., holotype (l), paratypes (m–n).

Erebia chastilovi Churkin, 2003, stat. n.

(Figs 22i–k, 23c, 24e–h, 25)

Known from highlands in the south of the Mongolian Altai, local, vii. The nominate subspecies is recorded from the following habitats of the Gobi-Altai aimak: the Khan-Taycharyn-Ula, the Tsakhir-Khalygn-Nuruu, the Khara-Adzragyn-Nuru, and the

Khasgt-Khirkhan Mountains *E. chastilovi* is a bona fide species and its status as a species is based on the following characters: clear external distinctions (detailed in the original description) and some distinctions in genitalia morphology (valve is strongly curved, with a specific process distally forming an almost flat area with small denticles on it, and a larger denticle at the base of the process; the antevaginal plate is U-shaped, with rather massive lateral processes, as opposed to the much smaller structures in *altajana* Staudinger, 1901). The new subspecies from the northern part of the distribution area (Khovd aimak, Ikh-Nuruu Mountains) is described and differentiated based on wing pattern elements, smaller size, and slight differences in female genitalia morphology.

***Erebia chastilovi nomada* ssp. n.**

(Figs 22i–n, 23d, 24i–o, 25)

Material. Holotype ♂, W Mongolia, Khovd aimak, Ikh-Nuruu Mountains (between Bodonchin-Gol and Uenchin-Gol valleys), Ikh-Daba pass, 2900m, 5.vii.2007, leg. R. Yakovlev (ZISP). – Paratypes: 11 ♂♂, 4 ♀♀, same data (ZISP, RYB).

Diagnosis. The new subspecies differs from the nominate in its smaller size (the length of the forewing is 15–16.5 mm, and 16–18.5 mm in the nominate subspecies). The wing upperside in males has a better defined ochreous pattern, forming a wide area in the forewing and consisting of small submarginal dashes in the hindwing. The hindwing underside is more brightly coloured, with a very well-defined marmorate pattern. The male genitalia have no obvious distinctions. The female genitalia bear signa, strongly converging distally on the corpus bursae.

Habitat. Very dry alpine tundra-steppe.

Etymology. The subspecies name comes from the word “nomad”.

***Erebia pandrose* (Borkhausen, 1788)**

Tsagan-Kol Lake, rare and local.

***Hyponephele lycaon* (Rottemburg, 1775)**

(Figs 26–27)

This species is very variable in Central Asia. Ssp. *catalampra* (Staudinger, 1895), described from the Central Khangai Mountains, has been traditionally considered present in Mongolia and is listed in the recent book with all western and central Mongolian populations (Tschikolovets et al. 2009). However, populations from different areas of the Mongolian Altai are very variable externally and represent very well-delineated taxa, whose rank needs refinement. In order to refine the real rank considerable additional material and molecular-genetic studies are required. Here taxa from the Mongolian Altai are considered as subspecies. Probably such a profusion of phenotypes is caused by the complete isolation of river valleys in the south of the Mongolian Altai, thus making the genetic exchange between populations of *Hyponephele lycaon* impossible. The extreme west of the southern macroslope of the Mongolian Altai is inhabited with ssp. *smirnovi* Yakovlev, 2004 **stat. n.** (LT: Arshantyn-Nuruu Mountains) (Figs 26a, b). Similar toptotypical butterflies were collected in the valley of Ulyastain-Gol River. Eastwards in the Mogoin-Gol river valley and the Hara-Adzragyn-Nuru Mountains a small series of specimens was collected, different from all the known forms of *Hyponephele lycaon*, and it is described here as a new subspecies.



Fig. 23. Genitalia of females of *Erebia callias* group: **a:** *Erebia callias altajana*, Russia, Altai, Aktash, **b:** *Erebia przhewalskii* sp. n., **c:** *Erebia chastilovi* Churkin, 2003, Gobi-Altai aimak, Khasagt-Khairkhan Mountains, 2700 m, **d:** *Erebia chastilovi nomada* ssp. n.

***Hyponephele lycaon dmitrievae* ssp. n.**

(Figs 26c, d, 27)

Material. Holotype ♂, SW Mongolia, Gobi-Altai aimak, Mongolian Altai Mountains (S. slope), Mogoin-Gol Valley, 6–8.vii.2010, 1800 m, 45°39'N; 93°47'E; R. Yakovlev & E. Guskova (ZISP). – Paratypes: 10 ♂♂, 1 ♀, same data; 21 ♂♂, 13 ♀♀, Mongolia, Gobi-Altai aimak, Mongolian Altai (south.sl.), Mogoin-gol R. 2000–2400 m, 8.vii.2004, Churkin S. leg. (RYB, SZMN, coll. S. Churkin).

Description. Forewing length 19–20 mm. Forewing dark greyish brown, with a well-defined ochreous area postdiscally, and a pair of rather large black ocelli; hindwing patternless; fringe grey. Forewing underside bearing a well-defined ochreous area medially and greyish margins, a very small marmorate pattern and a pair of ocelli postdiscally; hindwing underside with a well-defined marmorate pattern, two or three clear, very small ocelli submarginally, a poorly defined broad band in discal area.

Habitat. Dry steppe slopes.

Diagnosis. Small size, marbled pattern and small dots on the underside of the forewing.

Etymology. The new subspecies bears the name of the professor of Phylology Lidiya M. Dmitrieva (Barnaul), an organizer of the Friendship Community 'Mongolia-Russia'.

***Hyponephele lycaon kerzhneri* ssp. n.**

(Figs 26e, f, 27)

Material. Holotype ♂, SW Mongolia, Gobi-Altai aimak, Mongolian Altai Mountains, Hara-Adzragyn-Nuru Mountains, Najtvaryn-Sajr River Valley (under stream) 15–16.vii.2010, 1700–2000 m, 45°52'N; 95°30'E; R. Yakovlev & E. Guskova (ZISP). – Paratypes: 18 ♂♂, same data (RYB, SZMN).

Description. Forewing length 19–21 mm. Forewing brown, with a well-defined pale ochreous area postdiscally, with a pair of black ocelli; hindwing patternless; fringe grey. Forewing underside with an ochreous area medially, pale grey margins, very small marmorate pattern and one or two ocelli postdiscally. Hindwing underside pale grey, with a suffusion of brownish scales, without marmorate pattern; submarginal ocelli very often absent, sometimes one or two ocelli present. Discal broad band poorly defined.

Habitat. Dry steppe slopes.

Diagnosis. The new subspecies is easily distinguished by paler coloration of both wings and larger spots near the apex of the forewing.

Etymology. The new subspecies is named after the professor of Entomology Izyaslav Kerzhner, an active participant in the study of the Mongolian Entomofauna.

