

Additions to the fauna of butterflies (Insecta, Lepidoptera, Papilionoidea) of the Republic of Khakassia and of the southern Krasnoyarsk Krai (South Siberia, Russia)

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Abstract

Here we present additional data and information about new records of Lepidoptera, Papilionoidea from the Republic of Khakassia and the southern Krasnoyarsk Krai, based on collections and observations in 1986–2025. Five species are reported for the fauna of these regions for the first time and fifteen are reliably confirmed. In addition, we verified the presence of a number of species that were not in the Catalogue for this region, but were noted by researchers in the past. A separate task of this work was an attempt to compile the most comprehensive bibliography of scientific works concerning the diurnal butterflies of Khakassia and the southern Krasnoyarsk Krai. A common eastward range shift pattern has been observed for several nemoral butterfly species, which we attribute to the onset of another Holocene Climatic Optimum.

Keywords

Biodiversity, climate change, global warming, Holocene Climatic Optimum, Lepidoptera, Papilionoidea, Rhopalocera, Diurna, Siberia, Khakassia, Krasnoyarsk Krai, new finds, diurnal butterflies

Introduction

Starting to species composition of Lepidoptera of Khakassia Republic and the south of Krasnoyarsk Kray [Province] ('kray' and 'oblast' are primary administrative units of Russia, the difference is that a former usually includes autonomous regions) (Maksimov et al. 2019; Loshchev & Maksimov 2021; Maksimov et al. 2022; Ustjuzhanin & Maksimov 2023; Ustjuzhanin et al. 2024), we assumed that this would primarily concern Heterocera moths. It was originally believed that the primary attention of our predecessors who studied Lepidoptera was directed to the butterflies of Khakassia and the southern Krasnoyarsk Kray. Typically, the relative paucity of species of Lepidoptera, Papilionoidea, as compared to the considerably more voluminous conventional group Heterocera, in conjunction with their relatively large sizes and more spectacular appearance, butterflies are typically favored in early entomological studies. Despite the fact that the study of Lepidoptera in our region proceeded in this manner indeed, and contrary to our initial assumptions, the comparatively not so diverse butterflies of Khakassia and southern Krasnoyarsk Kray turned out to be insufficiently studied. Analysis of information sources provided a clear understanding that the published data are often contradictory and require clarification or reliable confirmation through modern findings. Information presented in well-known catalogues concerning Lepidoptera, Papilionoidea (Korshunov 1972; Korb 2005; Sinev 2008; Sinev 2019) just further confirmed that even highly reputable Russian entomologists did not take into account a significant number of findings from previous researchers' reports, and sometimes many works, especially those written in foreign languages, are undeservedly forgotten. On the one hand, we have attempted to correct a number of obvious inaccuracies in the Zoological Institute of Russian Academy of Science (St. Petersburg) Catalogue of Lepidoptera of Russia (second edition) (Sinev 2019) using information gleaned from the works of our predecessors who previously studied the butterflies in Khakassia and the southern Krasnoyarsk Kray. On the other hand, we aim to present a relatively complete bibliography of works, which we are aggregating for the first time in this study. This is necessary at least because the results of many of these works have been overlooked, which inevitably led to inaccuracies and, sometimes, curious situations, examples of which are provided below. Furthermore, during our search, we also found several interesting articles and scientific reports that have been underutilized in Russian scientific circulation for many years (Trybom 1877; Pavel 1901; Haanshus 1922).

After analyzing a significant volume of material, we endeavored to compile, as complete as possible, a compendium of previous findings of each species of the list presented below, for both Khakassia and the southern Krasnoyarsk Kray, placing these data in square brackets after the Latin names of the taxon. Also, wherever possible, indicated there are synonyms used by the authors of those works, the pages on which the taxon is mentioned, and the localities where it was found. References to works where the presence of a particular taxon was indicated only hypothetically, for instance, for regions like "Southern Siberia", "Khakassia" or "southern Krasno-

yarsk Kray", without more specific clarifications or findings, were not taken into account. The presented faunistic list also includes a number of taxa previously recorded for Khakassia or the southern Krasnoyarsk Kray, but only as single findings.

Perhaps the earliest known reports concerning the butterflies of Khakassia and the southern Krasnoyarsk Kray are the faunistic data of the Swedish expedition of 1876. The report on the butterflies collected on its way from Krasnoyarsk to Yeniseysk was published a year later (Trybom 1877). The third Asian expedition of the Austro-Hungarian Count Jenő (Eugene) Zichy in 1897 (Pavel 1901), despite its impressive results, remained forgotten by the Russian entomological community for many years, as will soon be published elsewhere. Although published in the same year as the above mentioned work, a diary "Journeys to the Abakan Mountains" (Jakobson 1901) concerned findings made in 1898, a year after the Hungarian expedition. The last referenced article also mentioned a field research conducted in the summer of 1885 in the vicinity of Minusinsk by entomologists Hammarström and Enberg, but we failed to find any publication or scientific report concerning this curious episode. A significant step, opening perspectives for further entomological study of the region, was made by the works of Otto Staudinger (Staudinger 1886, 1887, 1892, 1899; Staudinger & Rebel 1901), including a distinct milestone was the "Katalog der paläarktischen Lepidopteren," published jointly with H. Rebel. Even though these works didn't include material collected in Khakassia and the southern Krasnoyarsk Kray, their impact on the future study of butterflies in the region is hard to overstate.

A serious milestone for the study of Papilionoidea of the region was also put by the work of Russian researchers Sushkin and Chetverikov (1907), which reported 125 butterfly species for the territory of the present-day Khakassia, southern Krasnoyarsk Kray and western Tuva. The reports by S.M. Tschugunov (1912, 1913, 1916) additionally broadened the faunistic list of known butterflies in the region. Subsequently, an expedition of Norwegian researchers, led by Ørjan Olsen (Haanshus 1920), made a significant contribution to the study of Lepidoptera within the Minusinsk Depression. Regrettably, its work also faded from the memory of the Russian entomological community for a considerable period (Maksimov 2025). The systematic and meticulous work of W.D. Kozhantshikov and his assistants (S.R. Tsygankov, I.W. Kozhantshikov, L.W. Kozhantshikov, and A. Gerasimov-Morachinsky) between 1915 and 1929 played a key role in the study of the region's butterflies (Kozhantshikov 1923, 1924, 1926, 1928). This not only significantly expanded the results of the previous research but also established an excellent foundation, still used today, for further scientific investigations (Maksimov 2022, 2024).

Unfortunately, over the subsequent three decades, the study of butterflies in Khakassia and the southern Krasnoyarsk Kray was conducted with noticeably less intensity and regularity. Infrequent articles were based on old collection materials by W.D. Kozhanchikov or other researchers mentioned above (Wnukovsky 1930; She1juzhko 1928a, 1928b; Ermolajev 1935). It was only since late 1960s that research on the Lepidoptera of our region received a fresh impetus, notably from Y.P.

Korshunov and a number of other researchers of the new generation (Korshunov 1969, 1972, 1978, 1984, 1988; Korshunov & Gorbunov 1995; Korshunov 2000; Korshunov & Nikolaev 2002). It seems that a relatively small number of works dedicated to the butterflies of Khakassia and southern Krasnoyarsk Kray does not reflect the significant influence that Y.P. Korshunov has had on entomological research in our region. Unfortunately, many of this scientist's materials were never published, including the manuscript dedicated to the Lepidoptera, Rhopalocera of Khakassia. Reports from the Sukachev Institute of Forest of the Siberian Division of the Russian Academy of Sciences (Kondakov & Baranchikov 1975; Yanovsky 1996, 2002) played a significant role in understanding the entomofauna of the region, including butterflies. Y.P. Baranchikov conducted the main work on butterflies there.

