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## New data on butterfly fauna (Lepidoptera, Diurna) of the Katunskii mountain range (Central Altai)

### О.Э. Костерин. Новые данные по фауне дневных бабочек (Lepidoptera, Diurna) Катунского хребта (Центральный Алтай)

**Key words:** Butterflies, Diurna, Hesperioidea, Papilionoidea, the Altai Mts., fauna.

**Ключевые слова:** дневные бабочки, Diurna, Hesperioidea, Papilionoidea, Горный Алтай, фауна.

**Abstract.** Ninety eight butterfly species were recorded by an expedition to the Akkem River basin on the Katunskii Range (Central Altai) northern principal slope which took place on 26.06.-9.07.2007. Eleven butterfly species are added to 127 ones reported for the range by the author earlier [Kosterin, 1994]. Of them, 7 were for the first time found during this expedition: *Pyrgus serratulae* (Rambur, 1839); *Syrichthus cribrellum obscurior* (Staudinger, 1892); *Parnassius s. stubbendorffii* Ménétrics, 1849; *Lycaena p. phlaeas* (Linnaeus, 1761); *Glaucopsyche alexis* (Poda, 1761); *Cupido osiris* (Meigen, 1829); *Lasiommata maera* (Linnaeus, 1758); 1 is added by an old collection in the Argut River valley: *Agrodiaetus ripartii* (Freyer, 1830); 3 were identified from the material misidentified in [Kosterin, 1994]: *Leptidea reali yakovlevi* Mazel, 2001 (1 specimen misidentified as *Lepidea morsei* Fenton, 1881), *Oeneis magna dubia* Elwes, 1899 (misidentified as *Oeneis norna altaica* Elwes, 1899); *Erebia s. stubbendorffii* Ménétrics, 1846 (misidentified as ‘*Erebia brimo* (Böber, 1809)’, under which *Erebia maurisius* (Esper, 1803) was implied, which still has not been recorded on the Katunskii Range). The two latter species were also collected in 2007; *L. reali* was not collected but the true *L. morsei* was, which was absent from the materials by Kosterin [1994]. Besides, in [Kosterin, 1994] *Plebejus idas sailjugemicus* Zhdanko et Samodurov, 1999 was misidentified as *Plebejus argyrognomon* (Bergsträsser, 1779). Thus, 138 species are presently recorded in the Range. The collected material of the added species is enumerated. New data on habitat preferences of some species and taxonomical comments on *Plebejus idas* (Linnaeus, 1758) are provided

**Резюме.** Экспедицией в бассейн р. Аккем на северном макросклоне Катунского хребта (Центральный Алтай), имевшей место 26.06–9.07.2007, найдено 98 видов дневных бабочек. К 127 видам, приведенным автором для этого хребта ранее [Kosterin, 1994], добавляется 11.

Из них 7 найдено в ходе экспедиции: *Pyrgus serratulae* (Rambur, 1839); *Syrichthus cribrellum obscurior* (Staudinger, 1892); *Parnassius s. stubbendorffii* Ménétrics, 1849; *Lycaena p. phlaeas* (Linnaeus, 1761); *Glaucopsyche alexis* (Poda, 1761); *Cupido osiris* (Meigen, 1829); *Lasiommata maera* (Linnaeus, 1758); 1 добавлен по старым сборам С. Богачева из долины р. Аргут: *Agrodiaetus ripartii* (Freyer, 1830); 3 переопределены по ранее неправильно определенным материалам (Kosterin, 1994): *Leptidea reali yakovlevi* Mazel, 2001 (один экземпляр, ранее определенный как *Lepidea morsei* Fenton, 1881), *Oeneis magna dubia* Elwes, 1899 (был определен как *Oeneis norna altaica* Elwes, 1899); *Erebia s. stubbendorffii* Ménétrics, 1846 (был определен как ‘*Erebia brimo* (Böber, 1809)’, под которой подразумевалась *Erebia maurisius* (Esper, 1803), на самом деле на хребте не отмеченная). Два последних вида собраны также в 2007; *L. reali* встречена не была, однако встречена настоящая *L. morsei*, отсутствовавшая в материалах для статьи [Kosterin, 1994]. Кроме того, в упомянутой статье *Plebejus idas sailjugemicus* Zhdanko et Samodurov, 1999 был неверно определен как *Plebejus argyrognomon* (Bergsträsser, 1779). Таким образом, на данный момент с территории хребта известно 138 видов дневных бабочек. Для видов, добавляющихся к фауне хребта, приведен коллекционный материал. Приводятся новые данные по биотопической приуроченности видов.

#### Introduction

Basing on the collections and observations obtained during four seasons, 1985-1988, spent on the Katunskii Mountain Range (Катунский хребет) or Katunskie Belki Range (хребет Катунские белки) of Central Altai (Катунский хребет. Центральный Алтай) I published a paper about its butterfly fauna [Kosterin, 1994]. On 26.06–9.07.2007 I was lucky to participate in the expedition of the Katunskii State Nature Reserve (Государственный природный заповедник “Катунский”) aimed to investigate the nature of the neighbouring territory of the Belukha Nature Park (Природный парк “Белуха”), and so to revisit the Akkem River basin (бассейн р. Аккем), which had been previously visited in 1985 (but the collecting sites partly did not coincide). I was

fortunate to add 9 more species to the fauna of the Katunskii, that is published herewith. Two more species are added by older collections. Now we know 138 species for this range. Some more species are still expected. Knowledge of the butterfly fauna of this range are important (i) since the range includes the highest summit of the Siberia, the Belukha Mountain (г. Белуха), 4506 m above sea level, and thus is the highest range in the entire Altai-Sayan Mountain System and (ii) since this range, especially just the Akkem River basin which is within the Belukha Natural Park (existing mostly in documents than in reality), is an area of explosively developing tourism. So it may suffer from over-recreation and is to be intensively visited by butterfly 'lovers' of all kinds. The first goal to solve a problem of protection of the rich butterfly fauna of the Belukha Natural Park is to reveal its precise species composition. This paper is one of the steps in this direction.

The list of butterfly species observed is given here as a table with conventional scores of abundance, while all new information and interesting observations added to [Kosterin, 1994] are provided in comments. Information of specimens collected is reported only for the species for the first time reported for the range.

### Collecting sites

For a general characterization of the natural conditions of the range look at O.E. Kosterin [1994]. Observations and collections were made in the following sites and areas, here abbreviated with short conventional names.