***Hyponephele lupina* (Costa, 1836)**

Bulgan-Gol river basin (Arshantyn-Nuruu Mountains), western part of the Dzungarian Gobi desert. Very rare and local. vi–vii.

***Hyponephele narica* (Hübner, 1813)**

Hyponephele narica ambaltaica Kosterin, 2002

Near Hovd, Dzungarian Gobi. Local. vi–vii.

***Hyponephele naricina* (Staudinger, 1870)**

Dzungarian Gobi desert. Rare. vi–vii.

***Hyponephele cadusina* (Staudinger, 1881)**

Different parts. Common. vi–vii.

***Hyponephele interposita* (Erschoff, 1874)**

Recorded only in the Chinese part of Mongolian Altai – Dzhangyz-Agach (Meinhard 1910a).

***Oeneis jutta* (Hübner, 1806)**

Oeneis jutta akoene Belik & Yakovlev, 1998

Ulegem and Ulyasutai gol Valleys (Meinhard 1910a; Tshikolovets et al. 2009). Local and rare. vi–vii.

***Oeneis magna* Graeser, 1888**

Oeneis magna eltgoli Yakovlev, 2006

Elt-Gol, Ulyastain-Gol and Kobdo-Gol Valleys. Very local and rare. vi–vii.

***Oeneis norna* (Thunberg, 1791)**

Oeneis norna altaica Elwes, 1899

Elt-Gol and Chumek Valleys, Shadzgat-Nuruu Mountains. Very local and rare. vii.

***Oeneis elwesi* Staudinger, 1901**

Oeneis elwesi devius Churkin & Yakovlev, 2005

Tsagan-Nuur Lake, Suok and Tsagduultai rivers Valley, Alag-Khairkhan Mt. Very local and rare. vi–vii.

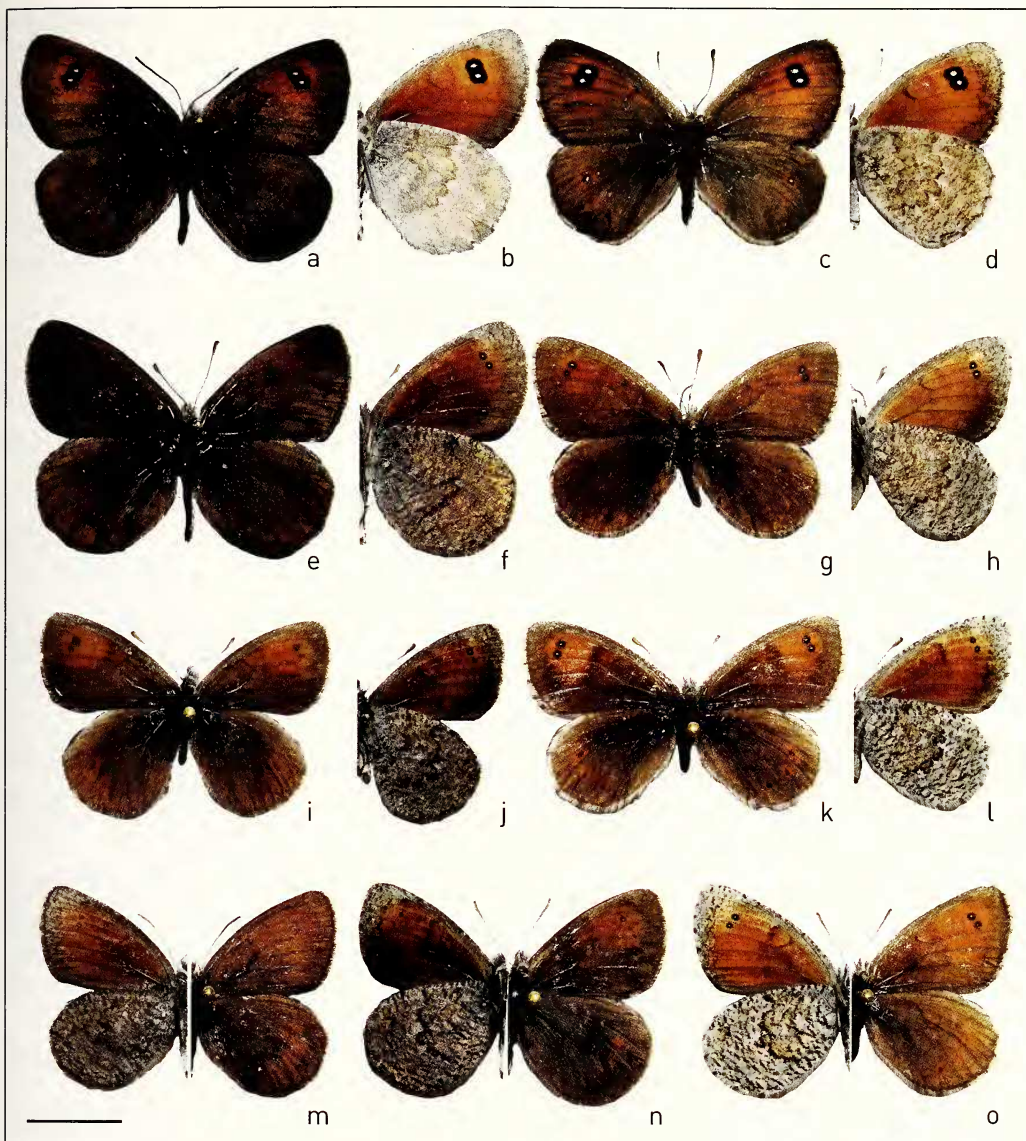


Fig. 24. *Erebia callias* group: **a:** *Erebia przhivalskii* sp. n., holotype, ♂ (upperside) (ZISP), **b:** *Erebia przhivalskii* sp. n., holotype, ♂ (underside) (RYB), **c:** *Erebia przhivalskii* sp. n., paratype, ♀ (upperside) (RYB), **d:** *Erebia przhivalskii* sp. n., paratype, ♀ (underside), **e:** *Erebia chastilovi* Churkin, 2003, ♂, (upperside) Gobi-Altai aimak, Khasagt-Khairkhan Mountains, 2700 m (RYB), **f:** *Erebia chastilovi* Churkin, 2003, ♂, (underside), **g:** *Erebia chastilovi* Churkin, 2003, ♀, (upperside), same locality (RYB), **h:** *Erebia chastilovi* Churkin, 2003, ♀, (underside), **i:** *Erebia chastilovi nomada* ssp. n., holotype, ♂ (upperside) (ZISP), **j:** *Erebia chastilovi nomada* ssp. n., holotype, ♂ (underside), **k:** *Erebia chastilovi nomada* ssp. n., paratype, ♀ (upperside) (RYB), **l:** *Erebia chastilovi nomada* ssp. n., paratype, ♀ (underside), **m:** *Erebia chastilovi nomada* ssp. n., paratype, ♂ (upper- and underside) (RYB), **n:** *Erebia chastilovi nomada* ssp. n., paratype, ♂ (upper- and underside) (RYB), **o:** *Erebia chastilovi nomada* ssp. n., paratype, ♀ (upper- and underside) (RYB). Scale bar = 1 cm.