At the end of the XXth century, atlases and identification guides for Siberian butterflies were finally published, significantly transforming and expanding our knowledge of this group, including in our region (Lukhtanov & Lukhtanov 1994; Lukhtanov & Eitschberger 2000; Tuzov et al. 1997, 2000; Tuzov 2015; Korshunov 2000; Gorbunov & Kosterin 2003, 2007; Tshikolovets et al. 2009). Even in the early XXIst century, researchers from Khakass State University played a role in the study of the butterflies in the region (Dragan 2003, 2004, 2005, 2007, 2011, 2014; Dragan & Listvyagova 2016; Dragan 2018; Dragan et al. 2019; Larionov 2006). The most recent works on diurnal butterfly faunistics in the region are the comprehensive report by Krasnoyarsk National Park 'Stolby' (Loshchev 2015) and the article by Kosterin (2023). The latter not only added a number of interesting findings but also, in a certain way, served as a catalyst for the author of this material.

Materials and methods

We acquired previously unpublished data from our personal material collected during the period from 1986 to 2025 in 45 localities in Khakassia and the southern Krasnoyarsk Kray with different habitat characteristics, from the steppe zone to the alpine area of both the Western Sayans and Kuznetsky Alatau, as well as the foothills of the Eastern Sayans Mountains. All specimens caught in the daylight with butterfly net. In addition to the author's personal collection materials, the work used previously unpublished information about butterfly collections records of V.G. Butnaru (VBA) and S.V. Dragan (SDA), from Abakan, A.I. Baznikin (ABK), M.A. Ivanov (MIK), G. Kuleshov (GKK) and I.S. Zakhazhevsky (ZIK) from Krasnoyarsk, S.A. Knyazev from Omsk (SKO) and A.V. Chuvilin (ACT) from Tula which were included. Photographs of most of the species listed can be viewed on the website 'The Nature of South Siberia' by the following link: <https://ermak24.com/animalia-insecta.html>. In the checklist, we used general classification adopted by the Catalogue of Lepidoptera of Russia (2-nd edition) (2019). The list of localities where the material was collected is provided below and enhanced with a map (Fig. 1):

1. Abakan – **Khakassia**, Abakan city, near Pobeda Cultural Center on the Ulmus sp. 53.7225°N, 91.4402°E, 248 m a.s.l.
2. Agaskyr – **Khakassia**, Ordzonikidze district, Kuznetsky Alatau foothills, between Sarala and Agaskyr villages, forest meadow, 54.9150°N, 89.2731°E, 550 m a.s.l.
3. Atkhol – **Khakassia**, Tashtyp District, West Sayans, A161 road, 215km, Atkhol spring, mountain taiga, 52.3921°N, 90.0184°E, 691m a.s.l.
4. Balankul' – **Khakassia**, Askiz District, Balankul' Lake vicinity, forest-steppe hills with rocky slopes, 53.4629°N, 90.4189°E, 861 m a.s.l.
5. Belyi Balakhchin – **Khakassia**, Shira District, Belyi Balakhchin village vicinity, near the road, herbaceous grass steppe, 54.5607°N, 89.4961°E, 445 m a.s.l.
6. Belyi Yar – **Khakassia**, Altay District, Belyi Yar village vicinity, floodplain meadow and forest by the Old Abakan river, 53.5938°N, 91.3436°E, 256 m a.s.l.

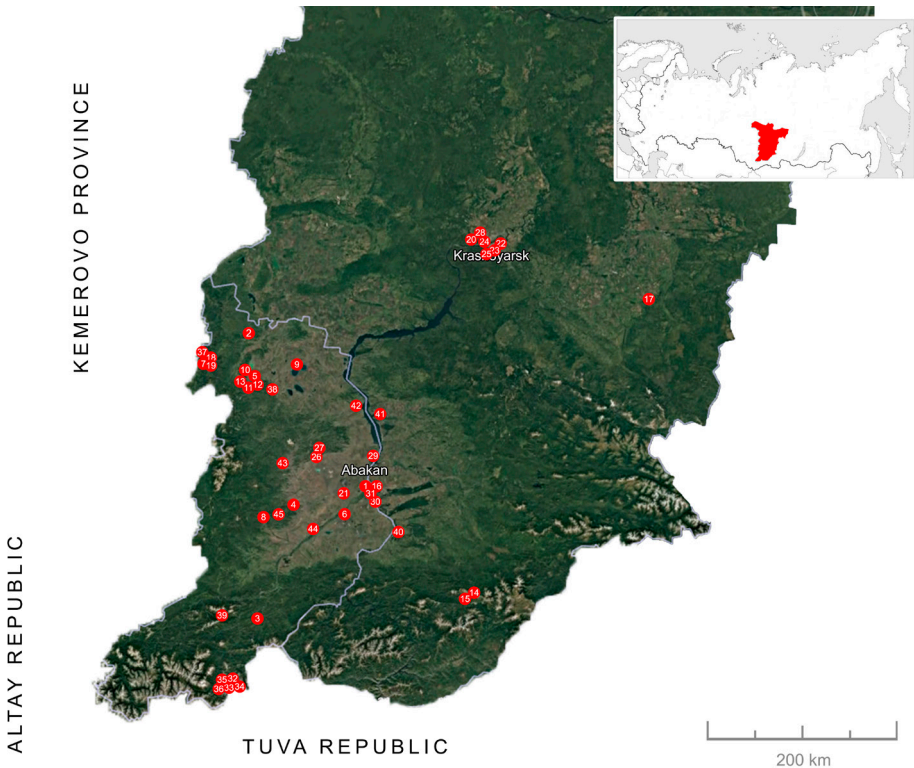


Figure 1. Collecting localities in Khakassia and the southern Krasnoyarsk Kray. The numbers inside the red circles correspond to the collection site numbers in the localities list below. Location map showing the placement of Khakassia and southern Krasnoyarsk Kray in the Russian Federation, according to the boundaries marked in the Catalogue of Lepidoptera of Russia (2019), positioned in the upper right corner.

