



УДК 595.789

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**NEW RECORDS OF BUTTERFLIES FOR TYVA REPUBLIC
[TYVA]. III. MATERIALS ON THE BUTTERFLY (*LEPIDOPTERA*,
DIURNA) FAUNA OF THE TODZHA DEPRESSION**

Zinchenko V. K. *, Kosterin O. E. **

[Зинченко В. К., Костерин О. Э. Новые находки дневных бабочек в Республике Тыва [Тува]. Материалы по фауне дневных бабочек (*Lepidoptera*, *Diurna*) Тоджинской котловины]

*Institute of Systematics and Ecology of Animals, Siberian Division of Russian Academy of Sciences, Frunze str. 11, Novosibirsk, 630091, Russia

Институт систематики и экологии животных Сибирского отделения Академии Наук России, ул. Фрунзе 11, Новосибирск, 630091, Россия

** Institute of Cytology and Genetics, Siberian Division of Russian Academy of Sciences, Acad. Lavrentiev ave. 10, Novosibirsk, 630090, Russia

Институт цитологии и генетики Сибирского отделения Академии Наук России, пр. акад. Лаврентьева 10, Новосибирск, 630090, Россия

Azas State Nature Reserve, Zelenaya str. 14, village Toora-Khem, Todzha Kozhuun, Tyva Republic, Russia.

Государственный природный заповедник «Азас», ул. Зеленая 14, с. Тоора-Хем, Тоджинский кожуун, Республика Тыва, Россия.

На основе литературных данных, собственных сборов авторов в 1987, 1988 и 2000 гг. и информации, полученной от В. К. Тузова, для Тоджинской котловины, Республика Тыва, приводится 105 видов дневных бабочек. Кроме того, приводятся 4 высокогорных вида, найденных в непосредственной близости от ее границ. 12 из приводимых видов ранее для территории Республики Тыва не отмечались. Фауна в целом имеет восточносибирский облик, что хорошо соответствует характеру территории, относящейся по геоботаническому районированию к Восточно-Саянской Тажной Провинции и весьма непохожей на в целом аридные районы Центральной и Южной Тывы.

Todzha Depression, or Todzha Hollow [Тоджинская Котловина], is situated in the northeastern part of Tyva Republic, or Tuva (the former spelling) [Республика Тыва, Тува], Russia. This is a large and very scarcely populated area contrasting to the rest of Tyva by its natural conditions. It extends for about 250 km longitudinally and 70-100 km latitudinally (this and following brief information is adopted from [Molokova, Kartashev, 1999]). Its bottom elevates above sea level from 850 m in the west



to 2000 m in the east. It is bordered with mountain systems with altitudes of 2300-2900 m: the Academician Obruchev Upland [нагорье акад. Обручева] in the south (including the Taskyl Mt. Range [хр. Таскыл] as its western arm, which is brought through by the Bii-Khem River [р. Бий-Хем]), the West Sayans in the west and north-west, the East Sayan [Западный Саян] (with the highest summit Topographers' Peak [пик Топографов] of 3044 m) in the north-east and east.

There are less elevated latitudinal mountain ranges dividing the watersheds of the main rivers of the Hollow, namely, from North to South, Khamsara [Хамсара], Azas [Азас] and Bii-Khem, or Bol'shoi Enisei [Major Enisei, Большой Енисей]. The latter is the main source of the great Siberian river Enisei [Енисей]. Most of the hollow territory is a hilly elevated plain with a relief of a glacial origin, as about 18 000 years ago the most of the central and eastern parts of the hollow was occupied with a vast (30 000 km²) glacier. There are numerous lakes of different size of a glacial origin, the largest being Manu-Khol' [Маны-Холь], Kadysh [Кадыш] (with an area of about 2500 ha each) and Azas, or Todzha [Азас, или Тоджа] (5470 ha).

The climate of the hollow is sharply continental, moderately humid. The average year temperature is -5°C, frostless period duration is 52 days but summer frosts are often, the average yearly sum of precipitation is 343 mm, 60% of which falls in summer. The highlands have a less continental climate and the precipitation increased up to 600-800 mm.

Such a combination of conditions corresponds to the light taiga ecosystems, which are widely developed here. According to the geobotanical classification, this region represents the Todzha Stone pine-Larch District of the East-Sayanian Mountain Taiga Province [Тоджинский кедрово-лиственничный округ Восточносаянской горнотаежной провинции] [Maskaev et al., 1985]. Altitudinal belts are represented by fragmentary steppes and forest-steppes (at the altitudes of 850-900 m), a well-expressed subtaiga belt of the grassy birch (*Betula pendula*) and larch (*Larix sibirica*) forests (900-1100 m), the mountain taiga larch (1000-1300 m), stone pine (*Pinus sibirica*) (1200-1700 m) and common pine (*Pinus sylvestris*) forests (1000-1700 m), the subhighland stone pine, rarely larch forests and parklands (1700-1900 m) and the highlands (above 1900 m). The latter are represented by the dwarf birch (*Betula rotundifolia*) tundras, with fragments of open stone pine and fir stands (1900-2100 m), subalpine and alpine communities scarcely expressed at 1900-2200 m, *Dryas*/lichen (above 2000 m) or stony/detritous (above 2200 m) tundras.