Oeneis ammon (Elwes, 1899)

Khoton-Nuur Lake, Elt-Gol Valley. Very local and rare. vii.

***Oeneis aktashi* Lukhtanov, 1984**

Khoton-Nuur Lake. Very rare and local. vii.

***Oeneis temujin* Churkin, 2003**

Endemic species. Very rare and local. vi–vii.

***Oeneis tarpeia* (Pallas, 1771)**

Tsengel-Khairkhan and Elt-Gol Valley only. Very rare and local. vii.

***Oeneis nanna* (Ménétriés, 1859)**

Near Hovd and Khara-Adzragyn-Nuru Mountains. Very local and rare. vi–vii.

***Oeneis sculda* (Eversmann, 1851)**

Elt-Gol Valley, Alag-Khairkhan Mt. and Khoton-Nur Lake. Very local. vi–vii.

***Hipparchia autonoe* (Esper, 1783)**

Chinese part (Kairty Valley), Arshantyn-Nuruu and Sajlyugem Mountains. Local and rare species. vii.

***Arethusana arethusa* (Denis & Schiffermüller, 1775)**

Arshantyn-Nuruu Mountains. Very local. vii.

***Minois dryas* (Scopoli, 1763)**

Chinese part (Sara-Syumbe). Local. vii.

***Pseudochazara hippolyte* (Esper, 1784)**

Central and southern parts of the Mongolian Altai. Very common. vii.

***Pseudochazara pallida* (Staudinger, 1901)**

Only northern part of the Mongolian Altai (upper stream of Bulgan-Gol, Munkh-Khairkhan Mt., near Ulegei). Common. vii.

***Chazara briseis* (Linnaeus, 1764)**

Chinese part (Tsingil and Kairty rivers, Sara-Syumbe). Local. vii.

***Chazara enervata* (Staudinger, 1881)**

Arshantyn-Nuruu Mountains. Very local. vii.

***Chazara heydenreichi* (Lederer, 1853)**

Arshantyn-Nuruu Mountains, Mogoin-Gol Valley Very local. vii.

Chazara kaufmanni* (Erschoff, 1874)Chazara kaufmanni doroshkini* Yakovlev, 2004

Only in Dzungarian-Gobi and Bulgan-Gol Valley. Local. vii.

***Neptis rivularis* (Scopoli, 1763)**

Elt-Gol Valley, Arshantyn-Nuruu Mountains, Tsagan-Kol Lake; Chinese part: Ulasty and Krana Valleys. Local. vi–vii.

***Polygonia c-album* (Linnaeus, 1758)**

Bulgan-Gol Valley. Very local. vii.

Polygonia interposita* (Staudinger, 1881)Polygonia interposita adya* Churkin, 2003

Elt-Gol Valley, Arshantyn-Nuruu Mountains, Mogoin-Gol Valley, Bulgan-Gol Valley. Local and rare. vi.

***Aglais urticae* (Linnaeus, 1758)**

Different parts. Common. v–vii.

***Vanessa cardui* (Linnaeus, 1758)**

Different parts. Common. v–ix.

Euphydryas iduna* (Dalman, 1816)**The subspecies *sajana* Higgins, 1950 in Khara-Belchir-Daba pass, Ulyastain-Gol Valley. In the south (Arshantyn-Nuruu Mountains, Khan-Tajcharyn-Ula Mountains, Tzak-hir-Khalgyn-Nuruu Mountains) – ssp. *eremita* Churkin, 2003. vi–vii.Euphydryas ichnea* (Boisduval, 1833)**

Northern part (Tsengel-Khairkhan Mt., Elt-Gol Valley). Local. vi–vii.

Euphydryas aurinia* (Rottemburg, 1775)**Two subspecies: ssp. *altivolans* Tuzov, 2000 (LT: [Russia], Altai, Severochujskij Mountains, Sunkor Mt.) in highlands of the northern part of the Mongolian Altai (Elt-Gol valley, Tsengel-Khairkhan Mt., 20 km S of Buyant-somon) (Fig. 33b) and *asiatica* Staudinger, 1881 (LT: Ala-Tau [E. Kazakhstan, Dzhungarian Ala-Tau Mountains]) in southern slopes of the Mongolian Altai (Arshantyn-Nuruu Mountains, Mogoin-Gol Valley) (Fig. 33a).Melitaea athalia* (Rottemburg, 1775)**

Tsagan-Kol Lake, Elt-Gol valley. Very local and rare. vii.

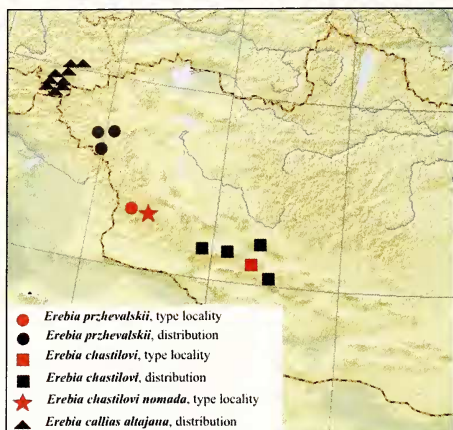


Fig. 25. Distribution of *Erebia callias* species complex in the Russian and Mongolian Altai.

***Melitaea elenae* Yakovlev, 2007**

Arshantyn-Nuruu Mountains. Endemic and very rare. vi.

***Melitaea britomartis* (Assmann, 1848)**

Tsengel-Khairkhan Mountains, Elt-Gol Valley. Rare. vi–vii.

***Melitaea menetriesi* Caradja, 1895**

Melitaea menetriesi centralasiae Wnukowsky, 1929

Tsagan-Kol Lake. Very rare. vi–vii.

***Melitaea rebeli* Wnukowsky, 1929**

Tsagan-Kol Lake, Very rare. vii.

***Melitaea rhea* Churkin & Devyatkin, 2005**

Arshantyn-Nuruu Mountains, Shadzgat-Nuruu Mountains, Alag-Khairkhan Mountains. Endemic and very rare. vi.