7. Bobrovaya – **Khakassia**, Ordzonikidze District, Kuznetsky Alatau mountains, mountain tundra and a stone scree on the top of the Bobrovaya mountain, 54.6207°N, 88.6682°E, 1592 m a.s.l.
8. Birikchul – **Khakassia**, Askiz District, West Sayans, foothills of Abakansky Range, forest-steppe hills near Birikchul village, 53.3125°N, 89.9139°E, 546 m a.s.l.
9. Chalpan – **Khakassia**, Shira District, Khakasskiy State Nature Reserve, Bele terrain, Chalpan mountain, herbaceous-grass steppe, rocky slope, 54.7041°N, 90.1569°E, 538 m a.s.l.
10. Chernoe Lake – **Khakassia**, Shira District, Chernoe Lake vicinity, muddy road next to the puddle, 54.6055°N, 89.3864°E, 445 m a.s.l.
11. Efremkino (Ancestor Trail) – **Khakassia**, Shira District, Kuznetsky Alatau Mountains, near Efremkino village, beginning of the ecological 'Ancestor Trail', mountain meadows, SW-exposed slope, 54.4526°N, 89.4561°E, 532 m a.s.l.
12. Efremkino (northern vicinity) – **Khakassia**, Shira District, Kuznetsky Alatau Mountains, 1,5 km north of Efremkino village, forest-steppe meadow, 54.4938°N, 89.4657°E, 519 m a.s.l.
13. Efremkino (Pandora's Box Trail) – **Khakassia**, Shira District, Kuznetsky Alatau Mountains, near Efremkino village, the path to the Pandora's Box Cave, mountain forest meadow, S-exposed rocky slope, 54.4308°N, 89.4595°E, 522 m a.s.l.
14. Ergakii Lokatornaya 1 – **Krasnoyarsk Krai**, Ermakovskoye District, West Sayans, Ergakii Range, Lokatornaya Mountain, SW-exposed slope, subalpine meadow, mountain tundra, 52.8516°N, 93.2672°E, 1554 m a.s.l.
15. Ergakii (Oyskoye Lake) – **Krasnoyarsk Krai**, Ermakovskoe District, West Sayans, Ergakii Range, Oyskoye Lake vicinity, alpine meadow, 52.8488°N, 93.2484°E, 1432 m a.s.l.
16. Gryady – **Krasnoyarsk Krai**, Minusinsk District, near Bystraya village, the Funtikova Mountain, steppe hills, S-exposed slope, 53.7391°N, 91.5606°E, 359 m a.s.l. Note: Following W. Kozhantshikov's indications, we can only approximately guess which point the author called 'Gryady' (Kozhantshikov 1923; 1924; 1925; 1926; 1928). From several possible and very similar points, we opted for this, guided mainly by the least influence of the anthropogenic factor on it.
17. Irbeiskoye – **Krasnoyarsk Krai**, Irbeisky District, 3 km on SW from Irbeiskoye village, forest and meadow, 55.5765°N, 95.5243°E, 335 m a.s.l.
18. Ivanovskie Lakes – **Khakassia**, Ordzonikidze District, Kuznetsky Alatau Mountains, subalpine meadow and birch grove on the W foot of the slope of the Bobrovaya Mountain, 54.6177°N, 88.6516°E, 1172 m a.s.l.
19. Ivanovskie Lakes-2 – **Khakassia**, Ordzonikidze District, Kuznetsky Alatau Mountains, alpine meadow and mountain tundra in the Ivanovskie lakes vicinity, 54.6215°N, 88.6058°E, 1336 m a.s.l.

20. Karaul'naya – **Krasnoyarskiy Krai**, Minino village vicinities, the Karaul'naya River, taiga, 56.025517°N, 92.554195°E, 263 m a.s.l.
21. Krasnoye Lake – **Khakassia**, Ust'-Abakan District, near Krasnoye Lake, steppe rocky hills, 53.6346°N, 91.1189°E, 275 m a.s.l.
22. Krasnoyarsk (Bazaikha) – **Krasnoyarsk Krai**, Krasnoyarsk City, Bazaikha microdistrict vicinity, forest and steppe, 56.0162°N, 93.0763°E, 221 m a.s.l.
23. Krasnoyarsk (Cheryomushky) – **Krasnoyarsk Krai**, Krasnoyarsk City, Cheryomushky microdistrict vicinity, forest and steppe, 55.9967°N, 93.0489°E, 241 m a.s.l.
24. Krasnoyarsk (Nikolaevskaya Sopka Hill) – **Krasnoyarsk Krai**, Krasnoyarsk City, Oktyabr'sky District, Nikolaevskaya Sopka Hill, forest and steppe, 56.0014°N, 92.7375°E, 484 m a.s.l.
25. Krasnoyarsk (Torgashinskiy Range) – **Krasnoyarsk Krai**, Krasnoyarsk City, Torgashinskiy Range vicinity, forest and steppe, 55.9567°N, 92.8736°E, 422 m a.s.l.
26. Kuten`Buluk – **Khakassia**, Ust'-Abakan District, Kuten` Buluk valley, forest-steppe meadow next to the road, 53.9388°N, 90.6581°E, 616 m a.s.l.
27. Kuten` Buluk 2 – **Khakassia**, Ust'-Abakan District, Kuten` Buluk valley, forest-steppe meadow on SW-exposed rocky slope, 53.9404°N, 90.6604°E, 670 m a.s.l.
28. Minino – **Krasnoyarsk Krai**, Krasnoyarsk NW vicinity, near Minino village, forest-steppe with birch groves, 56.0824°N, 92.7309°E, 220 m a.s.l.
29. Oglakhty 1 – **Khakassia**, Bograd District, Khakassky State Nature Reserve, Oglakhty terrain, S-exposed slope, herbaceous-grassy steppe, rocky hills, 53.9894°N, 91.4919°E, 334 m a.s.l.
30. Podsinee – **Khakassia**, Altay District, near Podsinee village, meadow on the Enissey River, 53.6861°N, 91.5759°E, 248 m a.s.l.
31. Samokhval – **Khakassia**, Altay District, Abakan City vicinity, Samokhval Mountain, steppe meadow with a rocky slope, 53.6947°N, 91.5298°E, 353 m a.s.l.
32. Saylig-Khem-Taiga (mountain top) – **Khakassia**, Tashtyp District, West Sayans, Saylig-Khem-Taiga Range, stone scree, nival belt, 51.7257°N, 89.9058°E, 2569 m a.s.l.
33. Saylig-Khem-Taiga (S-exposed slope) – **Khakassia**, Tashtyp District, West Sayans, Saylig-Khem-Taiga Range, alpine tundra, 51.714188°N, 89.866984°E, 2045 m, a.s.l.
34. Saylig-Khem-Taiga (Bolshoy On headwaters) – **Khakassia**, Tashtyp District, West Sayans, Saylig-Khem-Taiga Range, the Bolshoy On River headwaters, mountain tundra, 51.7152°N, 89.8859°E, 2081 m a.s.l.
35. Saylig-Khem-Taiga (south border) – **Khakassia**, Tashtyp District, West Sayans, Saylig-Khem-Taiga Range (the southern border of Khakassia), mountain tundra, nival belt, N-W exposed slope, 51.7123°N, 89.8816°E, 2112 m a.s.l.

36. 36.Saylig-Khem-Taiga (NW-exposed slope) – **Khakassia**, Tashtyp District, West Sayans, Saylig-Khem-Taiga Range, NW-exposed slope, mountain tundra and nival belt, 51.7002°N, 89.8806°E, 2226 m a.s.l.
37. Semeynaya – **Khakassia**, Ordzonikidze District, Kuznetsky Alatau Mountains, Semeynaya Mountain, subalpine meadow on the mountain top, 54.6733°N, 88.6422°E, 1337 m a.s.l.
38. Shira (western environs) – **Khakassia**, Shira District, Kuznetsky Alatau foothills, 1.5 km west from Shira village, steppe hills, 54.4680°N, 89.8672°E, 620 m a.s.l.
39. Shaman – **Khakassia**, Tashtyp District, West Sayans, Shaman Range, mountain tundra, nival belt, SW-exposed slope, 52.2234°N, 89.3115°E, 1754 m a.s.l.
40. Shushensky Bor – **Krasnoyarsk Kray**, Shushenskoe District, near Shushenskoye village, Shushensky Bor National Park. A broad steppe powerline cutting through pine forest, from 53.3175°N, 91.9514°E to 53.325286°N, 91.993769°E, 280 m a.s.l.
41. Syda bay – **Krasnoyarsk Kray**, Krasnoturansk District, eastern bank of the Enissey River, Syda Bay, near Parus Camping, forest-steppe, *Termopsis* sp./ herbaceous meadow, 54.3406N, 91.5272E, 258 m a.s.l.
42. Ust`-Erba – **Khakassia**, Bograd District, Ust`-Erba village vicinity, birch forest and herbaceous steppe, 53.5118°N, 91.1300°E, 302 m a.s.l.
43. Uybat – **Khakassia**, Ust`-Abakan District, Ust`-Biur village vicinity, Uybat River valley, taiga meadow, 53. 8248°N, 90. 0512°E, 705 m a.s.l.
44. Uytag-1 – **Khakassia**, Askiz District, Sarj Mountains, near Uytak station, the foot of the Uytag Mountain, steppe rocky hills, W-exposed slope, 53.3131°N, 90.7867°E, 294 m a.s.l.
45. Yugachy – **Khakassia**, Askiz District, near Yugachy station, Askiz - Vershino Tyoya road, 54th km), mountain steppe, a rocky SW-exposition slope, 53.2753°N, 89.9694°E, 583 m a.s.l.