In the lower altitudes an asymmetry of vegetation is strongly expressed. On the southern slopes, mostly facing the valleys of major rivers and at Lake Azas, the steppen ecosystems penetrate into the subtaiga and mountain taiga belts, rising up to 1300 m. They are petrophyte steppes on more steep slopes, true bunchgrass steppes on more gentle slopes, meadowy steppes and herbaceous polydominant meadows on foothills and on terraces. In river valleys common are the patches of spruce (*Picea obovata*) taiga. Local Tuvinian people differ from other Tuvinians physically (they are more stout and of a less Mongol appearance), linguistically, and by the way of life: they are mostly reindeer breeders, pasturing their herds in highlands in summer and in lowlands in winter.

So far there were very few publications concerning the butterflies of the Todzha Hollow. In 1972, the Hollow was shortly visited by the 3rd Complex Expedition of Estonian Young Scientists, its participants T. Ruben and J. Viidalepp collected a considerable variety of butterflies which were treated and published by Y. P. Korshunov [1979] and J. Viidalepp [1979]. T. Ruben and J. Viidalepp collected butterflies at the village Toora-Khem [с. Тоора-Хем] on (52°27' N 96°08' E, alt. ~ 800-900 m) on 26-28.VII.1972 and at the Azas tourist base [турбаза Азас] on the north-western bank of Lake Azas (52°25' N 96°26' E, alt. ~ 900 m) on 29-31.VII.1972 and got 38 species. It should be noted that their repeated indications at 'the left bank' after 'Toora-Khem' in Korshunov [1979] should refer to the Bii-Khem River rather than Toora-Khem, as stepped SE slopes exist only on the Bii-Khem left bank. In the below list these repeated localities will be abbreviated as 'Toora-Khem' and 'Azas tourist base'. In the former locality the area on the Bii-Khem River bank as 'left bank', the Arbyk brook [руч. Арбык] valley on this left bank as 'Arbyk'.

The first author collected butterflies, along with his main research of ecology and biotopic distribution of amphibians and reptilians of the Azas reserve, in 1987-1988 in the same sites, in the environs of the village Toora-Khem and at Lake Azas: on 1-15.VI.1988 at the tourist base and on the hilly lake northern bank at the Okunevyy Bay [Окуневый залив], and on 10-29.VI.1987 on the northern bank of the eastern part of the lake at the Ilgi-Chul brook [руч. Илги-Чул] mouth, where the bank faces hills with steep and rocky stepped southern slopes (52°44' N 96°36' E, alt. 900-1000 m, presently there is situated the Reserve cordon Ilgi-Chul, abbreviated Ilgi-Chul). Besides, he collected in the lower reaches of the Azas River at the first hut (cordon) and at the Kara-Tesh brook valley (abbreviated lower Azas River 52°44' N 96°45' E, alt. About 1000 m) and in the Izig-Sug River headwaters at the Choigan mineral water springs (about 52°38' E 98°45' E,



alt. 2000 m and higher), abbreviated Chiogan, Izig-Sug. The latter site provided many representatives of the highland fauna of Todzha, so far not studied at all. In total, the collections of the first author yielded 65 butterfly species.

Some of the materials collected by the first author of this paper were mentioned by Y. P. Korshunov, mostly as paratypes of his new subspecies, in his works concerning Siberia as a whole: *Polyommatus icarus korshunovi* P. Gorbunov, 1995 [Korshunov, Gorbunov, 1995], *Pyrgus serratulae shukshini* Korshunov, 1996 [Korshunov, 1996], *Oeneis brunhilda* Korshunov, 1998, *Clossiana eunomia stromi* Korshunov, 1998 [Korshunov, 1998]; here we abstain from assuming or rejecting validity of these subspecies. All these published data are reproduced in this our paper, with corresponding references.

In 1986 the Hollow was visited by V. K. Tuzov. In 1989 the Azas Nature Reserve territory was extensively explored by an expedition of the Moscow Specialized Forest Management Enterprise, the participant of which I. V. Tishin systematically collected butterflies. His collection was treated by V. K. Tuzov as well. Unfortunately, he did not published a special report concerning these collections, but kindly shared with us with the total list of the taxa collected which updates our list with 11 species more (right now the exact information of species is not readily available for technical reasons). Presence of a taxon in these collections will be further mentioned as 'collected by MSFME expedition'. Besides, some of the butterflies collected by V. K. Tuzov were presented in illustrations for the guide of the butterflies of the former USSR [Tuzov et al., 1998].