Kuzuyak – the roads going through the Kuzuyak Pass (перевал Кузуйак) through a northern spur dividing the lower Kucherla (р. Кучерла) and Akkem valleys: elevations between 1010 and 1590 m above sea level: mixed *Larix sibirica* Ledeb. / *Betula pendula* Roth. forests at lower elevations and *Picea obovata* Ledeb. / *Larix sibirica* taiga at higher elevations, both alternating with large meadows with the aspect of *Carum carvi* L., *Geranium pratense* L. etc. Coordinates of the very pass are: 50°06.395' N, 86°25.704' E. Examined on 26.06.2007 and 9.07.2007.

Akkem meadows – rich herbaceous meadows and long fallow lands, with some larch parkland, of the Akkem River right bank terraces at the Oroktoi Brook (руч. Ороктой) mouth. Partly correspond to the LOWER AKKEM locality in [Kosterin, 1994]. Examined on 6–9.07.2007.

Oroktoi – the Oroktoi brook gorge from its mouth (50°06,240' N, 86°28.815' E, 1009 m above sea level) upstream to its left tributary the Sala-Koba brook (руч. Сала-Коба), also the valley of the latter up to the Adzhara-Burunda terrain (ур. Аджара-Бурунда) on the opposite (southern) side of the Borondinskii Ridge (50°04,717' N, 86°32.698' E, 1940 m above sea level). At the lower levels, southern slopes are covered with stone steppe with domination of *Artemisia santolinifolia* Turcz. ex Bess. (partly degraded by sheep overgrazing), while the brook banks and northern slopes are covered with spruce taiga (with admixture of *Larix sibirica* and *Pinus sibirica* Du Tour.); above 1500 m the steppe is replaced by shrubbery (*Rosa spinosissima* L., *Caragana arborescens* Lam., *Spiraea* spp.); the Sala-Koba valley is covered by mostly a 'cedar' (*Pinus sibirica*) taiga; Adzhara-Burunda is a very large slanting glade with a tall-herb

subalpine meadow with dominance of *Veratrum lobelianum* Bernh. The rocks are composed mostly by shale. Examined on 27.06.2007 and July 5–8.07.2007.

Aryskan – the Tukman River (р. Тукман) valley downstream from 50°04,066' N, 86°34.500' E, 1740 m above sea level, to its fall into the Aryskan River (р. Арыскан), the valley of the latter until somewhat downstream of the Aktashka brook (руч. Акташка) mouth (50°03' N, 86°35' E, about 1710 m a. s. l.), and the left slope of the Aryskan valley until the pass to the Kamdyt valley (лог Камдыт). Gorges covered with the taiga of mixed *Larix sibirica* and *Pinus sibirica*, at the Aryskan lower reaches with few birches. In the Tukman valley there are openings with tall-herb forest meadows and bogged low shrubbery of *Salix* spp and *Pentaphylloides fruticosus* (L.) Schwartz. In the Aryskan valley there are large-stone screes with their characteristic flora. Examined on 27–28.06.2007 and 4–5.07.2007.

Kamdyt – the Kamdyt valley, with a brook being the right tributary of the Tekelyu River (р. Текелю). The area, examined on 29.06-5.07, is restricted by the low reaches of the Kamdyt brook where our camp situated (49°59.094' N, 86°33.154' E, 2150 m a. s. l.), the top of the Skynchak vertical cliff (49°58.686' N, 86°34.136' E, 2514 m a. s. l.) the top of the mountain closest to it (49°59.109' N, 86°34.900' E, 2699 m a. s. l.), the pass to the Aryskan valley (50°00.031' N, 86°33.763' E, 2402 m a. s. l.), and the rocks on the right ridge closing the Kamdyt valley (49°59.145' N, 86°32.924' E, 2260 m a. s. l.). The wide and gentle Kamdyt valley exhibited an inversion of vertical zonality: its bottom are covered with a boggy dwarf birch (*Betula nana* L. s. l.) tundra, more elevated lateral parts are clad with flowery alpine meadows and patches of a short-grass subalpine meadows (with indicative species *Bistorta officinalis* Delabre and *Aconogonon alpinum* (All.) Schur), the valley slopes are covered with open larch taiga, with participation of 'cedar' and by large-stone screes, bearing open park-like stand of *Salix sajanensis* Nasarov, the crests are covered with dry tundras, dwarf birch, lichen or *Dryas oxyodonta* Juz., and broken stones. The rocks are represented exclusively by granites. A peculiarity of this area is abundance of impressive column- or wall-like zeugen rocks of weathered matraz-like granites, which would more fit to some Central Asian arid landscape but here crowning the crests tops of the local mountains. Examined since 28.06.2007 till 4.07.2007.

### The list of species

The list of species met with and the conventional scores of their abundance are provided in the Table. The subspecies attribution, if any, is accepted following Gorbunov, Kosterin [2003; 2007], if otherwise not stated. The estimations of abundance are very arbitrary and incomparable for large and small species, abundance of the latter being underestimated 'by eye'. The period of our expedition coincided with the flight period of most species and their maximum abundance, yet abundance of some of them somewhat changed with time (e. g. decreased dramatically for *Aporia crataegi* (Linnaeus, 1758), increased for *Polyommatus erotides* (Staudinger, 1892) and *Boloria napaea altaica* (Grum-Grshimailo, 1893), etc.). Since Kuzuyak and Aryskan were examined shortly, many quite common species surely remain not recorded there.

The materials collected will be kept in the collection of the Siberian Zoological Museum at the Institute of Systematics and Ecology of Animals of the Siberian Branch of the Russian Academy of Sciences and in the private collection by Prof. Dr. Tomoo Fujioka, Tokyo.

### Comments and discussion

Hereby I provide any data and observations which update or do not coincide with those provided in my previous paper (Kosterin, 1992).

*Carterocephalus palaemon* (Pallas, 1771). Although this species is usually found in lowland South Siberian forests together with *C. silvicola* (Meigen, 1830), although less abundant, here we obtain hints on their different ecological preference: while *C. silvicola* was abundant everywhere in forest environments, up to the uppermost larch stands in the Kamdyt valley, *C. palaemon* was absent at low levels, once, on 28.06.2007, it was collected in the Aryska valley (almost together with *P. centaureae* (Rambur, 1839)), but in larch stand edges in the Kamdyt valley, at 2150 m above sea level, it appeared almost equal in number with *C. silvicola*. So, in the Katunskii Range *C. palaemon* behaves as a more highland species. (Note that a specimen was collected at exactly the same elevation in the ‘Confluent of Argem’ [Kosterin, 1994]). Noteworthy that at and in Omsk, in a semiarid forest-steppe environment, *C. palaemon* is common but *C. silvicola* is absent [Kosterin, Ponomarev, 2002]. All this may suggest that *C. silvicola* tends to replace *C. palaemon* from the pure forest environments to peripheral forests: birch groves among lowland steppe or larch groves in highlands. It is also not excluded that *C. palaemon* as such prefers more open habitats.