Results

Below we present a list of species registered in Khakassia and the southern Krasnoyarsk Kray for the first time. When a taxon was reported in previously published works from our region but for some reason was not included in the Catalogue of Lepidoptera of Russia (Sinev ed. 2019) for our region, corresponding to their region 22, the author and year of this work are indicated in square brackets after the Latin name. This concerned only the species confirmed by our own data or previously unpublished collected materials from our colleagues.

Family Hesperidae

Spialia orbifer (Hubner, [1823]) [Tshikolovets et al. 2009: 40 (ISEA: Khakassia, Uryup river)].

Material examined: Irbeyskoye, 28.VI.1988, 1♀, I.S. Zakhazhevskiy; Uybat, 07.VII.2010, 1♂, S.V. Dragan (SDA); Efremkino (Pandora's Box Trail), 13.VI.2017, 1♂; Birikchul, 23.VI.2019, 1♀, R.E. Maksimov (RMA).

Note: Despite the absence of an indication of this species from the Catalogues for our region 22 (Devyatkin 2008; Dubatolov, Lvovsky & Streltsov 2019), its findings in a number of neighboring regions allowed us to hope that sooner or later it would be discovered in our territory as well. This species, quite rare in the region, occurs in Khakassia and the southern Krasnoyarsk Krai on dry steppe and meadow xerophytic slopes or mountain river floodplain meadows from mid-June to early July.

Pyrgus centaureae (Rambur, [1839]) [*Hesperia centaureae* Ramb., – Suschkin & Chetverikov, 1907: 31 (Sayan Mts., Aradanskiy Pass); *Hesperia centaureae* Ramb., – Kozhantschikov, 1923: 14 (Minussinsk-Bezirk); Ivonin, Nikolaev, 2008a: 103 (Saylyg-Khem-Tayga Mts., Sayanskiy Pass); *Pyrgus centaureae kurentzovi* Korshunov, 1995 – S.L. Nikolaev, M.S. Tolstaya, 1sp., Tashtyp Distr., Sayansky Pass, 06.07.2004.]

Material examined: Saylig-Khem-Taiga (Bolshoy On headwater), 28.VI.1998, 1♂; Saylig-Khem-Taiga (southern border), 09.VII.2000, 1♂; 19.VI.2022, 2♂; 1♀ R.E. Maksimov (RMA); Ergakii Lokatornaya-1, 17.VII.2009, 1♂, M.A. Ivanov (MIK); Oglakhty-1, 03.VI.2023, 1♂, R.E. Maksimov (RMA);

Note: Although there are no of this species in our region according to the Catalogues (Devyatkin 2008; Dubatolov, Lvovsky & Streltsov 2019), *P. centaureae* has been reported from there many times before. In the meantime, this inhabitant of mountain meadows, swamps and tundras is not rare, which is indirectly suggested by the significant number of its discoveries, found in both Khakassia and the southern Krasnoyarsk Krai.

Pyrgus serratulae (Rambur, [1839]) [Yanovsky, 1996: 40 (Sayano-Shushensky Biosphere State Nature Reserve); P. Ustjuzhanin, 1♂, 06-08.07.1986, Khakassia, Altay Distr., Beryozovka village vicinity; V. Zinchenko, 1♀, 24.07.1998.]

Material examined: Samokhval, 30.V.2005, 1♀; 05.VI.2005, 1♂, S.V. Dragan (SDA); Ust'-Erba, 13.VI.2015, 1♂; Atkhol, 01.VI.2016, 2♂; Krasnoye Lake, 16.VII.2020, 1♀; Gryady, 26.V.2019, 2♀; 21.V.2022, 1♂; Oglakhty-1, 28.VII.2021, 1♀; Efremkino (Pandora's Box Trail), 21.VI.2024, 1♂; R.E. Maksimov (RMA).

Note: In both the original and revised editions of the Catalogues (Devyatkin 2008; Dubatolov, Lvovsky & Streltsov 2019) *P. serratulae* has been noted for our region as doubtful and requiring further confirmation. Nevertheless, the considerable number of both relatively old and quite fresh findings of this species dispels any doubt in its presence in Khakassia and the southern Krasnoyarsk Krai. This species,

inhabiting both steppes and meadows and observed by us at elevations up to 1500 m a.s.l., is not particularly rare.

Pyrgus sibiricus (Reverdin, 1911) [Gorbunov & Kosterin, 2003: 98 (the highlands of < > W Sayan, < >... Sayanskiy Pass through Sailyg-Khem-Taiga Range, W. Sayan; Ivonin, Nikolaev, 2008a: 105 (Tuva: W. Sayan, Saylyg-Khem-Tayga Mts., Sayanskiy Pass; Ivonin & Nikolaev, 2008b: 118 (Tuva: W. Sayan, border of Tuva and Khakassia, Saylyg-Khem-Tayga Mts., Sayanskiy Pass; Kosterin, 2023: 332 (Sayanskiy Pass)]

Material examined: Ergakii Lokatornaya 1, 17.VII.2009, 2♂, M.A. Ivanov (MIK); Saylig-Khem-Taiga (NW-slope), 15.VI.2024, 3♂; Saylig-Khem-Taiga (southern border), 16.VI.2024, 1♀, R.E. Maksimov (RMA).

Note: This species has not been reported for Khakassia and the south of Krasnoyarsk Krai neither in the first (Devyatkin 2008) nor in the second edition of the Catalogue (Dubatolov, Lvovsky & Streltsov 2019). Meanwhile, information about its presence in the territory of Khakassia has been published on numerous occasions, as we have demonstrated above. With the discoveries made by our Krasnoyarsk colleague Mikhail Ivanov and our own, we further corroborate the presence of *Pyrgus sibiricus* in both Khakassia and the southern Krasnoyarsk Krai.

Family Pieridae

Euchloe ochracea naina W. Kozhantschikov, 1923 [*Anthocaris Belia* var. *Ochracea* nov. Subsp. – F. Trybom, 1877: 37 (Nischnaja Tunguska, 14.VII.1876, 1 sp.); *Euchloe belia* Cr. f. *ausonia* Hb. – Suschkin, Chetverikov, 1907: 11 (Sayans, upper reaches of Oya river and Aradansky Pass); *Euchloe belia naina* nov. subsp. – W.D. Kozhantschikov, 1923. Materialien zur Macrolepidopteren Fauna des Minussinsk-Bezirktes. Jb. Martj. Staatsmus. Minussinsk 1: 2–3. Type locality and type material: "... im Sajan-Gebirge am Bujba See auf der Hoehe von 1400 m. erbenet wurden", Krasnoyarsky kray, Russian Federation, Syntypes 7 und 27 (Kozhantschikov, 1923: 3); *Euchloe belia naina* nov, subsp. – Kozhantschikov, 1923: 3 (... im Sajan-Gebirge am Bujba See)].