The second author and Natalya Priidak collected butterflies in 2000 in two already traditional sites: the village Toora-Khem environs on 20, 25, 26.VII and at Lake Azas at the cordon Ilhi-Chul on 21-24.VII. They got 34 species.

In the below annotated list the collectors can be inferred from the dates; the sites Ilgi-Chul and Okunevyi Bay are often given altogether but one should note that, if otherwise not stated, the collections of 1987 and 2000 refer to the former while those of 1988 to the latter. The site Ilgi-Chul is situated in the buffer zone of the Azas State Nature Reserve, the site Lower Azas River – on a strictly protected area.

Besides, in June 2001, I. I. Lyubchanskii, R. A. Dudko and A. A. Dudko undertook a coleopterologist expedition of the Institute of Systematics and Ecology of Animals, Siberian Division of Russian Academy of Sciences, to the Khertesh-Taiga (abbreviated Khertesh-Taiga) and Dongul-Taiga (abbreviated Dongul-Taiga) mountain ranges being the western spurs



of the Academician Obruchev Upland. These ranges form the left border of the Bii-Khem River gorge, they are situated in the Kyzyl District in 40 and 60 km NE of Kyzyl, respectively. The former is separated from Todzha only by the Taskyl mountain range, being the northernmost of the Upland western spurs, and the Ulug-Oo River valley. Nevertheless, the Academician Obruchev Upland represents a contiguous chain of highlands which should have the identical fauna throughout, from the mentioned ranges at Bii-Khem at its western end to the junction with the East Sayan at the eastern end. Along this highland chain, the collection sites are separated by only 90 km from the border of Todzha above Lake Myun-Khol'. Therefore, of these most recent collections, below we mention (still without numerals) those four species which so far were not collected in Todzha and its borders as such, since they must be present there, but omit those materials which represent species already recorded in Todzha.

Annotated list of species

Asterisks (*) indicate at the species for the first time reported for Tyva Republic.

Hesperiidae

1.* *Syrichthus cribrellum* (Eversmann, 1841)

Lake Azas, Ilgi-Chul and Okunevyi Bay, steppefied hill slopes: 21.VI.1987 – I ♂, 15.VI.1988 – 1 ♂; 22.VII.2000 – 1 spec..

2. *Pyrgus malvae* (Linnaeus, 1758)

Toora-Khem, the Toora-Khem River valley meadows: 29.V.1988 – 1 ♀; Azas tourist base, a meadow at the lake bank: 31.V.I 1987 – 1 ♀; Lake Azas, Ilgi-Chul and Okunevyi Bay, steppefied hill slopes: 14,22, 29.VI.1988 – 3 ♂, 4.VI.1988 – 1 ♀.

3. *Pyrgus alveus* (Hübner, [1803])

Korshunov, 1979: Azas tourist base: 29.VII.1972 – 1 ♂ 1 ♀.

Lake Azas, Ilgi-Chul, steppefied hill slopes: 16,18,22.VI.1987 – 3 ♂. Collected by MSFME expedition.

4. *Pyrgus serratulae* (Rambur, 1839)

Toora-Khem, left bank: 28.VI.1987 – 1 ♀; Lake Azas, Ilgi-Chul and Okunevyi Bay, steppefied hill slopes: 14-27.VI.1987 – 8 ♂, 4,11.VI. 1988 – 4 ♂; lower Azas River: 17,18.VI.1988 – 2 ♂. Collected by MSFME expedition.

The mentioned specimens were included by Y. P. Korshunov [1996] into the type series of his subspecies *Pyrgus serratulae shukhsini* Korshunov, 1996.

5. *Carterocephalus palaemon* (Pallas, 1771)

Toora-Khem, left bank, Arbyk, a mixed forest: 3.VII.1987 – 1 ♀, 28.VI.1988 – 1 ♂; Lake Azas, Ilgi-Chul and Okunevyi Bay, meadowy glades within a larch forest on the bank: 14,17.VI.1987 – 1 ♂ 1 ♀, 25.VI.1988 – 1 ♀. Collected by MSFME expedition.



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

Toora-Khem, left bank, a mixed forest: 28.VI.1988 – 1 ♂ 1 ♀; 3.VII.1987 – 1 ♀; Lake Azas, Ilgi-Chul and Okunevyi Bay, a larch forest on the bank: 14.VI.1987 – 4 ♂ 1 ♀, 11,15.VI.1988 – 4 ♂; lower Azas River: 17,18.VI.1988 – 2 ♀; Choigan, the Izig-Sug River valley: 12.17.VI.1988 – 1 ♂ 1 ♀.