***Melitaea diamina* (Lang, 1789)**

Melitaea diamina erycina Lederer, 1853

Arshantyn-Nuruu Mountains, Elt-Gol Valley. Rare. vi–vii.

***Melitaea didyma* (Esper, 1778)**

Melitaea didyma turkestanica Sheljuzhko, 1929

Rare in the south Dzungarian slope, Dzungarian Gobi. V–vi.

***Melitaea didymina* Staudinger, 1895**

Adzh-Bogdo Mountains, Sutai-Uul Mountains, Tajcharyn-Ula Mountains, near Hovd. Local. vi–vii.

***Melitaea yakovlevi* Kolesnichenko, 2005**

Arshantyn-Nuruu Mountains, Shadzgat-Nuruu Mountains. Very rare endemic species. vi.

***Melitaea latonigena* Eversmann, 1847**

Melitaea latonigena altaica Grum-Grshimailo, 1893

Elt-Gol Valley. Rare and local. vii.

***Melitaea didymoides* Eversmann, 1847**

Khara-us-Nuur Lake (Alberti 1971). Very rare. vi.

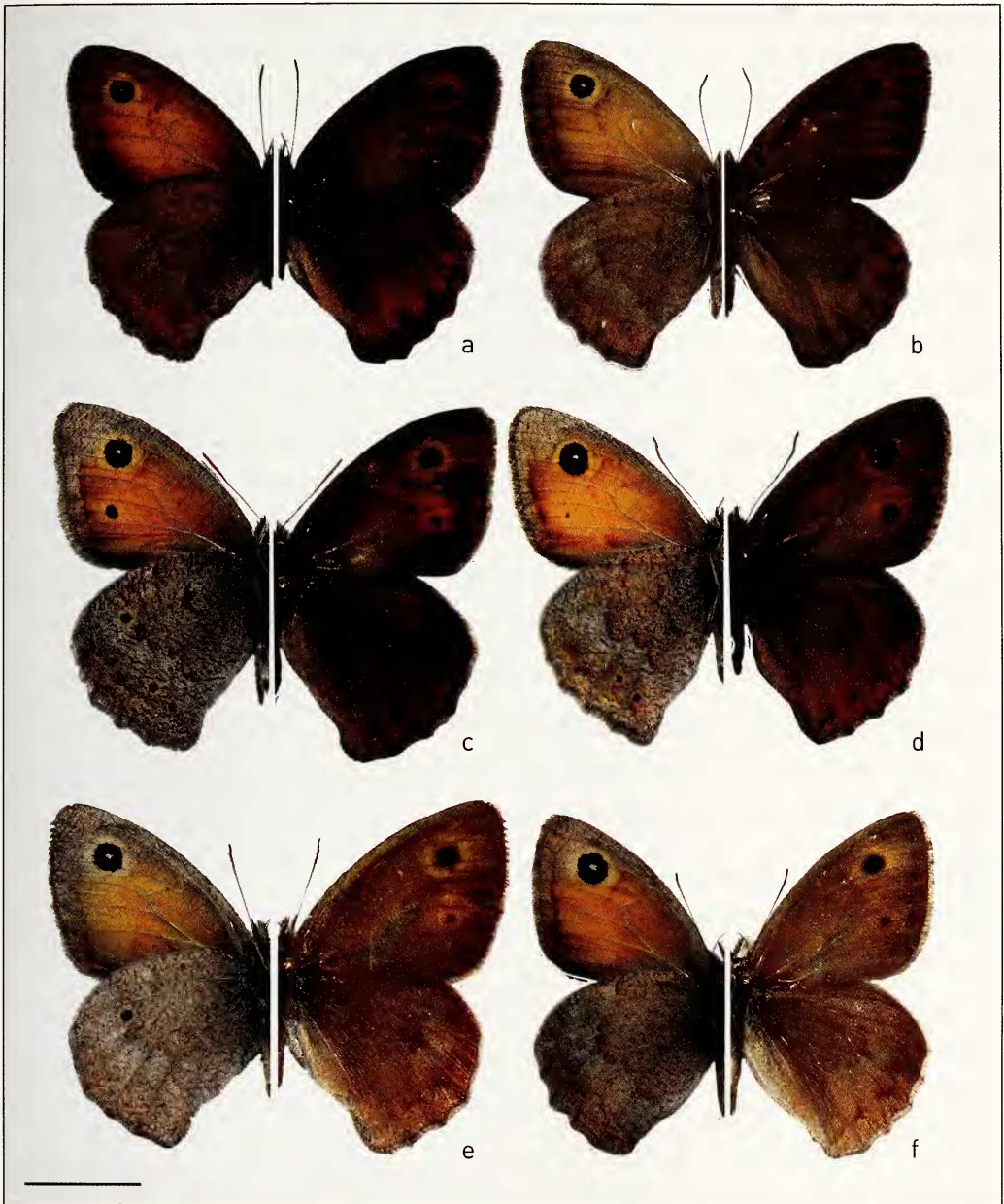


Fig. 26. *Hyponephele lycaon* in the Mongolian Altai (males): **a:** ssp. *smirnovi* Yakovlev, 2004, paratype (upper- and underside) (RYB), **b:** ssp. *smirnovi* Yakovlev, 2004, paratype (upper- and underside) (RYB), **c:** ssp. *dmitrievae* ssp. n., holotype (upper- and underside) (ZISP), **d:** ssp. *dmitrievae* ssp. n., paratype (upper- and underside) (RYB), **e:** ssp. *kerzhneri* ssp. n., holotype (upper- and underside) (ZISP), **f:** ssp. *kerzhneri* ssp. n., paratype (upper- and underside) (RYB).

***Melitaea athene* Staudinger, 1881.**

Melitaea athene danae Churkin & Kolesnichenko, 2005

Arshantyn-Nuruu, Mogoin-Gol Valley. Very rare. vi–vii.

Melitaea trivia* (Denis et Schiffermüller, 1775)Melitaea trivia singularia* Korshunov, 1995

Arshantyn-Nuruu Mountains. Very rare. vi.

Melitaea cinxia* (Linnaeus, 1758)**Two subspecies: *tschujaca* Seitz, 1908 (northern and central part) and *mogoin* Churkin & Kolesnichenko, 2005 (southern slope). Local. vi.Melitaea arcesia* Bremer, 1861**Two subspecies: *minor* Elwes, 1899 (northern part) and *dea* Churkin & Kolesnichenko, 2003 (southern slope and central part). Local. vi–vii.***Melitaea phoebe* (Denis & Schiffermüller, 1775)***Melitaea phoebe streltzevi* Kolesnichenko & Yakovlev, 2004

Western part of the Dzungarian Gobi, Bulgan-Gol Valley. Local. vi–vii.