Material examined: Ergakii Lokatornaya 1, 10.VII.2016, 2♂, 1♀, R.E. Maksimov (RMA).

Note: On the one hand, *Euchloe ochracea* (Trybom 1877) has been described as a new taxon based on a specimen caught in Krasnoyarsk Krai and recorded for our region in both the first edition of the Catalogue (Lvovsky, Churkin, Dubatolov & Morgun 2008) and the second (Dubatolov, Lvovsky & Streltsov 2019). Yet, a bitter irony persists in these sources: the subspecies *Euchloe ochracea naina*, described by W.D. Kozhantschikov, as *E. belia naina*, in 1923 specifically from individuals captured in our region (as referenced above), remains unlisted in the Catalogue for Khakassia and the southern Krasnoyarsk Krai. Our finding serves to further substantiate the presence of this taxon, at least in the southern Krasnoyarsk Krai.

Family Lycaenidae

Nordmannia w-album (Knoch, 1782)

Material examined: Abakan, 13.VI.2020 1♀, R.E. Maksimov (RMA); Krasnoyarsk (Cheryomushky), 28.VI.2020, 2♂, 1♀, A.I. Baznikyn (ABC); Podsee, 06.VII.2024, 4♂, 2♀, V. Butnaru (VBA, RMA);

Note: This is the first record of this species for our region. As previously noted (Ivonin et al. 2018), the rapid eastward expansion of the *Nordmannia w-album* range provides further evidence supporting a recent Holocene dating for the disjunctions of ranges, primarily of nemoral Lepidoptera species, in Siberia. Indeed, as our predecessors have already noted, it is the disjunct ranges of such species that exhibit maximum dynamism in this case (Dubatolov & Kosterin 2000). Consequently, the detection of *Nordmannia w-album* in Khakassia and southern Krasnoyarsk Kray was not a surprise, as it was surely predictable and anticipated.

Pseudophilotes vicrama (Moore, 1865) [Yanovsky, 1996: 43 (Sayano-Shushenskiy Biosphere Natural Reserve)]

Material examined: Krasnoyarsk (Torgashinskiy Khrebet), 25.V.2006, 1♂, 1♀; Krasnoyarsk (Bazaikha), 05.VI.2006, 2♂, 1♀, G. Kuleshov (GKK).

Note: In the Catalogue (Lvovsky, Lukhtanov, Churkin & Morgun 2008: 311), the species was recorded for the southern Krasnoyarsk Kray and Khakassia. Meanwhile, in its second edition (Dubatolov, Lukhtanov & Streltsov 2019: 209), the species is considered as absent from our region, most likely due to a lack of reliable information by the edition's compilers. This is indirectly evidenced by our discovery of only a single reference to the capture of *P. vicrama* in the Sayano-Shushenski Nature Reserve report, a manuscript document infrequently cited (Yanovsky 1996). More recent findings presented here strongly confirm the presence of this rare butterfly, which is found very locally in our region. It should be added, that in the southern part of Krasnoyarsk Kray, *P. vicrama* favours dry slopes or, in damp stream valleys, small, stony outcrops. At the highest elevations of the Torgashinskiy Range, the butterflies are on the wing from late May to early June, whereas at the base of the Range, by the Bazaikha River, their flight period extends to late June (G. Kuleshov, personal communication).

Patricius lucifer (Staudinger, 1867) [*Lycaena lucifera* Stdgr. – Suschkin, Chetverikov, 1907: 27 (15 km verst of Us village, Mirskaya River); *Plebejus lucifera* (Staudinger, 1867) – Kosterin, 2023: 344 (Krasnoyarskiy Kray Province, Sharypovskiy District, 5 km NNE of Parnaya Village, 55°19'N, 89°16'E, 500-600 m. a.s. l., 1♂)].

Material examined: Kuten` Buluk-2, 25.VI.2023, 1♂; 15.VI.2025, 1♂; 20.VI.2025, 2♂, R.E. Maksimov (RMA).

Note: Previously, scarce findings of this inhabitant of steppe and meadow stony slopes in the southern part of Krasnoyarsk Kray had not been paralleled by data

from Khakassia. Therefore, this study reports the first reliably confirmed discoveries of *Patricius lucifer* in Khakassia.

Agriades (Albulina) orbitulus (Prüner, 1798) [*Lycaena pheretes* Hbn. *sajana* (Heyne) – Kozhantschikov, 1923: 13 (W. Sayans, the confluence of the Koyart and Us Rivers); *Lycaena pheretes sajana* Heyne. – Sheljuzhko, 1928: 118 (Sajan mts., vallis fl. Kujarg.)]

Material examined: Saylig-Khem-Taiga (southern border), 05.VII.1999, 2♂, R.E. Maksimov (RMA); Saylig-Khem-Taiga (southern border), 16.VI.2006, 1♂, 1♀, G. Kuleshov (GKK); 1♂; 28.VII.2016, 2♂, R.E. Maksimov (RMA); Saylig-Khem-Taiga (NW-slope), 27.VI.2015, 1♂; 15.VII.2024, 1♂, R.E. Maksimov (RMA);

Note: While this species was listed for Khakassia and the southern Krasnoyarsk Krai in the first edition of the Catalogue (Lvovsky, Lukhtanov, Churkin & Morgun 2008: 311), it was subsequently omitted from the second (Dubatolov, Lukhtanov & Streltsov 2019: 212), presumably because the authors lacked sufficient information. Meanwhile, *A. orbitulus* is hereby reliably reported by us for the first time for Khakassia. This butterfly, though not very frequent and usually found by single individuals, occurs in the alpine zone of the Kohosh and Saylig-Khem-Taiga Passes. On July 28, 2015, on the southern slope of the Saylig-Khem-Taiga Pass, the author witnessed a mass aggregation of dozens of specimens of this species at puddles in the vicinity of the Kara-Sug stream.

Agrodiaetus ripartii (Freyer, 1830) [*L. admetus* esp. var. *ripperti* Fr. – J. Pavel, 1901: 174 (Siberia: Minussinsk); *Lycaena admetus ripartii* Frr. – Suschkin, Chetverikov, 1907: 28 (Us village); *Lycaena admetus ripartii* Frr. – Kozhantschikov, 1923; 13 (Tagarsky Island, “Gryady”, Minussinsk-Bezirk); *Lycaena admetus ripartii* Frr. – L. Sheljuzhko, 1928 (Tagarsky Island, Minussinsk-Bezirk); *Lycaena admetus ripartii* Frr. – Ermolajev, 1935; 159 (Bezirk Minussinsk); Tuzov, 2000e: 464, fig. 5 (Krasnoyarsk Region, S Stolby Nature Reserve near Krasnoyarsk); ZMKU: Minussinsk vic.; Minussinsk, Tagarskij Ostrov; ISEA: Khakassia: Abakan river, Sartaban, Birichkul'; O. Kosterin (Novosibirsk): Tashtyp; S.Nikolaev, M.Tolstaya (Tashtyp district, The downstream of the Kurlugash River, 08.07.2004, 1m); O. Kosterin (Tashtyp district, Tashtyp River valley, right bank near Tashtyp village, 06.07.2000, 1m); Korshunov, (Tashtyp district, Sartaban river valley, 01-14.08.1972, 5m, 1f); V. Zinchenko, ex-R. Yakovlev coll. (Shira district, Kommunar vicinity, Malaya Sya river, 24.07.1998, 1m)]

Material examined: Ust'-Erba, 22.VII.2000, 1♂, 1♀, R.E. Maksimov (RMA); Chernoye Lake, 15.VII.2008, 3♂; Belyi Balakhchin, 15.VII.2009, 1♂; Samokhval, 21.VII.2009, 1♂, S.V. Dragan (SDA); Yugachy, 09.VII.2016, 2♂, 1♀; Syda Bay, 13.VII.2019, 2♂, 1♀; Efremkino (Pandora's Box Trail), 24.VII.2021, 2♂, 04.VIII.2023, 1♀; Oglakhty-1, 28.VII.2021, 1♂, 1♀; Gryady, 01.VIII.2021, 2♂, 2♀; Chalpan, 23.VII.2021, 2♂, 1♀; Kuten Buluk-2, 29.VII.2022, 3♂, 1♀, R.E. Maksimov (RMA).