7. *Carterocephalus argyrostigma* (Eversmann, 1851)

Tuzov et al., 1998: «Tyva, Todzha Region, Umargysh [sic], 9.06.1986. V. Tuzov leg.» – 1 ♂; Lake Azas, Ilgi-Chul and Okunevyi Bay, stepped hill slopes on N bank: 14.VI.1987 – 1 ♀, 3,4.VI.1988 – 4 ♂. Collected by MSFME expedition.

8. *Ochlodes faunus* (Turati, 1906) (= *Ochlodes sylvanus* (Esper, [1778]))

Korshunov, 1979: *Ochlodes venata similis* Leech, Toora-Khem, stepped slope: 27.VII.1972 – 1 ♀; Azas tourist base, a lake bank: 30.VII.1972 – 1 ♂.

Toora-Khem, left bank, at the Arbyk brook: 3.VII.1987 – 2 ♂, 28.VI.88 – 1 ♂; Lake Azas, Ilgi-Chul and Okunevyi Bay, meadows between a riparian larch forest and hills: 18,21,22,27.VI.1987 – 4 ♂, 3 ♀, 25.VI.1988 – 1 ♂; lower Azas River: 30.VI.1987 – 1 ♂.

The valid name of this taxon is at present uncertain, perhaps, the name *sylvanus* will be conserved by the International Commission for Zoological Nomenclature [Tuzov et al., 1998].

9. *Thymelicus lineola* (Ochsenheimer, 1808)

Toora-Khem, left bank, Arbyk: 20.VII.2000 – 1 spec, a meadow at the settlement: 26.VII.2000 – 2 spec; Lake Azas, Ilgi-Chul, a stepped hill slope: 26.VII.2000 – 1 spec.

10. *Hesperia comma* (Linnaeus, 1758)

Korshunov, 1979: Azas tourist base: 29.VII.1972 – 2 ♀.

Papilionidae

11. *Papilio machaon* (Linnaeus, 1758)

Lake Azas, the Krasnyi Kamen' cape: 10.VI.1987 – 1 ♂; Ilgi-Chul and Okunevyi Bay, stepped hills at the bank: 14,16.VI.1987 – 2 ♂, 3.VI.1988 – 1 ♂; Choigan: 12.VII.1988 – 1 ♂. Collected by MSFME expedition.

12. *Parnassius apollo* (Linnaeus, 1758)

Korshunov, 1979: Toora-Khem, stepped open forest: 27.VII.1972 – ♂.

The Azas River shingle bank 1 km upstream of the Chinche-Khem River, on *Hieraceum umbellatum*: 29.VII.2000 – 1 ♂ (D. N. Shaulo leg.). Collected by MSFME expedition.

13. *Parnassius nomion* Fischer von Waldheim, 1823

Korshunov, 1979: Toora-Khem, stepped slope: 27.VII.1972 – 3 ♂ 1 ♀; Azas tourist base, a lake bank: 30.VII.1972 – 1 ♂.

Lake Azas, Ilgi-Chul, steep stepped rocky slope: 24.VII.2000 – 1 ♂. Collected by MSFME expedition.

14. *Panassius phoebus* (Fabricius, 1793)

Toora-Khem, left bank, stepped hill slopes: 3.VII.1987 – 1 ♂; Lake Azas, Ilgi-Chul, stepped hills: 12-30.VI.1987 – 13 ♂ 1 ♀. Collected by MSFME expedition.



Parnassius evermanni (Ménétries in Siemashko, 1850)

Dongul-Taiga, highlands: 18.VI.2001 – 1 ♂, 22.VI.2001 – 1 ♂ 1 ♀; Khertesh-Taiga, 2000-2500 m above sea level: 20.VI.2001 – 5 ♂ (I. I. Lyubechanskii, R. A. Dudko, A. A. Dudko leg.).

Pieridae

15. *Leptidea sinapis* (Linnaeus, 1758)

Lake Azas, a riparian larch forest: 21.VI.1988 – 1 ♂

16. *Leptidea morsei* (Fenton in Butler, 1881)

Korshunov, 1979: Azas tourist base: 30.VII.1972. – 1 ♂. Toora-Khem, left bank, Arbyk: 29.VI.1988 – 1 ♂ 2 ♀; Lake Azas, Ilgi-Chul and Okunevyi Bay, a riparian larch forest: 17.VI.1987 – 1 ♂, 15.VI.1988 – 1 ♂; Azas tourist base, the lake bank: 10.VI.1987 – 1 ♂ 2 ♀; lower Azas River, floodland: 20.VII.1988 – 1 ♂. Collected by MSFME expedition.