Clossiana eunomia* (Esper, 1799)Clossiana eunomia asiatica* (Staudinger, 1901)

Rather common. vi–vii.

Clossiana selenis* (Eversmann, 1937)Clossiana selenis sibirica* (Erschoff, 1870)

Kairty and Elt-Gol Valleys. Local. vi–vii.

***Clossiana selene* (Denis & Schiffermüller, 1775)**

Elt-Gol Valley. Rare and local. vii.

Clossiana euphrosyne* (Linnaeus, 1758)Clossiana euphrosyne umbra* Seitz, 1908

Chingiztei and Elt-Gol. Local. vi–vii.

Clossiana freija* (Thunberg, 1791)Clossiana freija pallida* (Elwes, 1899)

Elt-Gol and Shadzgat-Nuruu. Local and rare. vi–vii.

Clossiana frigga* (Thunberg, 1791)Clossiana frigga alpestris* (Elwes, 1899)

Elt-Gol Valley. Rare and local. vii.

Clossiana dia* (Linnaeus, 1758)Clossiana dia alpina* Elwes, 1899

Chumek, Hoton-Nuur and Elt-Gol. Local. vi–vii.

***Clossiana titania* (Esper, 1793)**

Clossiana titania staudingeri (Wnukowsky, 1929)

Kobdo-Gol Valley. Local. vii.

***Clossiana tritonia* (Boeber, 1812)**

Clossiana tritonia matveevi Korshunov & Gorbunov, 1995

Only one male near Tsagan-Kol lake. Very rare. vii. The subspecific rank of *matveevi* has been established (Dubatolov & Kosterin, 2010).

***Boloria frigidalis* Warren, 1944**

Elt-Gol. Very rare. vii.

*** *Boloria roddi* Kosterin, 2000**

Known from various parts of the Russian Altai, bordering with Mongolia (Ukok, Chuya valley, Koksus Valley).

***Boloria altaica* (Grum-Grshimailo, 1893)**

Alpine formations of the Mongolian Altai. Rare. vi–vii.

***Kuekenthaliella eugenia* (Eversmann, 1847)**

Malyj Sinij Irtysh Valley and Kobdo lake. Very local and rare. vii.

***Issoria lathonia* (Linnaeus, 1758)**

Sara-Syumbe, Arshantyn-Nuruu Mountains, Dayan-Nuur and Tsengel-Khairkhan Mountains. Rare. vi–vii.

***Brenthis ino* (Rottemburg, 1775)**

Brenthis ino paidicus Fruhstorfer, 1907

Local in Elt-Gol Valley, Arshantyn-Nuruu Mountains. Local. vi–vii.

***Brenthis daphne* (Denis & Schiffermüller, 1775)**

Recorded in the Chinese part (Meinhard, 1910) – Kok-Tegey Valley. Very local. vii.

***Brenthis hecate* (Denis & Schiffermüller, 1775)**

Brenthis hecate warreni Kudrna, 1974

Arshantyn-Nuruu Mountains. Local. vi.

***Argynnis niobe* (Linnaeus, 1758)**

Argynnis niobe barkhatovi P. Gorbunov, 1995

Kobdo Lake and Malyj Sinij Irtysh Valley. Very local. vii.

***Argynnis adippe* (Rottemburg, 1775)**

Chinese part (Malyj Sinij Irtysh Valley), Local. vii.

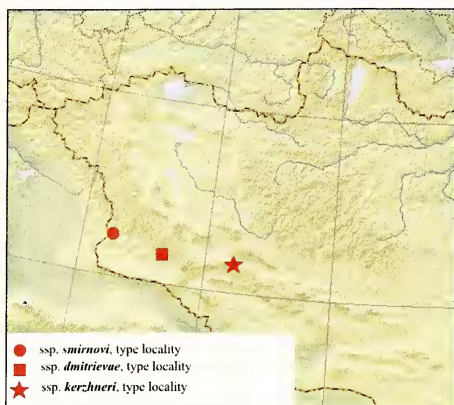


Fig. 27. Distribution of *Hyponephele lycaon* in the Mongolian Altai.

Argynnis aglaja (Linnaeus, 1758)

Common in northern and central parts, vii.

Conclusions

Alltogether 178 butterfly species (Hesperiidae: 17; Papilionidae: 5; Pieridae: 17; Lycaenidae: 50; Nymphalidae: 86) have been recorded in the Mongolian Altai. Another six species are listed as possible.

The butterfly fauna of the Mongolian Altai comprises the following elements: Transpalearctic, West Palearctic, East Palearctic, Dzhungarian, Southern Siberian, and Mongolian, as well as endemic species (16 species, or 9% of the total). Stretching from the northwest to southeast, the Mongolian Altai is an important border for species distribution. Depending on their exposure, different habitats in the high zone result in substantially different fauna.

Acknowledgements

I am indebted to Drs Elena Guskova, Vasilij Anikin, Petr Ustyuzhanin, Alexandr Shmakov, Sergej Smirnov, Dmitrij German, Sergej Djachenko, Petr Kosachev, Beket Ulugvanuly, Mr. Vyacheslav Doroshkin, Vadim Tschikolovets, Alexandr Shalimov, Dmitrij Ryzhkov, Ilja Sherin, Sergej Churkin, Colonel Grigorij Khabiev and to our drivers M. Sidorov and V. Yevdoshenko for helping us reach the most inaccessible parts of Altai, Sayan, Kazakhstan, and Mongolia. I also thank two anonymous reviewers whose comments helped improve the manuscript.

References

- Alberti, B. 1971. Lepidopteren aus der Mongolischen Volksrepublik. – Deutche entomological Zeitschrift, N. F. **18** (4–5): 361–376.
- Bálint, Zs. 1987. Systematic List of Mongolian Lycaenidae. – Galathea **3** (1): 10–14.
- Bálint, Zs. 1988a. New data of the lycaenid fauna of Mongolia (Lep. Lycaenidae). – Galathea **4** (3): 91–112.
- Bálint, Zs. 1988b. A New Polyommatus Species from Southern Mongolia: *Polyommatus aloisi* spec. n. (Lepidoptera: Lycaenidae). – Atalanta **18**: 385–394.
- Bálint, Zs. 1989a. Recently collected Lycaenid Butterflies of Mongolia (V) (Lep., Lycaenidae). – Galathea **5** (3): 101–112.
- Bálint, Zs. 1989b. Hairstreaks, Coppers and Blues from Mongolia (Lep., Lycaenidae). – Atalanta **19**: 87–100.
- Bálint, Zs. 1990. Neue Untersuchungen an Mongolischen Bläulingen – New investigations on Mongolian lycaenid butterflies. (Lep., Lycaenidae). Lycaenidae of Mongolia vi. – Galathea **6** (1): 1–16.
- Bálint, Zs. 1996. *Lycaena dabrerai*, a new copper species from the Transaltai Gobi, Mongolia (Lepidoptera: Lycaenidae, Lycaenini). – Linneana Belgica **15** (6): 237–241.
- Bálint, Zs., B. Benedek & T. Csöväri 2006. Contributions to the knowledge of the Macrolepidoptera fauna of Mongolia. – Folia Entomologica Hungarica **67**: 93–108.