\* *Pyrgus serratalae* (Rambur, 1839). One fresh male was collected on the western slope of the Kuzuyak Pass in open birch-larch forest on 26.06.2007 and two extremely worn out females were collected on the Akkem terrace meadows on 6.07.2007.

*P. centaureae kurentzovi* Korshunov, 1995. This is a highland skipper, two males of which were, however, collected in the Aryska valley on 28.06.2007 as low as at 1700 m above sea level – in an opening in a larch/spruce taiga near a large-stone scree with abundant lichens. In the highland valley of Kamdyt only two male specimens were collected in the dwarf birch tundra on 3.07.2007.

\* *Syrichthus cribrillum obscurior* (Staudinger, 1892). Two extremely worn out females were collected on a large glade with ruderal vegetation (*Urtica cannabina* L., *Cirsium setosum* (Willd.) Bess., *Carduus crispus* L., *Arctium tomentosum* Mill., *Anthriscus sylvestris* (L.) Hoffm., locally called ‘Konoplyanaya polyana’ (Конопляная поляна) in at the middle of the Oroktoi valley on 27.06.2007 and 7.07.2007, respectively. In South Siberia this is a common but early flying steppen skipper which so escaped from my net in July 1985–88 [Kosterin, 1994].

*Spialia orbifer* (Hübner, [1823]). A male of this meadow species was unexpectedly collected, on 28.06.2007, in quite a taiga’s environment at the fall of the Tukman River into the Aryska River, in a small gap in the coniferous tree stand. Most probably, it migrated from the neighboring very steep slopes with cliffs, where some meadow vegetation was present.

*Parnassius phoebus phoebus* (Fabricius, 1793). These butterflies were very abundant on alpine meadows in the Kamdyt valley and strongly kept to them, avoiding patches of the dwarf birch tundra. Noteworthy that their larval foodplant there most probably was a very rare species *Rhodiola krylovii* Polozhij et Revjak. (= *Rh. pennatifida* subsp. *subpinnata* Krasnob.), an endemic of the highest ranges of Altai and the Mongun-Taiga Massif in SW Tuva. It was unexpectedly abundant at the Kamdyt brook, while *Rh. rosea* L., the common larval foodplant of *P. phoebus* in Altai, was much less abundant. *Rh. krylovii* differs from *Rh. rosea* by glossy leaves without a waxy bloom, absence of red tones in the inflorescence, and larger individuals with numerous stems sprouting from a more robust rhizomata, which grow at running water. Noteworthy that on 7.07.2007, I encountered a very worn out female of *P. phoebus* feeding at the dandelion inflorescences as low as at above sea level in the above mentioned ruderal opening in the Oroktoi valley. Such a low occurrence of this species is rare but regular [Kosterin, 1994].

\* *P. stubbendorffii stubbendorffii* Ménétriés, 1849. This species was expected but did not recorded on the Katunskii Range. As the previous one, it appeared abundant in the Kamdyt valley on alpine meadows (at 2150 m above sea level) but did not so strictly avoid patches of the dwarf birch tundra and tended to wet places, where its larval foodplant, *Corydalis pauciflora* (Stephan) Pers. grew (to the time of observations mostly ceasing its flowering). Material collected is as follows: Kamdyt, 2.07.2007 – 14 ♂♂, 3 ♀♀.

*P. clarius* (Eversmann, 1843) (= *P. ariadne* Lederer, 1853). In total, three males were collected in lower and middle sections of the Oroktoi brook valley on 27.06.2007 (one) and 7.07.2007 (two). One of them slowly flew over degraded absynth steppen slopes, another one – over the mentioned ruderal Konoplyanaya glade, and the third investigated steep slopes above that glade. There were no large steep screes facing south, being a favorable habitat of this species [Kosterin, 1994; Gorbunov, Kosterin, 2003], but there were large and very steep rocky cliffs which may have provided similar conditions. No doubt I met just individuals happened to descend down from their true habitats. Hitherto the only plant species is known as a larval foodplant of *P. clarius*, namely *Corydalis nobilis* (L.) Pers. [Gorbunov, Kosterin, 2003], which grows exactly in its habitats. This plant is recorded on the southern principal slope of the Katunskii Range [Artemov et al., 2001], while the northern slope was not still specially examined for ephemeroids (I. A. Artemov, pers. comm.).

*P. eversmani eversmani* Ménétriés, 1850. I for the first time encountered this species on the Katunskii Range by myself. I observed it on 1.07.2007 the left (western) slope of the Kamdyt valley, at about 2400–2500 m above sea level where the males flew low over green sedge patches along small springs among large-stoned screes, where *Corydalis pauciflora* (the larval foodplant of *P. eversmani*) flowered vigorously, together with *Claytonia joannea* Rhoemer et Schultze and *Pedicularis amoena* Adam. ex Stev. Together with *P. eversmani*, there flew males of *Proclissiana eunomia* (Esper, 1799).

*Leptidea sinapis* (Linnaeus, 1758). This species was found rather rare; only 2 males were collected, their genitalia were examined and proved to be true *L. sinapis* s. str. I also reconsidered specimens of *Leptidea* collected on the range in 1985–1991 [Kosterin, 1992]. In the collection of Siberian Zoological Museum at the Institute of Systematics and Ecology of Animals, Novosibirsk, I found all 10 specimens collected by me (all males) but not 2 specimens collected by I. I. Lyubchanskii at Lake Tal'menye. As to the conventional localities accepted in [Kosterin, 1992], there were 1 from TYUNGUR, 2 from KAPCHAL, 2 from KOKSU and 2 from WATERFALL. All 9 of them identified in the mentioned paper as *L. sinapis* were proved to be so. At the same time, a male identified as *L. morsei* appeared to be *Leptidea reali yakovlevi* Mazel, 2001 (its label, as translated from Russian, is as follows: E[ast] K[azakhstan] P[rovince], Altai, Katon-Karagai District, 15 km W of Rakhmanovskie Klyuchi village, the Yazovaya River valley, a forest meadow on a cutting, 1600 m above sea level, 15.07.1987, O. Kosterin). Along with the doubtless genitalia characters (very long aedeagus and saccus), this specimen (of a spring generation) had the same outer characters slightly distinguishing it from gen. vern. *L. sinapis* (in particular from the other male with the same label) as the toptotypical specimens of *L. r. yakovlevi* from the surroundings of Berdsk, Novosibirsk Province: more pointed fore wing apices, UNH almost evenly suffused below vein M1 but very light above it, with almost clear space, dark suffusion along the distal parts of veins Cu1 and Cu2 on UPF. These characters were sufficient to recognise it not to be *L. sinapis* at times where I had no idea of *L. reali* (Reissinger, 1990) but lead to the misidentification. Hence, hereby *L. reali* is for the first time recorded for the Katunskii Range.