Note: The fact that this common and widespread inhabitant of steppes, forest-steppes, and dry meadows is considered as absent for Khakassia and southern Krasnoyarsk Krai, in both the first (Lvovsky, Lukhtanov, Churkin & Morgun 2008: 314) and the second (Dubatolov, Lukhtanov & Streltsov 2019: 214) editions of the Catalogue, necessitates its inclusion in our list. Considering the many records of *A. ripartii* captures in our region by our predecessors, we deem this was a regrettable oversight. The population size of this species can at times be so large that it impedes precise enumeration. *A. ripartii* frequently exhibits a marked quantitative dominance over other Lepidoptera species.

Family Nymphalidae

Limenitis helmanni Lederer, 1853

Material examined: Atkhol, 14.VII.2024, 1♂, R.E. Maksimov (RMA).

Note: Previously, *L. helmanni* was unknown in Khakassia and the southern Krasnoyarsk Krai, making its first documented reports from the region. It appears that, similar to several other nemoral forest species, this butterfly has been actively extending its range in recent years, moving into Khakassia from the north-west. It follows river courses from the Kemerovo region, where the species was noted in the foothills of the Western macroslope of Kuznetsky Alatau as far back as the early XXth century (Tshugunov 1916: 99). Apparently, the unexpected appearance of this butterfly in Khakassia was influenced by the "window of opportunity" of the current climat warwing, which opened up a decade and a half ago in Siberia and is now being utilized by some nemoral forest species.

At present, the author has captured a single, rather worn-out male specimen en route to the Sailyg-Khem-Taiga pass, in the vicinity of the settlement of Kubayka, directly on a rocky slope near the highway running along the Atkhol River. *Lonicera tatarica* L. was noted as the host plant for caterpillars of this species at our capture site (Ivonin et al. 2013). The discovery of *L. helmanni* in Khakassia suggests the eastward shift of this butterfly's range. Judging by the rarity of such captures, the species is advancing towards us not in a broad front, but along individual vectors, via river and stream mouths. The typical habitats of *L. helmanni* are the edges of ribbon forests, forest clearings, mixed forests, and riparian thickets.

Euphydryas laeta (Christoph, 1893) [*Melitaea aurinia* Rott. – Suschkin, Chetverikov, 1907; 16 (Us village); *Melitaea aurinia sibirica* Stgr. – Kozhantschikov, 1923: 7 (Minussinsk-Bezirk); Ermolajev, 1935: 159 (Umgebung der Siedlung (= Jurty) Domoshakovy, Bezirk Minussinsk); ZMKU: Minussinsk, Tagarsky Ostrov; ISEA: Khakassia: Petshistshe river valley; *Euphydryas aurinia laeta* (Christoph, 1893) – O. Kosterin (Novosibirsk): 11 km NWW Shira, 54°32' N 89°47' E, 18.05.2022, 1♂;]

Material examined: Balankul', 06.VI.2002, 1♂, R.E. Maksimov (RMA); Samokhval, 05.V.2005, 4♂, S.V. Dragan (SDA); Oglakhty-1, 04.VI.2021, 5♂, 2♀; 03.VI.2023, 2♂; 25.V.2024, 4♂; Uyttag 1, 15.VI.2021, 5♂, 2♀, R.E. Maksimov (RMA).

Note: From the extensive list of findings by our predecessors, it becomes clear that this inhabitant of xerophytic meadows and steppes in the territory of Khakassia and the southern Krasnoyarsk Krai has been well and long known, but under its synonyms *Melitaea aurinia* (Rottemburg 1775) or *Melitaea aurinia sibirica* (Staudinger 1871). However, the species is not mentioned for our region in the first edition of the Catalogue (Lvovsky, Bogdanov & Morgun 2008), most likely due to an unfortunate oversight. The second edition of the Catalogue (Dubatolov, Lvovsky & Streltsov 2019: 217) lists *E. laeta* as a distinct species (Korb & Bolshakov 2011), yet unexplainably omits its presence in Khakassia and the southern part of Krasnoyarsk Krai. We highlight this omission, in agreement with our predecessors. It should be noted that *E. laeta* is found in the steppes and forest-steppes of our region from late April to mid-June significantly more often than it is indicated by our list of findings.

Clossiana freija (Thunberg, 1791) [*Argynnis freija* Thub. – Suschkin, Chetverikov, 1907; 20; *Argynnis freija* Thub. – Kozhantschikov, 1923: 10]

Material examined: Saylig-Khem-Taiga (southern border), 25.V.2003, 3♂, 1♀, G. Kuleshov (GKK).

Note: On the one hand, the presence of this species in the regions surrounding Khakassia and the southern Krasnoyarsk Krai allowed us to expect its early findings in our area as well. On the other hand, an analysis of previous works directly indicated that this species had been found by only two researchers. Furthermore, in the original source (Suschkin & Chetverikov 1907), the species was presented without precise geographical data on the label, while another work (Kozhantschikov 1923) merely cited rather vague indications from previous scientists. Consequently, the data we have gathered on the capture of this rare inhabitant of high-altitude coniferous forests, wetlands, and dwarf birch mountain tundras stands as the only credible evidence of the presence of this species in our region to date.

Boloria aquilonaris roddi Kosterin, 2000 [*Boloria aquilonaris? buerteri* – Churkin, Bogdanov 2003: 218–219 (West Sayan: Shevelinsky Pass; Aradanskyi Mts., Aradan Russia); *Boloria aquilonaris* – Tshikolovets et al. 2009 (ZMKU: Minusinsk vic., Mozharskie ozera)]

Material examined: Saylig-Khem-Taiga (southern border), 02.VII.2003, 1♂, G. Kuleshov (GKK); Ivanovskie Lakes, 11.VI.2022, 2♂, 1♀, R.E. Maksimov (RMA).

Note: The taxon is noted for Khakassia and the southern part of Krasnoyarsk Krai as *Boloria aquilonaris aquilonaris* (Stichel, 1908) (Dubatolov, Lvovsky & Streltsov 2019: 221), a designation that, in our view, represents an erroneous identification. As observed in Altai a separate subspecies is characteristic – *B. aquilonaris roddi* is restricted to wide and flat river valleys at high elevations (Kosterin 2000), and not to sphagnum bogs (mires) in lowlands and at moderate elevations. This butterfly is similarly found in the Western Sayan Mountains, specifically in stream valleys in the vicinity the Saylyg-Khem-Taiga Pass, and in the Kuznetsky Alatau, around the Ivanovskie Lakes. It occurs at altitudes of 1550–2000 m, inhabiting moist

or slightly marshy meadows where *Dasiphora (Pentaphylloides) fruticosa*, *Betula rotundifolia*, and *Salix* sp. grow in thickets. The discal band in males from Khakassia is more reddish than *B. a. banghaasi*. where it is ochraceous-yellow, which may be assumed as inclination towards *B. aquilonaris aquilonaris*, where it is brick-red. Besides this, our specimens exhibit a single reliable distinction of *B. aquilonaris roddi* from *B. aquilonaris aquilonaris* and *B. aquilonaris banghaasi* – a narrower black and contrasting pattern on the upper wings. However, the postdiscal band does not touch the discal cell, or only slightly touches it in very rare cases.