17. *Leptidea amurensis* (Ménétries, 1859).

Collected by MSFME expedition.

18. **Pieris brassicae* (Linnaeus, 1758).

Collected by MSFME expedition.

This species should have envied the Hollow only recently.

19. *Pieris (napi)* (Linnaeus, 1758) *euorientis* Verity, 1908

Korshunov, 1979: *Pieris napi*, Toora-Khem, 27.VII.1972 – 3 ♂ 1 ♀; Azas tourist base: 30.VII – 1 ♂.

Toora-Khem, left bank, Arbyk: 3.VII.1988 – 1 ♂; Lake Azas, Ilgi-Chul, a riparian larch forest: 12,14,18.VI.1987 – 2 ♂ 1 ♀, 15.VI.1988 – 1 ♂ 1 ♀; Choigan, Izig-Sug, floodland: 11,12,17.VII.1988 – 3 ♀. Collected by MSFME expedition.

Pieris (napi) (Linnaeus, 1758) *bryoniae* (Hübner, [1806])

Collected by MSFME expedition.

Relationships of the Siberian taxa within the superspecies *napi* are still unclear. The two mentioned here most likely represent lowland and highland populations, differences of which could be both determined by environmental modification and some genetic specificity. The proportion of relative contribution of these factors is unknown, but they can hardly be good species.

20. *Aporia crataegi* (Linnaeus, 1758)

Korshunov, 1979: Azas tourist base: 30.VII – 1 ♂; Toora-Khem: 27.VII – 3 ♂ 1 ♀.

Toora-Khem, left bank, Arbyk: 3.VII.1987 – 1 ♂, 20.VII.2000 – 3 ♂ 2 ♀; Lake Azas, Ilgi-Chul and Okunevyi Bay, the bank: 25.VI.1988 – 1 ♂, 21,24.VII.2000 – 3 ♂. Collected by MSFME expedition.

21. *Pontia edusa* (Fabricius, 1777)

Toora-Khem, at the settlement: 25.VII.2000 – 1 ♂. Collected by MSFME expedition.

Synchlœ callidice (Hübner, [1800])

Khertesh-Taiga, 2000-2500 m above sea level: 20.VI.2001 – 2 ♂ 3 ♀ (I. I. Lyubechanskii leg.)

22. **Anthocharis cardamines* (Linnaeus, 1758)



Toora-Khem, left bank, Arbyk: 3.VII.1987 – 1 ♀; Lake Azas, a boggy riparian larch forest and meadows at the Azas River mouth: 12,14,16,22.VI.1987 – 6 ♂, Okunevyy Bay, small-leaved forest in a ravine among hills on the bank: 15.VI.1988 – 1 ♂; Choigan, Izig-Sug: 13.VII.1988 – 1 ♀. Collected by MSFME expedition.

23. *Colias hyale* (Linnaeus, 1758)

Korshunov, 1979: Azas tourist base, a steppe: 30.VII – 1 ♀.

Lake Azas, Ilgi-Chul, a riparian meadow: 21.VI.1987 – 1 ♀. Collected by MSFME expedition.

24. *Colias tyche* Böber, 1812.

Toora-Khem, left bank: 28.VI.1988 – 1 ♂; Lake Azas, the Krasnyi Kamen' cape: 31.V.1988 – 2 ♂; the Azas tourist base, a river bank: 16,22.VI.1987 – 2 ♂, meadows on the lake bank: 3.VI.1988 – 1 ♀. Collected by MSFME expedition.

25. *Colias palaeno* (Linnaeus, 1761).

Collected by MSFME expedition.

Nymphalidae

26. *Limnitis populi* (Linnaeus, 1758)

Viidalepp (1979): Toora-Khem, at a river: 31.VII.1972 – 1 ♀ (T. Ruben leg.).

27. *Neptis rivularis* (Scopoli, 1763)

Korshunov, 1979: Toora-Khem, on legumes in shrubbery in open larch taiga: 27.VII.1972 – 6 ♂; Lake Azas, shrubbery on the bank: 29.VII.1972 – 1 ♂ 2 ♀.

Toora-Khem, left bank, Arbyk: 3.VII.1987 – 1 ♂, 27.VI.1987 – 1 ♂; 20,26.VII.2000 – 2 spec.; Lake Azas, Ilgi-Chul, bushes at the foot of the bank hills: 17,18,21.VI.1988 – 5 ♂ 1 ♀, 19,22.VI.1988 – 3 ♀, 22.VII.2000 – 1 spec. Collected by MSFME expedition.