The following specimens of *L. sinapis* were collected: Oroktoi, 28.06.2007 – 1 ♀; 7.07.2007 – 1 ♂, 1 ♀, Ayskan, 5.07.2007 – 2 ♂.

*Leptidea morsei major* (Grund, 1905). It follows from above that the doubtless female of this species collected on 9.07.2007 at the Kuzuyak Pass is the first record of true *L. morsei* (Fenton, 1881) for the range.

*Pieris napi napi* (Linnaeus, 1758). It was quite abundant at rivers and especially small brooks in taiga, but, contrary to my earlier observations [Kosterin, 1994], was not observed penetrating into highlands and even in taiga being inferior in number to *Aporia crataegi*.

*Colias hyale hyale* (Linnaeus, 1758). On 3.07.2007 a male was unexpectedly encountered on a short subalpine meadow in the Kamdyt valley, as high as at 2150 m above sea level.

\* *Lycaena phlaeas phlaeas* (Linnaeus, 1761). A male of this species, hitherto not found on the range [Kosterin, 1994], was met on 9.07.2007 as sitting on a muddy road going up to the Kusuyak Pass from the Akkem among birch/larch groves and somewhat degraded meadows with an aspect of *Carum carvi*, at about 1200 m above sea level.

\* *Glaucopsyche alexis* (Poda, 1761). A very worn out male was collected on the mentioned ruderal 'Konoplyanaya' glade in the Oroktoi valley middle part on 27.06.2007. This species, common in West Siberian land, was not hitherto recorded on the range. Noteworthy that a common South Siberian species *G. lycormas* (Butler, 1886) still is not recorded.

*Maculinea arion arion* (Linnaeus, 1758). It was thought that the Altai Mts. are inhabited by the taxon *cyaneacula* (Eversmann, 1848), characterised by a glistening greenish suffusion almost entirely occupying the hind wing underside, which is either a subspecies of *M. arion* [e. g. Gorbunov, 2001] or *bona species* [e. g. Gorbunov, Kosterin, 2003]. The West Siberian Plain is considered to be inhabited either by the nominotypical subspecies or by a very close to it subspecies *M. a. ruehli* (Krulikovskiy, 1892), here considered as a synonym. On the Bugotakskie Sopki hills in Novosibirsk Province either sympatry of *cyaneacula* and *arion* s. str. [Korshunov, 2002; Gorbunov, Kosterin, 2003] or their transition into each other (S. L. Nikolaev, pers. comm.) takes place. However, Yakovlev and Nakonechniy [2001] reported that they faced all the transitions in an extent of the greenish suffusion between the states typical for *cyaneacula* and *ruehli* on Kuraiskii Range of Altai. I myself repeatedly collected typical *cyaneacula* along the Chuiskii Tract road in Central Altai: at Kurota and Shashikman villages and in the Chuya valley, as well as in NW Altai at Kelei village. Quite unexpectedly, all 6 males collected by me on 6–7.07.2007 on the right bank terrace meadows had a very concise suffusion, well corresponding to the nominotypical subspecies. I took DNA preparations from them, which may help in forthcoming molecular phylogenetical analysis of Siberian populations of the *arion*-group. Noteworthy this species was not met in the Oroktoi valley. I may suppose that its larval foodplant in the meadows is *Shizonepeta multifida* (L.) Broq. oviposition on which by females of the *cyaneacula* appearance I several times observed in different parts of Altai (Gorbunov, Kosterin, 2007).

\* *Cupido osiris* (Meigen, 1829). A male was collected on a shingle right bank of the Akkem at the bridge, among several other blues, on 6.07.2007. A widespread but rare species in Siberia, for the first time recorded for the range.

*Albulina orbitulus pheretimus* (Staudinger, 1892). The supposed correlation of presence of this species with the chlorite debris [Kosterin, 1994] has not been confirmed. It was abundant on alpine and short-grass subalpine meadows in the Kamdyt valley, that is solely on the granite basis.

*Aricia artaxerxes artaxerxes* (Fabricius, 1793). One male was unexpectedly found on a short-grass subalpine, transitory to alpine, meadow in the Kamdyt valley, that is as high as at 2150 m above sea level on 3.07.2007.

*Plebejus argus clarasiatica* (Verity, 1931). One male was collected on the same highland meadow as *A. artaxerxes* on 1.07.2007, that is extraordinarily high for this species. It was enormously abundant on the Akkem terrace meadows, associated most probably with *Medicago falcata* L., but extremely scarce in the Oroktoi valley, with its dry steppen slopes and small meadow patches at cliffs and forest edges.

*P. (Lycaeides) idas ongodai* (Tutt, 1909). In contrast to the previous species, this one was abundant on steppen slopes of the Oroktoi valley while in the Akkem terrace meadows its abundance comprised maybe about 1/5 of that of *P. argus* (Linnaeus, 1758). In [Kosterin, 1994] this taxon was reported as *P. subsolanus* (Eversmann, 1851) but with a reservation that the males were transitory between *P. idas* (Linnaeus, 1758) and *P. subsolanus* as having the black border on the wing upperside about 1.5 mm wide, and that

there seemed to be a cline in Altai which connects *P. idas* (with the border less than 1 mm) and *P. subsolanus* (with a border occupying almost half of the wing area. In fact, both taxa considered are conspecific and belong to a very variable Holarctic species *P. idas* [Gorbunov, 2001; Gorbunov, Kosterin, 2003; Churkin, Zhdanko, 2003]. My collections from different parts of the Altai Mts. suggest that all this mountain country, except for the highlands of Central and South-East Altai, is occupied by rather homogenous large butterflies with the border in males being about 1,5 mm wide, no cline being traced. This taxon was described as *ongodai* Tutt, 1909, which is the valid name for it.