Issoria lathonia (Linnaeus, 1758)

Material examined: Krasnoyarsk (Nikolaevskaya Sopka hill), 08.V.1995, 1♀, I.S. Zakharzhevsky (MIK); Ergakii (Oyskoye Lake), 14.VIII.1998, 3♂, 2♀, R.E. Maksimov (RMA); Minino, 07.VIII.2001, 1♂, M.A. Ivanov (MIK); Samokhval, 06.VII.2016, 1♂, S.V. Dragan (SDA); Semeynaya, 12.VIII.2021, 1♂, 1♀; Shushenskiy Bor, 01.V.2025, 2♂, R.E. Maksimov (RMA).

Note: Although the first edition of the Catalogue (Lvovsky, Lukhtanov, Churkin & Morgun 2008: 318) listed the species as present in Khakassia and the southern Krasnoyarsk Kray, the second edition (Dubatolov, Lvovsky & Streltsov 2019: 222) presented it as absent from our region. To our surprise, *I. lathonia* proved to be one of the few taxa on the published list that lacked any reliable confirmations of captures in the preceding scientific literature regarding the studied territories. This species is thus reported for the first time from Khakassia and the southern Krasnoyarsk Kray. This was quite unexpected, given that, in our opinion, this taxon is not rare. It is worth noting that the number of specimens presented above does not reflect all encounters of this common species, but rather indicates the material stored in the collections. For instance, on 14.VIII.1998, the author observed dozens of *I. lathonia* specimens active along a considerable portion of the "Yenisey" federal highway, extending from Locatornaya Mountain to Aradan village.

Argynnis sagana Doubleday, 1847 [*Argynnis sagana relict*a Korshunov, subsp. n. Korshunov, 1984: 59-61 (Krasnoyarsky Kray, Tyazhynsky leskhoz, kvartal 65, 23.VIII.1958 – Grygoryev; Krasnoyarsky kray, Taseevsky district, Sutyagi village, VII.1966, 1♀, leg. Loshchinsky; Krasnoyarsky distr., E. Sayan mts., middle part of Sisim river, 02.VII.1981, 1♂, leg. Siltshenko.)]

Material examined: Belyi Yar, 27.VII.2006, 2♀, R.E. Maksimov (RMA); Karaul' naya, 21.VII.2014, 2♂, 1♀, M. A. Ivanov (MIK).

Note: While this species is listed in the Catalogue for our region (Dubatolov, Lvovsky & Streltsov 2019: 222), only a single literature source could be found reporting its sporadic occurrences (Korshunov 1984). In this regard, we consider it necessary to point out a couple of previously unpublished reliable records for *A. sagana* in our region. Numerous attempts to find this species in these and other similar localities – humid deciduous forests and forest clearings along riverbanks – in subsequent years have so far yielded no positive results.

Family Satyridae

Maniola jurtina (Linnaeus, 1758)

Material examined: Efremkino (North vicinity), 22.VII.2022, 1♂, R.E. Maksimov (RMA).

Note: The first edition of the Catalogue (Lvovsky, Lukhtanov, Bogdanov & Morgun 2008: 320) indicated that the eastern boundary of the *Maniola jurtina* range was located in the South-West Siberian region, precisely in the Omsk and Novosibirsk Regions. In the meantime, the second edition of the Catalogue (Dubatolov, Lukhtanov & Streltsov 2019: 226) points to the presence of this species considerably further east, in the western foothills of Altai. Such an obvious eastward range shift of *Maniola jurtina* can hardly be explained solely by poor territorial research. A noticeable warming and less severe Siberian winters over the last 15-20 years (Dubatolov & Kosterin 2000), are far more likely to be driving the active eastward spread of the nemoral species. It is widely known that the eastward expansion of *M. jurtina* at a rate of 50 km per year has been documented (Ivonin et al. 2016, 2018). This assumption of the cited authors was also corroborated, suggesting that the range expansion of *M. jurtina* is occurring in a more diffuse manner, rather than as a broad front. In any case, we haven't encountered this butterfly in the subsequent two years. Meanwhile, it's not surprising to find only one *M. jurtina* specimen in Khakassia so far. It is also highly probable that with any possible noticeable cooling of the climate, the range of this butterfly may recede to its former boundaries.

Oeneis aktashi Lukhtanov, 1984 [*Oeneis aktashi ona* Korshunov, 1996 ssp. n. (W. Sayan, Sayalyg-Khem-Tayga mts., Sayansky pass, 28.07.1975, 14 sp, Korshunov leg.); *Oeneis sarala* Korshunov, sp. n. – Korshunov, 1988: 74-76 (Kuznetsky Alatau, upper of Sarala river, Bobrovaya mt., 09.VII.1975, 1♂, 1♀, Korshunov leg; *Oeneis aktashi ona* Korshunov, 1996 – (Sayanskiy Pass, 07.07.2000, 4♂, 4♀, O. Kosterin leg.)]

Material examined: *Oeneis aktashi sarala* (Korshunov, 1998): Bobrovaya, 14.VII.1993, 1♀, R.E. Maksimov (RMA); Bobrovaya, 14-15.VII.1993, 6♂, 1♀, A.V. Chuvilin (ACT). *Oeneis aktashi ona* (Korshunov, 1996): Saylig-Khem-Taiga (southern border), 05.VII.1999, 2♂, 2♀; 09.VII.2000, 1♂, 2♀; 30.VI.2002, 1♂, 1♀; 19.VI.2022, 1♀; R.E. Maksimov (RMA).

Note: In the second edition of the Catalogue (Dubatolov, Lukhtanov & Streltsov 2019: 229), the subspecies *Oeneis aktashi sarala* Korshunov, 1988 was mentioned Khakassia, but *Oeneis aktashi ona* Korshunov, 1986, which is only indicated for the Republic of Tuva, is absent. Meanwhile, both of these subspecies were described precisely from Khakassia and received their names from the Ona and Sarala rivers, which flow through its territory. The confusion was most likely caused by the fact that the type locality of *O. a. ona* is located directly on the administrative border between Khakassia and Tuva, which in this area runs along the Sayanskiy Pass through Sailyg-Khem-Taiga. Thus, butterflies caught at this point can be attributed to both Khakassia and Tuva, as they cross the administrative border of these

territories within their locality. Over years of research at this location started in 1998, the author has amassed a quite representative series of the subspecies *Oeneis aktashi ona*, demonstrating significant polymorphism and variability among individuals of this taxon, even within this single collection point. At the same time visual comparisons of series of *Oeneis aktashi aktashi* Lukhtanov, 1984, *Oeneis aktashi ona* Korshunov, 1996, and *Oeneis aktashi sarala* Korshunov, 1988, contrary to Y.P. Korshunov's assertion that "the new differs from all known ones, including *O. aktashi* Likh. (Lukhtanov 1984), both in pattern and in details of the male genital apparatus" (Korshunov, 1988), did not show convincing differences between these three groups, although they did demonstrate significant variability within each of the *O. aktashi* populations. In private correspondence, V.A. Lukhtanov, whose recent molecular genetic comparisons of these subspecies (in the validity of which the author seriously doubts) despite this, he reported that revealed minor discrepancies between specimens from the Western Sayans and Kuznetsk Alatau Mountains.