28. *Nymphalis xanthomelas* (Esper, [1781])

Collected by MSFME expedition.

29. *Nymphalis antiopa* (Linnaeus, 1758)

Toora-Khem, visually on the Bii-Khem River bank in June 1988.

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

Lake Azas, Ilgi-Chul and Okunevyy Bay, the lake bank at the Azas River mouth: 14,16,18,21.VI.1987, 25.VI.1988 – 1 ♂, 22.VII.2000 – 1 ♂; lower Azas River, floodland: 17.VI.1988 – 1 ♂ 1 ♀. Collected by MSFME expedition.

31. *Aglais urticae* (Linnaeus, 1758)

Korshunov, 1979: *Nymphalis urticae*, Lake Azas, a damp meadows on an island bank: 29.VII.1972 – 1 ♀.

Toora-Khem, the settlement edge: 29.V.1987 – 1 ♂, 20,24.VII.2000 – 2 spec.; Lake Azas, Ilgi-Chul, an old stable: 10-27.VI.1987 – 1 ♂ 8 ♀, 3.VI.1988 – 1 ♀; Azas tourist base, 31.V.1988 – 1 ♀; Choigan, a river bank, 17.VII.1988 – 1 ♀. Collected by MSFME expedition.

32. *Cynthia cardui* (Linnaeus, 1758)

Korshunov, 1979: *Vanessa cardui*, Toora-Khem, river bank: 27.VII.1972 – 1 ♂; Lake Azas, meadows on the bank: 29.VII.1972 – 1 ♀.

Collected by MSFME expedition.

33.* *Araschnia levana* (Linnaeus, 1758)



Toora-Khem, left bank: 3.VII.1987 – 1 ♂; Lake Azas, Ilgi-Chul and Okunevyi Bay, foothills: 14,17,22.VI.1987 – 1 ♂ 3 ♀, 4,24.VI.1988 – 2 ♀; the Azas tourist base, a brook bank: 3.VI.1988 – 2 ♂.

One of the latter two males have an aberrant hind wing underside colouration: the white transversal band is very wide and purely white, with projections reaching the wing base and outer margins, so that the white colour predominates on the wing.

34. *Euphydryas intermedia* (Ménétries, 1859)

Lake Azas, Okunevyi Bay, hills: 15.VI.1988 – 1 ♂; Choigan, Izig-Sug floodland: 12.VII.1988 – 2 ♂.

Euphydryas iduna (Dalman, 1816)

Dongul Taiga, highland tundra, 17.VI.2001 – 1 ♂; 18.VI.2001 – 1 ♂; 22.VI.2001 – 1 ♀ (I. I. Lyubechanskii, R. A. Dudko, A. A. Dudko leg.)

35. *Euphydryas aurinia* (Rottemburg, 1775)

Toora-Khem, left bank, a meadow at a hill foot: 28.VI.1987 – 1 ♂ 1 ♀. Collected by MSFME expedition.

36. *Mellicta athalia* (Rottemburg, 1775)

Korshunov, 1979: Azas, steppefied hill side within larch taiga: 29.VII.1972 – 1 ♀.

Toora-Khem, steppefied hill sides: 3.VII.1987 – 1 ♂; Lake Azas, Ilgi-Chul and Okunevyi Bay, steppefied hill slopes: 14-27.VI.1987 – 8 ♂ 4 ♀, 15,25.VI.1988 – 1 ♂ 1 ♀; lower Azas River, a slope of a riparian hills: 30.VI.1987 – 1 ♀.

37. *Mellicta britomartis* (Assmann, 1848) *amurensis* (Staudinger, 1892)

Korshunov, 1979: Toora-Khem, on herbaceous meadows and dry slopes: 27.VII.1972 – 9 ♂ 7 ♀; Lake Azas, a steppefied hill slope within larch taiga: 30.VII.1972 – 2 ♀.

Lake Azas, Ilgi-Chul, steppefied hill slopes: 14,16,22.VI.1987 – 4 ♂ 3 ♀. Collected by MSFME expedition.

38. *Mellicta menetriesi* (Caraja, 1895) *centralasiae* (Wnukowsky, 1929)

Toora-Khem, meadows at the settlement, 3.VII.1987 – 1 ♀, left bank, steppefied slopes: 3.VII.1987 – 1 ♀, 28.VI.1988 – ♂; Lake Azas, Ilgi-Chul and Okunevyi Bay, steppefied hill slopes: 12-27.VI.1987 – 11 ♂ 2 ♀, 24,25.VI.1988 – 3 ♂. Collected by MSFME expedition.

39. *Melitaea diamina* (Lang, 1789)

Lake Azas, Ilgi-Chul, steppefied hill slopes: 21.VI.1987 – 3 ♂. Collected by MSFME expedition.