Recently this complicated species, which used to be not so argumentedly split into a number of smaller species, was partly (within Central and East Siberia, Far East and Mongolia) revised by Churkin and Zhdanko [2003]. They consider the *idas* group as a 'superspecies' within which they isolate 'semispecies', which include subspecies which, in turn, are often combined into groups of subspecies. Curiously that such a consideration is claimed by the authors as a recommendation of the International Code for Zoological Nomenclature [2000] for such complicated cases: "All above mentioned arguments allow to treat *idas* as a superspecies (which includes a system of semispecies, some of which have their own system of true subspecies), as it is recommended by ICZN for such hard cases" [Churkin, Zhdanko, 2003. P. 9]. However, the proposals of introducing into the official taxonomy such ranks as 'superspecies' [Kiriakoff, Lorkovič, 1958a] and 'semispecies' [Kiriakoff, Lorkovič, 1958b] were in fact rejected and these ranks were never included into the Code. According to Art. 6 of the International Code [1999], a scientific name which includes, in parentheses, an intercalary name starting with a small letter between the generic name and the species group name, e. g. *A-us (b-us) c-us*, merely designates the species *A-us c-us*, for which its attribution to the group or complex of species *b-us*, is indicated. Therefore the following names used in the cited revision: *Plebejus (idas) subsolanus* (Eversmann, 1851), *P. (idas) polaris* Nordström, 1928, *P. (idas) uiguricus* Zhdanko, 2000, *P. (idas) sailjugemica* Zhdanko, 2000, *P. (idas) boreas* Balint, 1989, *P. (idas) saldaitisi*, и *P. (idas) munkhbayar* correspond to full species rather than 'semispecies'. Noteworthy that the authors added the two latter names with "ssp. n.", that is implicitly considered them as subspecies, that contradicts both to this form of name presentation and to their explicitly declared intentions. The phenomenology very subspecially described in this otherwise excellent revision, namely vicariance of taxa and presence of hybridisation zones between them allows to consider the entire *idas* group as a single biological species.

*P. (Lycaeides) argyrognomon mongolicus* (Grun-Grshimailo, [1893]). A part of specimens reported as *P. argyrognomon* (Bergsträsser, 1779) in [Kosterin, 1994] – those from 'YARLU' and 'ARGEM' – were misidentified. In fact they were small highland (short-grass subalpine) butterflies with a very narrow dark border in males (as in true *P. argyrognomon*), which in fact belonged to *P. idas*. Such butterflies were later described as *P. idas sailjugemica* Zhdanko et Samodurov in Zhdanko, 1999 [Zhdanko, 1999]. This form occupies highlands of the Sailyugem, Yuzhno-Chuiskii and Katunskii

(eastern part) Mountain Ranges and was never recorded sympatrically with *P. idas ongodai* due to so different habitats (short-grass subalpine meadows with domination of *Geranium albiflorum* Ledeb. versus stone and meadow steppes). So far, the Akkem basin is a place of the shortest horizontal distance recorded between localities of two different subspecies of *P. idas*, well insulated by a solid taiga belt: *P. idas ongodai* in the lower Akkem reaches at 1000 m a. s. l. and *P. idas sailjugemica* in the Yarly valley at 2200 m a. s. l. [Kosterin, 1994]. The main aim of my recent expedition was to collect large series of both, but unfortunately, in spite of a thorough search, I failed to find *P. i. sailjugemica* in the Kamdyt valley, which is just 7 km N from the Yarly River lower reaches where several specimens of it were recorded on 8.07.1985 (neither I managed to visit the Yarly valley in 2007). The habitat in the Kamdyt valley looked extremely suitable for this butterfly, as I observed it in the Yarly and Argem confluent valleys on the Katunskii Range [Kosterin, 1994] and in the Akkol River and Chikty River valleys on the Yuzhno-Chuiskii Mt. Range (unpublished). It should be noted that *P. i. sailjugemica* was abundant (Chikty) or very abundant (Akkol) on the Yuzhno-Chuiskii Range but not abundant on the Katunskii Range. Most probably, this highland subspecies, which undoubtedly belong to the fauna of rather arid highlands of Mongolian type, meets its western limit in the Akkem River basin and is either very local here or the 2007 season was unfavourable for it. It was characterised by an unusually cold weather in May (with the temperature dropping down to  $-7^{\circ}\text{C}$  in Ust'-Koksa), but sudden coolings could hardly influence butterflies in highlands, where such events are quite frequent.

The specimens of true *P. argyrognomon*, which is a strictly steppe species, were reported in [Kosterin, 1994] for 'SAMAKHA'. This season I collected the only male of *P. argyrognomon* in a group of different blues, mostly *L. idas*, on a fresh horse dung in the Konoplyanaya glade in the Oroktoi valley. It was fairly large: the fore wing length being 16.5 mm.

*P. (Lycaeides) pylaon katunensis* Balint et Lukhtanov, 1990. I collected only two males of this rare species: one on 7.07.2007 in the same congregation of blues on horse dung which was mentioned above, another on the southern steppe slope at the Oroktoi mouth on 8.07.2007.

*Agrodiaetus ripartii* (Freyer, 1830). About 15 years ago I had a chance to examine the private collection by Dr. S.S. Bogachev and saw there a male specimen of this species collected by him in the Argut valley in 1987. I have just reexamined his collection and did not find this specimen again, but the collection had been shrunken via donations to other persons. Nevertheless, I must state that this very expectable species did have been collected at the eastern rim of the range.

*Limnitis populi populi* (Linnaeus, 1758). On 27.06.2007, most probably a straying male was collected as unexpectedly high as at 2000 m above sea level, on horse dung at an edge of a 'cedar' forest and a short-grass subalpine meadow above the Adshara-Burunda terrain.

*Cynthia cardui* (Linnaeus, 1758). A fresh straying female was collected on 30.06.2007 on a ridge closing the Kamdyt valley from the west, at 2300 m a. s. l.

*Euphydryas iduna* cf. *emerita* Churkin et Kolesnichenko, 2003 was rather common in dwarf birch tundras and, to less extent, on alpine meadows at 2150–2300 m a. s. l.

*E. aurinia sibirica* (Staudinger, 1861) f. *bangaasi* Seitz., 1908. This one of the most common butterfly in highlands was also almost the only one which was observed to remain resting on flowers in bad weather rather than hide. The specimens collected did not differ so dramatically in size from those which fly in meadow steppes at lower levels, that is were rather large, at least females, for the highland form *bangaasi*: the fore wing length being 16–18 mm in males and 20–21 mm in females. This probably reflected some peculiarities of weather conditions of the season.

*Clossiana selenis sibirica* (Erschoff, 1870), *C. selene selene* ([Denis et Schiffermuller], [1775]) and *C. titania staudingeri* Wnukowsky, 1929 – all three species now recorded much higher than previously on the Katunskii Range [Kosterin, 1992] – on short-herb alpine/subalpine meadows at highest outposts of larch forest at 2150 m above sea level.

*C. dia* (Linnaeus, 1767) f. *alpina* Elwes. Occurs only in dwarf birch tundras where is quite common. Most probably, there it is trophically connected with the abundant *Viola altaica* Ker.-Gawl.

*Crebeta deidamia deidamia* (Eversmann, 1851). Not abundant, found among very abundant *Lopinga achine* (Scopoli, 1763).