- Churkin, S. 2002. A new species of blues, *Plebejus zhdankoi* sp. n. (Lepidoptera, Lycaenidae) from West Tian-Shan. – *Helios* 3: 121–127.
- Churkin, S. V. 2003a. A new species of *Oeneis* Hubner, 1819 (Lepidoptera, Satyridae) from South-West Mongolia. – *Helios* 4: 120–131.
- Churkin, S. V. 2003b. New taxa of butterflies (Lepidoptera, Rhopalocera) from Mongolia. – *Helios* 4: 160–178.
- Churkin, S. V. 2003c. Taxonomic notes on *Parnassius phoebus* (Fabricius, 1793) with the description of a new subspecies from South-west Mongolia (Lepidoptera, Papilionidae). – *Atalanta* 34 (1/2): 47–53.
- Churkin, S. V. 2003d. Taxonomic notes on *Polygonia* Hubner, [1818] (Lepidoptera, Nymphalidae) with the description of a new subspecies. – *Helios* 4: 132–147.
- Churkin, S. V. 2004a. A review of *Neolycaena* de Niceville, 1890 from South Siberia, Mongolia and North China with the descriptions of new taxa (Lepidoptera, Lycaenidae). – *Helios* 5: 153–218.
- Churkin, S. V. 2004b. New taxa of blues (Lepidoptera, Lycaenidae) from Mongolia. – *Helios* 5: 45–59.
- Churkin, S. V. 2004c. *Rhymnaria* from Siberia, Mongolia and China. – In: Z. Weidenhoffer, G. C. Bozano & S. Churkin, Lycaenidae. Part 2. Subfamily Theclinae, Tribe Eumaeini (partim): Satyrium, Superflua, Armenia, Neolycaena, Rhymnaria. – Milano, Omnes Artes [7]: 68–87, figs, maps.
- Churkin, S. V. 2004d. Taxonomic notes on *Athamanthia athamantis* (Eversmann, 1854), with the description of a new subspecies from Mongolia (Lepidoptera, Lycaenidae). – *Helios* 5: 142–148.
- Churkin, S. V. 2004e. Taxonomic notes on *Thersamolycaena* Verity, 1957 (Lepidoptera, Lycaenidae), with the description of a new species. – *Helios* 5: 75–90.
- Churkin, S. V. 2005a. A new subspecies of *Glaucopsyche argali* Elwes, 1899 from South-West Mongolia (Lepidoptera, Lycaenidae). – *Helios* 6: 89–92.
- Churkin, S. V. 2005b. A new subspecies of *Parnassius nomion* Fischer de Waldheim, 1923 from South-West Mongolia (Lepidoptera, Papilionidae). – *Helios* 6: 39–46.
- Churkin, S. V. 2005c. A review of *Agriades glandon* (de Pruner, 1798) from the Asian part of Russia and Mongolia with notes on the zoogeography of the complex (Lepidoptera, Lycaenidae). – *Helios* 6: 3–38.
- Churkin, S. V. 2005d. Notes on the *Erebia maurisius* complex with the descriptions of two new subspecies (Lepidoptera, Satyridae). – *Helios* 6: 146–168.
- Churkin, S. V. 2006. A review of the *Athamanthia dimorpha* (Staudinger, 1881) species group with the description of two new subspecies (Lepidoptera, Lycaenidae). – *Helios* 7: 43–76.
- Churkin, S. V. & P. V. Bogdanov 2003. Two new subspecies of the genus *Boloria* Moore (Lepidoptera, Nymphalidae) from Siberia and Mongolia. – *Helios* 4: 217–223.
- Churkin, S. V. & A. L. Devyatkin 2005. A new species of *Mellicta* Billberg, 1820 from the Mongolian Altai (Lepidoptera, Nymphalidae). – *Helios* 6: 181–188.
- Churkin, S. V. & K. A. Kolesnichenko 2003a. A review of *Euphydryas iduna* (Dalman, 1816) with description of new taxa (Lepidoptera, Nymphalidae). – *Helios* 4: 92–119.
- Churkin, S. V. & K. A. Kolesnichenko 2003b. Taxonomic notes on *Melitaea arcesia* Bremer, 1864 with the description of a new subspecies from South Mongolia (Lepidoptera, Nymphalidae). – *Helios* 4: 272–290.
- Churkin, S. V. & K. A. Kolesnichenko 2005a. *Melitaea athene danae* ssp. n., a new subspecies of Nymphalidae from South-West Mongolia (Lepidoptera, Rhopalocera). – *Helios* 6: 116–124.
- Churkin, S. V. & K. A. Kolesnichenko 2005b. A new subspecies of *Melitaea cinxia* L. from South Mongolia (Lepidoptera, Nymphalidae). – *Helios* 6: 125–132.
- Churkin, S. V. & V. K. Tuzov 2005. Taxonomic notes on some *Boloria* Moore and *Clossiana* Reuss with the descriptions of new subspecies (Lepidoptera, Nymphalidae). – *Helios* 6: 93–104.
- Churkin, S. V. & R. Yakovlev 2005a. A new subspecies of *Plebejus (idas) munkhbayar* Churkin & Zhdanko, 2003 (Lepidoptera, Lycaenidae) from the Mongolian Altai. – *Helios* 6: 169–174.
- Churkin, S. V. & R. Yakovlev 2005b. A new subspecies of *Oeneis elwesi* Staudinger, 1901 (Lepidoptera, Satyridae) from South Mongolia. – *Helios* 6: 175–180.
- Churkin, S. V. & R. Yakovlev 2006. A new subspecies of *Athamanthia athamantis* (Eversmann, 1854) from Mongolia (Lepidoptera, Lycaenidae). – *Helios* 7: 37–42.
- Churkin, S. V. & A. B. Zhdanko 2003. A review of the *Plebejus idas* – *subsolanus* complex of the Asian part of Russia and Mongolia with the description of new taxa (Lepidoptera, Lycaenidae). – *Helios* 4: 3–74.