Oeneis magna dubia Elwes, 1899 [*O. magna magna* – Korshunov, Nikolaev 2002: 166 (Khakassia, Askiz Distr., Biriktshul', 4♂, 26-27.06.1969); Korshunov, 2002: 333 (E., W. Sayan; Khakassia); p. 103, fig. 41.1-4 (genitalia; Khakassia, Biriktshul'); p. 105, fig. 42.5 (genitalia; Khakassia, Biriktshul'); Pl. 3, fig. 8 (Khakassia, Biriktshul')]. *Oeneis magna* ssp. (?) – Korshunov, 2002; Pl. 3, fig. 4 (Tuva/Khakassia, the first stream near Sayansky pass)].

Material examined: Shira (Western environs), 20.VI.1990, 1♂, 1♀; I.S. Zakharzhevsky.

Note: In both the first edition of the Catalogue (Lvovsky, Lukhtanov, Bogdanov & Morgun 2008: 322) and the second (Dubatolov, Lukhtanov & Streltsov 2019: 230), this species is given as absent from Khakassia and the southern Krasnoyarsk Kray. Meanwhile, its findings in almost all bordering regions eloquently indicated a high probability of the presence of *O. magna dubia* in our area. This also indirectly evidences for the poor study of our territory and the rarity of the butterfly itself, which usually inhabits grassy river valleys, forest-steppes, and sometimes forest areas. However, this species has indeed been found in our region. The data presented above include both published scientific records and new, unpublished locations of this taxon in Khakassia and the southern part of Krasnoyarsk Kray.

Oeneis norna altaica Elwes, 1899 [*Oeneis norna altaica* Elw. – Suschkin, Chetverikov, 1907: 22 (Sayan Mts., Oi lake, ♂♂, ♀♀); *Oeneis norna altaica* Elw. – Kozhantschikov, 1923: 5 (Kysyr-Sug spring, VI.1918, ♂♂, ♀♀, leg. L.W. Kozhantschikov, I.W. Kozhantschikov; Buiba Lake, Irgek-Targak-Taiga, VI.1918, ♂♂, ♀♀, leg. L.W. Kozhantschikov, I.W. Kozhantschikov.); *Oeneis shurmaki* Korshunov, 1988 – Korshunov, 2002: 327 (Kuznetsk upland (Pravaya Sarala river); p. 95. fig. 37.8-13 (genitalia; Khakassia, Kuznetsky Alatau, upper reaches of Pravaya Sarala river; Yanovsky, 1996:41; *Oeneis norna altaica* Elwes, 1899 – Ivonin, Nikolaev, 2009 (Sayanskiy Pass); *Oeneis norna altaica* Elwes, 1899 – Kosterin, 2023: 348, 2♂, 1♀, (Sayanskiy Pass);

ISEA: Khakassia: Bobrovaya, Agaskhyr, Sayanskii pass; Coll, Yakovlev (Barnaul): Khakas Republic, Shaman Range, 18.06.2003, 2♂ D. Glushko leg.].

Material examined: Ivanovskie Lakes 2, 06.VII.2003, 1♂; Saylig-Khem-Taiga (S-exposed slope), 27.VI.2015, 2♂, 2♀; Saylig-Khem-Taiga (mountain top), 1♂, R.E. Maksimov (RMA); Saylig-Khem-Taiga (Bolshoy On headwater), 25.V.2003, 2♂, 1♀, G. Kuleshov (GKK); Shaman, 11.VII.2004, 1♂, S.V. Dragan (SDA); Ergakii Lokatornaya 1, 17.VII.2009, 4♂, 2♀, M.A. Ivanov (MIK).

Note: The fact that this inhabitant of mountain tundras and high-altitude coniferous areas, interspersed with rocky scree slopes at an altitude of 1300 to 2200 m, was not stated as present in our region in either the first (Lvovsky, Lukhtanov, Bogdanov & Morgun 2008: 322) or the second edition of the Catalogue (Dubatolov, Lukhtanov & Streltsov 2019: 230) is, in our view, attributable solely to an unfortunate oversight. In confirmation of this, a sufficient volume of known information about the findings of *O. norna* has been provided above, both in Khakassia and in the southern part of Krasnoyarsk Krai. This is eloquently demonstrated by the list of relatively recent findings of this species that we are providing, both in the Western Sayans Mountains and in the Kuznetsky Alatau. As with *O. aktashi*, visual comparisons of *O. norna* specimens from the Altai Mountains, Western Sayans, and Kuznetsky Alatau showed no discernible differences between series of specimens from these regions, allowing for discussion of different subspecies. In contrast, within each of the studied localities, considerable polymorphism was observed, yet these forms were consistent with the subspecies *Oeneis norna altaica* Elwes, 1899.

Discussion

Thus, the butterflies included in our list can be divided into two conditional groups:

1. Fifteen that were absent from Khakassia and the southern Krasnoyarsk Krai according to the second edition of the Catalogue of Butterflies of Russia, but were mentioned in preceding scientific literature for our region;

2. Five taxa, recorded by us for Khakassia and/or the southern Krasnoyarsk Krai for the first time.

The remarkably large number of species and subspecies in the first part eloquently evidences for the poor understanding of the region's biodiversity, even concerning such a well-studied taxonomic group as Papilionoidea. In our opinion, the primary reason for this situation is the weak and extremely incomplete usability of the fragmented and sometimes hard-to-access reports, scientific articles and books compiled by our predecessors. There is an opinion that with the years, old reports and research papers largely lose their scientific potential. However, neglecting older scientific works leads to the loss of the large layer of knowledge. This is clearly evidenced by the significant number of species newly confirmed for our region that were previously noted in the area but were not reflected in the Catalogue. In the process of preparing this article, we were surprised to realize the absence of any

comprehensive bibliography on Lepidoptera, Papilioidea of Khakassia and the southern Krasnoyarsk Kray, so we attempted to present one here for the first time. Through years of extensive research, several sources of scholarly information have been discovered that, for various reasons, had been neglected or underutilized in the Russian academic sphere circulation for a long time (Trybom 1877; Pavel 1901; Haanshus 1922; Kondakov & Baranchikov 1975; Yanovsky 1996, 2002). It is hoped that this list will continue to grow, both with new works and with articles from previous years, which will serve to systematically expand our knowledge of the biodiversity of diurnal butterflies in our region.

The insect fauna, particularly Lepidoptera, Papilionoidea in Khakassia and the southern part of Krasnoyarsk Kray has experienced considerable shifts in recent decades. Based on discoveries of recent years, the boundaries of the distribution of nemoral species like *Nordmannia w-album*, *Maniola jurtina*, and *Apatura iris* (Dragan 2018) are moving eastward and approaching our region. A key reason on this process is the noticeable warming of the climate in southern Siberia, as well as elsewhere, which we would suggest to refer to the Second Holocene Climatic Optimum. As was recently noted (Dubatolov & Kosterin 2000), it is precisely the ranges of nemoral species that exhibit the highest dynamism in the event of climate warming. Here we provided the first record of the analogous eastward range expansion of another nemoral species *Limenitis helmanni*. As a result of the region's limited exploration, two more additions to the regional fauna are made, of *Pseudophilotes vicrama* (Moore, 1865) and *Issoria lathonia* (Linnaeus, 1758). There is no doubt that the here presented findings are far from exhaustive, as the process of studying the entomological biodiversity of Khakassia and the southern Krasnoyarsk Kray is still going on. It is also not difficult to suppose that, in connection with the sustained warming of the climate in Southern Siberia, our entomofauna may be replenished in the coming years by newly arrived migrant species.

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