\* *Lasiommata maera* (Linnaeus, 1758). A very worn out female was collected on 7.07.2007 on a road going through a patch of spruce forest at the Akkem River right bank in 3 km upstream from its mouth.

*L. petropolitana* (Fabricius, 1787). Worn-out males occurred on the road in a spruce-larch forest near the Kuzuyak Pass and on a path rising among a ‘cedar’ forest from the Sala-Koba valley to the Adshara-Burunda terrain, that is in coniferous forests at 1500–1700 m a. s. l., tending to rest on barren ground.

*Coenonympha hero perseis* Lederer, 1853. In the Kamdyt valley found as high as at 2150 m a. s. l.

\* *Oeneis magna dubia* Elwes, 1899. A very worn out male was collected and preserved in alcohol for DNA preparation in the Ayskan River valley on 28.06.2007 in an opening among taiga neighboring to a large-stone scree, at about 1700 m above sea level. However, these butterflies of both sexes were quite numerous (and rather fresh) in a very specific habitat: the crest of a ridge between the Akkem and Ayskan valleys, at about 2300 m a. s. l., west of the Kamdyt valley, examined on 28.06.2007 and 4.07.2007. This ridge is crowned with numerous zeugen rocks and columns of matraz-like granites and is overgrown with a dry open forest of rather low trees of *Pinus sibirica*, with participation of *Larix sibirica*, with the ground formed by a fine granite detritus, covered with lichens but very scarce grasses and herbs. There are many dry openings between the trees and rocks where these butterflies were abundant. Both sexes rested on stones or barren ground, slanting towards the sun. Nine males and one female were collected plus two males were stored in alcohol for DNA.

I must say that in the previous paper [Kosterin, 1994], six specimens of *O. magna dubia*, also collected in the upper part of the taiga belt, were misidentified (since not spread

before publication) as *O. norna altaica* Elwes, 1899. These were as follows: “... UPPER KURAGAN, 2200 m, 14.VII.1986, 1 ♂; ESHTU, 1300 m, 18.VII.1986, 2 ♀♀; ... WATERFALL, 1600 m, 17.VII.1987, 1 ♂; KOKSY, 1600 m, 11.VII.1988, 1 ♂; 12.VII.1988, 1 ♂” [Kosterin, 1994: 73–74].

*O. sculda sculda* (Eversmann, 1851). In the Kamdyt valley these weakly flying butterflies quite commonly occurred equally on alpine meadows and in dwarf birch and lichen tundras.

\* *Erebia stubbendorffii* Ménétrés, 1846. This species was reported in [Kosterin, 1994] under the name ‘*Erebia brimo* (Böber, 1809)’ which was implied to be a valid name for what had been known as *E. maurisius* (Esper, 1803). The last mentioned name is valid, but for the species which has not been yet found on the Katunskii Range, so my identification in [Kosterin, 1994] was erroneous. *E. stubbendorffii* used to be considered a subspecies of *E. theano* (Tauscher, 1806), but in fact this is a good species differing from *E. theano* by coloration (on the fore wing the light submarginal spots between veins more even in length but not so even as in *E. maurisius*; on the hind wing underside there is only one basal light spot), somewhat smaller size; in the male genitalia the valva costal margin has a moderately expressed heel-like projection without concavity distally of it (both well expressed in *E. theano*) [Gorbunov, Kosterin, 2007]. In the alpine meadows of the Kamdyt valley, *E. stubbendorffii* occurred (not abundantly) on alpine meadows where was met with beside individuals of *E. theano theano* extending from larch forest edges (while *E. maurisius* inhabits arid environments in highlands [Gorbunov, Kosterin, 2007]).

The species exhibits a substantial geographical variation which is of rather a clinal nature, so no satisfactory subspecies subdivision can presently be proposed, provided the two names relevant to the Russian territory, *stubbendorffii* Ménétrés, 1846 and *connexa* Warren, 1930 were based on two and one type specimens, respectively, with no topotypes available until present [Gorbunov, Kosterin, 2007]. In this respect the shape of the light spot in the fore wing space Cu2 is of interest: it is of the same size and shape as that in Cu1 in the nominotypical *stubbendorffii* from East Sayan, in most specimens from South-East Altai and in a close and vicariant eastern species *E. pawloskii* Ménétrés, 1859. In specimens from the rest of Altai and Tuva, the inner margin of the spot in Cu2 is usually skewed since the spot lower margin protrudes inwards more than its upper margin; in some specimens from Central Altai the inner margin of the spot in Cu2 is not skewed but the spot itself is somewhat longer and protrudes inwards more than that in Cu1, as in *E. theano* but to a far less extent. From the Sangilen Mts. in the southeastermost Tuva the taxon *connexa* was described, but the type specimen, as well as other representatives of the species available from southeast Tuva, have a much extended light pattern and more pointed wings than the Altaian specimens. So, the subspecies attribution of the specimens from Central and North Altai remains unresolved [Gorbunov, Kosterin, 2007]. During the expedition this year, I collected only four males and photographed one more on 3.07.2007. Three of them had the Cu2 spot inner margin skewed and two not skewed but more protruding inwards than that of the Cu1 spot.

*E. pandrose yernikensis* Korshunov, 1995. Few specimens were met with, on 28.06.2007 and 3.07.2007. They were restricted to a small patch on the pass to the Kamdyt valley where the snow has obviously been recently melted and the following plants were vigorously flowering: *Viola altaica*, *Oxytropis altaica* (Pall.) Pers., *O. alpina* Bunge, *Salix rectijulis* Ledeb. ex Trautv., *Gentiana grandiflora*.

*E. rossii* ero Bremer, 1861. This was the most highland butterfly species observed and at the same time the earliest highland species, which to the time of our visit was already rather worn out. It was found only on large-stone screes at 2300–2800 m above sea level, and was quite abundant. Here, as well as in the southern principle slope of the Yuzhno-Chuiskii Range where I observed this species between the Chikty and Akbul Rivers (unpublished), the screes inhabited by *E. rossii* were marked with a very spectacular lichen resembling huge black Armenian letters (of course I do not imply any direct connection between the butterfly and lichen, only coenotic ones). In sunny weather, the butterflies rested with their wings spread or fed on flowers of *Claytonia joannea*. When the sun hid behind a cloud, the butterflies hid into gaps between giant stones composing these screes.