40. *Melitaea cinxia* (Linnaeus, 1758)

Toora-Khem, left bank, steppefied hill slopes: 3.VII.1987 – 1 ♂ 1 ♀; Lake Azas, Ilgi-Chul and Okunevyi Bay, steppefied hill slopes: 14,16,21,22.VI.1987 – 3 ♂ 2 ♀, 15,25.VI.1988 – 2 ♂. Collected by MSFME expedition.

41. *Melitaea latonigena* Eversman, 1847

Korshunov, 1979: *Melitaea didyma latonigena* cf. *atrata*, Toora-Khem a steep SE steppefied slope on the left bank: 27.VII.1972 – 29 ♂ 11 ♀; Lake Azas, a steppefied sandy slope at the bank: 29-30.VII.1972 – 2 ♂ 1 ♀.

Toora-Khem, left bank, steppefied hill slopes: 3.VII.1987 – 1 ♂, 20.VII.2000 – 1 ♂ 1 ♀; Lake Azas, Ilgi-Chul, steppefied hill slopes: 22,23,27,30.VI.1987 – 7 ♂,



21,22,24.VII.2000 – 7 ♂ 4 ♀; Lower Azas River: 30.VI.1987 – 1 ♂. Collected by MSFME expedition.

42. *Argynnis paphia* (Linnaeus, 1758)

Toora-Khem, open birch/larch forest: 20,25.VII.2000 – 2 ♂ 2 ♀; Lake Azas, Ilgi-Chul, open larch forest, wet ground at the water, meadowy southern slopes: 21,22,24.VII.2000 – 7 ♂ 7 ♀.

43. *Fabriciana adippe* (Linnaeus, 1767)

Korshunov, 1979: *Argynnis adippe*, Toora-Khem, left bank: 27.VII.1972 – 3 ♂ 2 ♀; Azas, meadows and steppen slopes at the lake and river banks: 29-30.VII.1972 – 2 ♀.

Toora-Khem, forest edges at the settlement: 20,25.VII.2000 – 2 ♀; Lake Azas, Ilgi-Chul, open larch forest: 24.VII.2000 – 1 ♂ 2 ♀.

44. *Mesoacidalia aglaja* (Linnaeus, 1758)

Toora-Khem, forest edges: 25,26.VII.2000 – 2 ♀; Lake Azas, Ilgi-Chul, : 24.VII.2000 – 1 ♂. Collected by MSFME expedition.

45. *Brenthis ino* (Rottemburg, 1775)

Korshunov, 1979: *Argynnis ino*, Toora-Khem, stepped slope: 27.VII.1972 – 1 ♂; Lake Azas, shrubbery on the bank: 29-31.VII.1972 – 5 ♂ 2 ♀.

Toora-Khem, meadows in the Toora-Khem and Bii-Khem valleys: 20, 26.VII.2000 – 4 ♂ 1 ♀; Lake Azas, Ilgi-Chul, long-herb meadows on the bank: 21,24.VII.2000 – 5 ♂ 4 ♀. Collected by MSFME expedition.

46. *Clossiana euphrosyne* (Linnaeus, 1758)

Lake Azas, Ilgi-Chul and Okunevyi Bay, hills: 14,16,21.VI.1987 – 3 ♂ 1 ♀; 1.VI.1988 – 1 ♂; lower Azas River banks: 17.VI.1988 – 2 ♂; Choigan, Izig-Sug River floodland: 12.VII.1988 – 2 ♂. Collected by MSFME expedition.

47.* *Clossiana oscarus* (Eversmann, 1844)

Toora-Khem, left bank, Arbyk: 3.VII.1987 – 1 ♀; Lake Azas, Ilgi-Chul and Okunevyi Bay, hills: 21.VI.1987 – 1 ♂, 25.VI.1988 – 3 ♂. Collected by MSFME expedition.

48. *Clossiana angarensis* (Ershov, 1870)

Lower Azas River, the Kara-Tesh brook valley :17.VII.1988 – 1 ♂; Choigan, meadows on slopes of the Izig-Sug River valley: 17.VII.1988 – 1 ♂. Collected by MSFME expedition.

49. *Clossiana titania* (Esper, 1793)

Toora-Khem, the Bii-Khem right bank at the wharf, larch forest edge: 25.VII.2000 – 1 ♂.

50. *Clossiana selene* ([Denis et Schiffermüller], [1775])

Collected by MSFME expedition.

51. *Clossiana thore* (Hübner, [1804])

Collected by MSFME expedition.

52. *Clossiana frigga* (Becklin in Thunberg, 1791)

Choigan, Izig-Sug River floodland: 12.VII.1988 – 1 ♀. Collected by MSFME expedition.