- Churkin, S. V. & A. B. Zhdanko 2004. A new species of blues, *Plebejus murza* sp. n. from East Tian-Shan (Lepidoptera, Lycaenidae). – *Helios* **5**: 60–63.
- Churkin, S. V., A. Zhdanko & R. Yakovlev 2004. Notes on *Neolycaena musa* Zhdanko & Yakovlev, 2001 (Lepidoptera, Lycaenidae). – *Helios* **5**: 149–152.
- Dantchenko, A. V. & S. Churkin 2003. A new species of the genus *Polyommatus* Latreille, 1804 from Mongolia (Lepidoptera, Lycaenidae). – *Neue Entomologische Nachrichten* **54**: 5–13.
- Dubatolov, V. V. & O. E. Kosterin 2010. What is Matveev's Fritillary (*Clossiana matveevi* P. Gorbunov et Korshunov in Korshunov, Gorbunov, 1995)? *Amurian zoological journal* **2** (2): 184–188. [In Russian]
- Dubatolov, V., R. Yakovlev & V. Doroshkin 2005. New records of butterflies (Lepidoptera, Rhopalocera) from Russia and Mongolia – *Helios* **6**: 139–140.
- Elwes, H. J. 1899. On the Lepidoptera of the Altai Mountains. – *Transaction of the Royal entomologists Society of London* **47** (3): 295–367, Pl. 11–14.
- Forster, W. 1965. 58. Rhopalocera et Hesperiiidae. Ergebnisse der zoologischen Forschungen von Dr. Z. Kaszab in der Mongolei (Lepidoptera). – *Reichenbachia* **7** (19): 165–178.
- Forster, W. 1967. 102. Rhopalocera et Hesperiiidae ii. Ergebnisse der zoologischen Forschungen von Dr. Z. Kaszab in der Mongolei (Lepidoptera). – *Reichenbachia* **9** (14): 121–134.
- Forster, W. 1968. 147. Rhopalocera et Hesperiiidae iii. Ergebnisse der zoologischen Forschungen von Dr. Z. Kaszab in der Mongolei (Lepidoptera). – *Reichenbachia* **11** (18): 189–205.
- Forster, W. 1972. Rhopalocera et Hesperiiidae iv. Ergebnisse der zoologischen Forschungen von Dr. Z. Kaszab in der Mongolei. – *Faunistische abhandlungen aus dem Staatlichen Museum für Tierkunde in Dresden* (1971) **3** (17): 187–217.
- Grosser, N. 1981. Zur Fauna der Rhopalocera und Hesperiiidae der Mongolei (Insecta, Lepidoptera). – *Faunistische abhandlungen aus dem Staatlichen Museum für Tierkunde in Dresden* **8** (18): 181–187.
- Gus'kova E. V. & R. V. Yakovlev 2011. Kara-Irtysh biogeographically region of Altai. Opinion of entomologist (provisory results) // *Amurian zoological journal* **3** (2): 196–198. [In Russian].
- Huang, R.-X. & S. Murayama 1992. Butterflies of Xinjiang Province, China. – *Tyo to Ga* **43** (1): 1–22.
- Kamelin, R. V. 2005. New Flora of Altai (aims and conception of new floristic revision) Pp. 55–97. – *In*: R.V. Kamelin, M. G. Kuzev, D. V. Tikhonov, D. N. Shaulo, A. I. Shmakov & R. L. L. Viane, *Flora Altaica 1*. Azbuka Barnaul. [In Russian]
- Kolesnichenko, K. A. 2005. A new subspecies of *Melitaea didymina* Staudinger, 1895 (Lepidoptera, Nymphalidae), with taxonomic notes. – *Helios* **6**: 105–115.
- Kolesnichenko, K. & R. Yakovlev 2004. Taxonomic notes on *Melitaea phoebe* ([Denis et Schiffermuller], 1775) (Lepidoptera, Nymphalidae) from the south-western Mongolia with the description of a new subspecies. – *Helios* **5**: 101–109.
- Korshunov, J. P. 1977. Diurnal butterflies (Lepidoptera, Rhopalocera) of the Mongolian People's Republic, ii. – *In*: The joint Soviet-Mongolian complex biological Expedition. – *Insects of Mongolia* **5**: 649–681, fig. 1–2 [In Russian]
- Korshunov, J. P. & V. P. Soljanikov 1976. Diurnal Butterflies (Lepidoptera, Rhopalocera) of the Mongolian People's Republic. – *Insects of Mongolia* **4**: 403–458 [In Russian]
- Kryzhanovskij, O. L. 2002. Structure and distribution of entomofauns of World. Moskow. 237 pp. [In Russian]
- Meinhard, A. A. 1910a. A list of Ledidoptera collection of scientific expedition in south-eastern part of Russian Altai and Mongolia (Kobdo) in 1905–1906 by Prof. V. V. Sapozhnikov. – *Izvestiya Tomskogo University* **37**: 1–17 [In Russian]
- Meinhard, A. A. 1910b. A list of Ledidoptera collection of expedition in Mongolia (Kobdo) in 1908 by Prof. V. V. Sapozhnikov. – *Izvestiya Tomskogo University* **37**: 19–27. [In Russian]
- Sapojnikof, W. W. [Sapozhnikov V.V.] 1911. L'Altai Mongolien aux sources de l'Irtych et du Kobdo. *Sibirskoe T-vo Pechatnogo dela Tomsk*. 408+8 pp. [In Russian]
- Sergeev, M. G. 1986. Laws of distribution of Orthoptera insects of Northern Asia. – *Novosibirsk*. 238 pp. [In Russian]
- Suwa, T., Y. Hirano & S. Hirano 2008. Butterflies of the Mongol Altai, 1997. – *Goschkevitsch* **1**: 19–32.
- Tshikolovets, V. V., R. V. Yakovlev & O. E. Kosterin 2009. The Butterflies of Altai, Sayans and Tuva (South Siberia). Kyiv-Pardubice. 374 pp.
- Tshikolovets, V. V., R. V. Yakovlev & Z. Balint 2009. The Butterflies of Mongolia. Kyiv-Pardubice. 320 pp.