Hence, herewith I add 11 species for the known fauna of the Katunskii Range and exclude from it *Erebia*

*maurisius* (Esper, 1803), by the way correcting four cases of wrong identification in [Kosterin, 1994]: *Leptidea reali yakovlevi* Mazel, 2001 as *Leptidea morsei* (Fenton, 1909), *Plebejus idas sailjugemicus* Zhdanko et Samodurow, 1999 as *P. argyrognomon* (Bergsträsser, 1779), *Erebia stubbendorffii stubbendorffii* Ménétrés, 1846 as ‘*Erebia brimo* (Boeber, 1809)’, and *Oeneis magna dubia* Elwes, 1899 as *O. norna altaica* Elwes, 1899. Besides, *Agrodiaetus ripartii* (Freyer, 1830) is added by old collections from the Argut River valley.

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The list of butterfly taxons found at the Akkem river basin for 26.06–9.07.2007

Список таксонов дневных бабочек, найденных в бассейне р. Аккем 26.06–9.07.2007

| Species   | Kuzuyak | Akkem | Oroktoi | Aryskan | Kamdyt |
|---|---------|-------|---------|---------|--------|
| 1   | 2       | 3     | 4       | 5       | 6      |
| <i>Ochlodes sylvanus</i> (Esper, 1779)                      | -       | -     | 1       | -       | -      |
| <i>Thymelicus lineola</i> (Ochsenheimer, 1808)              | -       | 2     | 2       | -       | -      |
| <i>Carterocephalus silvicola</i> (Meigen, 1830)             | 3       | -     | 3       | 3       | 2      |
| <i>C. palaemon</i> (Pallas, 1771)                           | -       | -     | -       | 1       | 2      |
| <i>Pyrgus m. malvae</i> (Linnaeus, 1758)                    | -       | -     | 1       | -       | -      |
| * <i>P. serratulae</i> (Rambur, 1839)                       | 1       | 2     | -       | -       | -      |
| <i>P. centaureae kurentzovi</i> Korshunov, 1995             | -       | -     | -       | 1       | 2      |
| * <i>Syrichthus cribrillum obscurior</i> (Staudinger, 1892) | -       | -     | 2       | -       | -      |
| <i>S. tesselum dilutior</i> (Rühl, [1895])                  | -       | 2     | 2       | -       | -      |
| <i>Spialia orbifer</i> (Hübner, [1823])                     | -       | -     | 1       | 1       | -      |
| <i>Papilio machaon</i> (Linnaeus, 1758)                     | -       | -     | 1       | -       | -      |
| <i>Parnassius apollo alpherakyi</i> Krulikowsky, 1906       | -       | 2     | 3       | -       | -      |
| <i>P. ph. phoebus</i> (Fabricius, 1793)                     | -       | -     | 1       | -       | 3      |
| * <i>P. s. stubbendorffii</i> Мейнтрийс, 1849               | -       | -     | -       | -       | 3      |
| <i>P. clarius</i> (Eversmann, 1843)                         | -       | -     | 2       | -       | -      |
| <i>P. e. eversmanni</i> Мейнтрийс, 1850                     | -       | -     | -       | -       | 2      |
| <i>Leptidea sinapis</i> (Linnaeus, 1758)                    | -       | -     | 2       | 2       | -      |
| <i>L. morsei major</i> (Grund, 1905)                        | 1       | -     | -       | -       | -      |
| <i>Pieris n. napi</i> (Linnaeus, 1758)                      | 2       | 2     | 3       | 3       | -      |
| <i>Aporia crataegi</i> (Linnaeus, 1758)                     | 4       | 3     | 4       | 4       | 3      |
| <i>Pontia daplidice edusa</i> (Linnaeus, 1758)              | -       | 2     | 3       | -       | -      |
| <i>Anthocharis c. cardamines</i> (Linnaeus, 1758)           | 2       | -     | 2       | -       | -      |
| <i>Colias h. hyale</i> (Linnaeus, 1758)                     | -       | 2     | 2       | -       | 1      |
| <i>C. t. tyche</i> (Bücher, 1812)                           | -       | -     | -       | -       | 2      |
| <i>Nordmannia prunoides</i> (Staudinger, 1887)              | -       | -     | 1       | -       | -      |
| * <i>Lycaena p. phlaeas</i> (Linnaeus, 1761)                | 1       | -     | -       | -       | -      |
| * <i>Glaucopsyche alexis</i> (Poda, 1761)                   | -       | -     | 1       | -       | -      |
| <i>Maculinea a. arion</i> (Linnaeus, 1758)                  | -       | 3     | -       | -       | -      |
| <i>Scolitantides orion</i> (Pallas, 1771)                   | -       | -     | 2       | -       | -      |
| <i>Cupido m. minimus</i> (Fuessly, 1775)                    | 2       | -     | 1       | -       | -      |
| * <i>C. osiris</i> (Meigen, 1829)                           | -       | 1     | -       | -       | -      |
| <i>Aricia a. artaxerxes</i> (Fabricius, 1793)               | -       | 1     | 2       | 2       | 1      |
| <i>A. nicias bittis</i> (Fruhstorfer, 1914)                 | 1       | -     | -       | -       | -      |