- Tuzov, V. K., A. B. Zhdanko, & A. V. Dantchenko, Family Lycaenidae: *Polyommatus*. Pp. 190–196. – In: V. K. Tuzov (ed.), Guide to the Butterflies of Russia and Adjacent Territories (Lepidoptera, Rhopalocera). – Pensoft, Sofia-Moscow 2.
- Vodolazhsky D. I., R. V. Yakovlev & B. V. Stradomsky 2011. Study of taxonomic status of some specimens of subgenus *Agrodiaetus* (Lepidoptera: Lycaenidae: *Polyommatus*) from Western Mongolia based on mtDNA markers. – Caucasian Entomological Bulletin 7 (1): 81–82. [In Russian]
- Wnukowsky, W. 1927. Neue Lepidopterenformen aus Nordost-Sibirien und dem Mongolischen Altai. – Mitteilungen der Münchner Entomologischen Gesellschaft 17 (7/12): 69–72.
- Wnukowsky, W. 1929. 3. Einige Nomenklatur-Notizen über die paläarktischen Lepidopteren. – Zoologische Anzeiger 83 (9/10): 221–224.
- Wnukowsky, W. 1930. Révision des quelques articles par A. Meinhard et par S. Tshougounow (S. Cugunov) à la faune des Lépidoptères des Altaï, pays de Minousinsk, monts Sajan et de Mongolie septentrionale-occidentale. – Trudy Sibirskogo instituta selskogo khozyajstva i lesovodstva 13 (1/2): 275–285. [In Russian]
- Wnukowsky, W. 1934. Neue palaearktische Lepidopteren-Rassen. – Entomologische Anzeitung 14 (12): 111–112.
- Yakovlev, R. V. 2002. *Melitaea didyma pseudolatonigena* ssp. n. (Lepidoptera, Nymphalidae), a new subspecies from Tuva. – Helios 3: 102–106.
- Yakovlev, R. V. 2002. New data on the fauna of butterflies (Lepidoptera, Rhopalocera) on the East Palearctic Region. – Euroasian Entomological Journal 1 (2): 173–176. [In Russian]
- Yakovlev, R. V. 2003a. *Pseudophilotes (Inderskia) svetlana* sp. n., a new blue from Mongolian Altai (Lepidoptera, Lycaenidae). – Helios 4: 153–159.
- Yakovlev, R. V. 2003b. Butterflies (Lepidoptera, Diurna) of Altai Mountain country. Ecology and zoogeography. [Dissertation autoreferate]. Altai State University, Barnaul 16 p. [In Russian]
- Yakovlev, R. V. 2003c. Revision of Fischer's Blue *Tongeia fischeri* (Eversmann, 1843) (Lepidoptera, Lycaenidae). – Helios 4: 181–197.
- Yakovlev, R. V. 2004. New data on the taxonomy of the Mongolian Rhopalocera (Lepidoptera). – Helios 5: 221–231.
- Yakovlev, R. V. 2006. About biogeographical structure of Mongolian Altai. – Entomological investigations in the Northern Asia. Novosibirsk: 165–168. [In Russian]
- Yakovlev, R. V. 2007a. Two new taxa of the genus *Melitaea* Fabricius, 1807 (subgenus *Mellicta* Billberg, 1820) (Lepidoptera: Nymphalidae) are described from Western Mongolia and Eastern Kazakhstan. – Eversmannia 9: 34–39. [In Russian]
- Yakovlev, R. V. 2007b. Modern data about the distribution of of *Erebia tsengelensis* Suwa, Hirano et Hirano, 2002 (Lepidoptera, Satyridae). – Altai Zoological Journal 1: 52–53, map. [In Russian]
- Yakovlev, R. V. 2007c. New taxa of Lepidoptera for Mongolian fauna // Eversmannia 13–14: 86. [In Russian]
- Yakovlev, R. V. & S. V. Churkin 2003. A new subspecies of *Agriades glandon* (de Pruner, 1798) (Lepidoptera, Lycaenidae) from South-West Mongolia. – Helios 4: 148–152.
- Yakovlev, R. V. & V. V. Doroshkin 2004. New data of Macrolepidoptera for the fauna of Mongolia. ii (Insecta, Lepidoptera). – Atalanta 35 (3/4): 390–398.
- Yakovlev, R. V. & V. V. Doroshkin 2006. On the fauna of butterflies (Lepidoptera: Rhopalocera) of upper stream of Kara-Irtysh river (W. Mongolia). – Eversmannia 6: 13–26. [In Russian]
- Yakovlev, R. V., P. Ya. Ustjuzhanin, M. Chernila, A. N. Nakonechnyi & V. V. Tshikolovets 2009. On the first record of *Oeneis elwesi* Staudinger, 1881 (Lepidoptera, Satyridae) in Russian Altai for 110 years. – Altai Zoological Journal 2: 30–32. [In Russian]
- Yakovlev, R. V., P. Ya. Ustyuzhanin, & V. V. Doroshkin 2005. New records of Macrolepidoptera from Mongolia. – Euroasian Entomological Journal 4 (1): 55–56. [In Russian]
- Yazaki, Y. 2000. Papilionidae and Pieridae. – In: Butterflies of Mongolia, Kitami, Japan 1: 1–72. [In Japanese]
- Yazaki, Y. 2001. Nymphalidae. Supplement to Pieridae – In: Butterflies of Mongolia, Publ. by K. Yazaki, Kitami, Japan 2: 1–142. [In Japanese]
- Yazaki, Y. 2002. Satyridae. Supplement to Papilionidae, Nymphalidae and Pieridae – In: Butterflies of Mongolia, Publ. by K. Yazaki, Kitami, Japan 3: 1–251. [In Japanese]

- Yazaki, Y. 2004. Lycaenidae and Hesperiiidae. Supplement to Papilionidae, Pieridae, Nymphalidae and Satyridae. – *In*: Butterflies of Mongolia, Publ. by K. Yazaki, Kitami, Japan 4: 1–320. [In Japanese]
- Zhdanko, A. 2001. A new species of blues, *Plebejus churkini* sp. n. (Lepidoptera, Lycaenidae) from Inner Tian-Shan. – *Helios* 2: 74–78.
- Zhdanko, A. B. 2004. Notes on the systematic position of *Inderskia* Korshunov, 2000, with the description of *Paleophilotes (Inderskia) marina* sp. n. from East Kazakhstan (Lepidoptera, Lycaenidae). – *Helios* 5: 68–74.
- Zhdanko, A. & S. Churkin 2001. A review of the *Plebejus christophi* complex (Lepidoptera, Lycaenidae) from the Central Asia with the description of new taxa. – *Helios* 2: 50–73.
- Zhdanko, A. & S. Churkin 2004. A new species of blues, *Plebejus kapanovi* sp. n. from East Kazakhstan (Lepidoptera, Lycaenidae). – *Helios* 5: 64–67.
- Zhdanko, A. & R. Jakovlev 2001. New species of blue butterflies (Lepidoptera, Lycaenidae) from the Mongolian Altai. – *Helios* 2: 166–173.