| 1   | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| <i>Eumedonia e. eumedon</i> (Esper, [1870])                                   | 2 | 2 | 3 | - | - |
| <i>Plebicula a. amanda</i> (Schneider, 1792)                                  | - | 3 | 3 | 2 | - |
| <i>Albulina orbitulus pheretimus</i> (Staudinger, 1892)                       | - | - | - | - | 3 |
| <i>Cyaniris s. semiargus</i> (Rottemburg, 1775)                               | 2 | 3 | 3 | - | 2 |
| <i>Polyommatus e. erotides</i> (Staudinger, 1892)                             | - | 2 | 3 | - | 2 |
| <i>P. i. icarus</i> (Rottemburg, 1775)  | 2 | - | - | - | - |
| <i>Agrodiaetus d. damon</i> ([Denis et Schiffermüller], [1775])               | - | 2 | 1 | - | - |
| <i>Plebejus argus clarasiatica</i> (Verity, 1931)                             | 2 | 4 | 2 | - | 1 |
| <i>P. idas ongodai</i> (Tutt, 1909)   | - | 4 | 3 | - | - |
| <i>P. argyrognomon mongolicus</i> (Grum-Grshimailo, [1893])                   | - | - | 1 | - | - |
| <i>P. pylaon katunensis</i> Balint et Lukhtanov, 1990                         | - | - | 2 | - | - |
| <i>Limenitis p. populi</i> (Linnaeus, 1758)                                   | 2 | 1 | 2 | - | - |
| <i>Neptis rivularis magnata</i> Heyne in Rühl, 1895                           | 4 | 4 | 4 | 3 | - |
| <i>Aglais u. urticae</i> (Linnaeus, 1758)                                     | 3 | 2 | 2 | - | 2 |
| <i>Nymphalis vai-album</i> ([Denis et Schiffermüller], [1775])                | - | 1 | - | - | - |
| <i>Polygonia c-album kultukensis</i> Kleinschmidt, 1929                       | - | - | 2 | - | - |
| <i>Cynthia cardui</i> (Linnaeus, 1758)  | - | - | 1 | - | 1 |
| <i>Aracshnia l. levana</i> (Linnaeus, 1758)                                   | 3 | 2 | 2 | 2 | - |
| <i>Euphydryas intermedia</i> (Münch, 1859)                                    | 4 | 2 | 3 | 4 | 3 |
| <i>E. maturna staudingeri</i> (Wnukowsky, 1929)                               | 2 | - | 1 | - | - |
| <i>E. iduna</i> cf. <i>emerita</i> Churkin et Kolesnichenko, 2003             | - | - | - | - | 3 |
| <i>E. aurinia sibirica</i> (Staudinger, 1861) f. <i>banghaasi</i> Seitz, 1908 | - | - | - | - | 4 |
| <i>Melitaea p. phoebe</i> ([Denis et Schiffermüller], [1775])                 | - | 2 | 2 | - | - |
| <i>M. latonigena</i> (Eversmann, 1847)  | - | 2 | 3 | - | - |
| <i>M. cinxia tschujaka</i> Elwes, 1899  | - | 1 | - | - | - |
| <i>M. a. arcesia</i> (Bremer, 1864)   | - | - | - | - | 3 |
| <i>M. diamina erycinna</i> Lederer, 1853                                      | - | - | 2 | - | - |
| <i>Mellicta athalia reticulata</i> Higgins, 1955                              | 2 | 3 | 3 | - | - |
| <i>M. menetriesi centralasiae</i> (Wnukowsky, 1929)                           | - | 3 | 3 | - | 2 |
| <i>M. b. britomartis</i> (Assmann, 1847)                                      | - | 3 | 3 | - | - |
| <i>Boloria napaea altaica</i> (Grum-Grshimailo, 1893)                         | - | - | - | - | 4 |
| <i>Procllossiana eunomia acidalia</i> (Boeber, 1809)                          | - | - | - | - | 4 |

## Продолжение таблицы

| 1  | 2 | 3 | 4 | 5 | 6              |
|--|---|---|---|---|----------------|
| <i>Clossiana e. euphrosyne</i> (Linnaeus, 1758)          | 3 | - | 3 | 4 | 4              |
| <i>C. s. selene</i> ([Denis et Schiffermüller], [1775])  | - | - | - | - | 1              |
| <i>C. selenis sibirica</i> (Erschoff, 1870)              | 2 | 2 | 2 | - | 2              |
| <i>C. titania staudingeri</i> Wnukowsky, 1929            |   |   |   |   | 1              |
| <i>C. thore hyperusia</i> (Fruhstorfer, 1907)            | 1 | - | - | - | -              |
| <i>C. dia</i> (Linnaeus, 1767)<br>f. <i>alpina</i> Elwes | - | - | 2 | 2 | 3              |
| <i>Brenthis i. ino</i> (Rottemburg, 1775)                | 2 | 4 | 1 | - | -              |
| <i>Speyeria aglaja</i> (Linnaeus, 1758)                  | - | 3 | 2 | - | -              |
| <i>Fabriciana niobe barkhatovi</i> Gorbunov, 2001        | - | - | 1 | - | -              |
| <i>F. a. adippe</i> (Linnaeus, 1767)                     | - | 2 | 3 | - | -              |
| <i>Argynnis p. paphia</i> (Linnaeus, 1758)               | 3 | - | 2 | - | -              |
| * <i>Lasiommata maera</i> (Linnaeus, 1758)               | - | 1 | - | - | -              |
| <i>L. petropolitana</i> (Fabricius, 1787)                | 2 | - | 1 | - | -              |
| <i>Lopinga a. achine</i> (Scopoli, 1763)                 | 4 | 3 | 3 | - | -              |
| <i>Crebeta d. deidamia</i> (Eversmann, 1851)             | 2 | 2 | 2 | - | -              |
| <i>Coenonympha hero perseis</i> Lederer, 1853            | 3 | 3 | 3 | 3 | 3              |
| <i>C. glycerion iphicles</i> Staudinger, 1892            | - | 3 | 3 | 2 | -              |
| <i>C. a. amaryllis</i> (Stoll, 1782)                     | 2 | 4 | 4 | - | -              |
| <i>C. tullia elwesi</i> Dawenporrt, 1941                 | - | - | - | - | 3              |
| <i>Aphantopus h. hyperanthus</i> (Linnaeus, 1758)        | 4 | 4 | 4 | - | -              |
| <i>Hyponephele lycaon catamelas</i> (Staudinger, 1886)   | 2 | - | 3 | - | -              |
| <i>Minois d. dryas</i> (Scopoli, 1763)                   | - | - | 3 | - | -              |
| <i>Hipparchia a. autonoe</i> (Esper, [1783])             | - | - | 2 | - | -              |
| <i>Oeneis norna altaica</i> Elwes, 1899                  | - | - | - | - | 2              |
| * <i>O. magna dubia</i> Elwes, 1899                      | - | - | - | 2 | 3 <sup>1</sup> |
| <i>O. s. sculda</i> (Eversmann, 1851)                    | - | - | - | - | 3              |
| <i>Erebia jennisseiensis</i> (Trybom, 1877)              | 3 | - | 3 | 4 | 4              |
| <i>E. t. theano</i> (Tauscher, 1806)                     | - | - | 2 | 2 | 3              |
| * <i>E. stubbendorffii</i> Mäntzius, 1846                | - | - | - | - | 2              |
| <i>E. kefersteinii kholsunica</i> (Lukhtanov, 1990)      | - | - | - | - | 2              |
| <i>E. cyclopius</i> (Eversmann, 1844)                    | 2 | - | 1 | 1 | -              |
| <i>E. pandrose yernikensis</i> Korshunov, 1995           | - | - | - | - | 2              |
| <i>E. rossii ero</i> Bremer, 1861                        | - | - | - | - | 3              |

**Notes.** 1. For explanation of conventional names see the 'Collecting sites' section.

2. The following conventional degrees for species abundance are accepted: 1 – the only individual was encountered; 2 – few individuals were met; 3 – common; 4 – very abundant.

3. Asterisks indicate species added to those recorded by Kosterin (1994).

**Примечания.** 1. Условные наименования пунктов сбора разъяснены в тексте.

2. В таблице приняты следующие условные степени обилия: 1 – встречена единственная особь; 2 – встречено несколько особей; 3 – обычен; 4 – очень обилен.

3. Звездочками отмечены виды, не отмеченные в статье [Kosterin, 1994].

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<sup>1</sup> Not exactly in the Kamdyt valley, look the text.