53. *Clossiana freja* (Becklin in Thunberg, 1791)

Collected by MSFME expedition.



54. *Procllossiana eunoinia* (Esper, 1799)

Lake Azas, Ilgi-Chul, hills: 16,27.VI.1987 – 2 ♂.

These specimens were included by Y. P. Korshunov [1998] into the paratypes of his *Procllossiana eunomia stromi* Korshunov, 1998.

55.* *Boloria napaea* (Hoffmannsegg, 1804) *altaica* (Groum-Grshimailo, 1893)

Choigan, Izig-Sug River floodland: 12.VII.1988 – 1 ♂.

56. *Boloria (pales* Denis et Schiffermüller, [1775]) *banghaasi* Seitz, 1979

Collected by MSFME expedition.

The species was hitherto reported for Tyva (Tannu Ola) by Crosson du Cormier [1982]. It should occupy peat-moss bogs and boggy forests, which are abundant in the Todzha Hollow.

Satyridae

57. *Crebeta deidamia* (Eversmann, 1851)

Viidalepp (1979): *Pararge deidamia*, Toora-Khem, forest: 27.VII.1972 – 1 ♀ (N. Laanetu leg.)

Toora-Khem, left bank, larch forest edge on a hill crest: 20.VII.2000 – 1 ♂; Lake Azas, open larch forest at foothills: 24.VII.2000 – 1 ♂. Collected by MSFME expedition.

58. *Coenonympha glycerion* (Borkhausen, 1788)

Korshunov, 1979: *Coenonympha amyntas* Poda, Toora-Khem, stepped slopes and glades:

27.VII.1972 – 15 ♂ 4 ♀; Lake Azas bank, shrubbery: 29-30.VII – 18♂ 4♀.

Toora-Khem, left bank, stepped hill slope: 20.VII.2000 – 1 ♂; Lake Azas, Ilgi-Chul, stepped hill slopes: 21,22,24.VII.2000 – 5 ♂ 2 ♀. Collected by MSFME expedition.

59. *Coenonympha amaryllis* (Stoll, 1782)

Korshunov, 1979: Toora-Khem, a herbaceous meadow on a slope: 27.VII.1972 -1 ♂

Toora-Khem, left bank, stepped hill slopes: 20,26.VII.2000 – 6 ♂ 1 ♀; Lake Azas, Ilgi-Chul, stepped hill slopes: 24.VII.2000 – 1 ♂ 1 ♀.

60. *Coenonympha hero* (Linnaeus, 1761)

Toora-Khem, the Bii-Khem River left bank, the Arbyk brook: 3.VII.1987 – 2 ♂; Lake Azas, meadows at foothills: 14-30.22.VI.1987 – 15 ♂ 3♀, 11,15,20.VI.1988 – 8 ♂ 2 ♀; the Azas tourist base, lake bank: 13.VI.1988 – 6 ♂; the Azas River bank in lower reaches: 18.VI.1988 – 1 ♂. Collected by MSFME expedition.

61. *Triphysa dohrni* Zeller, 1850

Toora-Khem, the settlement environs: 29.V.1988 – 1 ♂ 1 ♀; Lake Azas, Ilgi-Chul, stepped hill slopes: 16.VI.1987 – 1 ♂, Azas tourist base, forestless hills surrounded by taiga: 5,6.VI.1988 – 1 ♂ 2 ♀; Lower Azas River, a riparian hill: 18.VI.1988 – 1 ♀.

62. *Erebia ligea* (Linnaeus, 1758)

Korshunov, 1979: Toora-Khem, left bank, openings and glades in taiga: 27.VII.1972 – 2 ♂ 2 ♀; Azas tourist base, taiga: 30.VII – 2 ♀.



Lake Azas, Igi-Chul brook valley, under the larch forest canopy: 24.VII.2000 – 1 ♂ 2 ♀.

63. *Erebia jeniseiensis* (Trybom, 1870)

Toora-Khem, left bank: 28.VI.1988 – 1 ♂; Lake Azas, Okunevyi Bay, foots of hills on the bank; Lower Azas River bank: 17.VI.1988 – 1 ♂; the same in the middle reaches: 20.VII.1988 – 1 ♂; Choigan, Izig-Sug River valley: 11-13,17.VII.1988 – 10 ♂. Collected by MSFME expedition.

64. *Erebia neriene* (Böber, 1809)

Korshunov, 1979: Toora-Khem, openings and glades in larch/birch taiga: 26-28.VII.1972 – 36 ♂ 2 ♀; Lake Azas at bank, shrubbery: 29-30.VII – 20 ♂.

Toora-Khem, spruce taiga edges and glades, open birch/larch forest (in abundance): 20,26.VII.2000 – 14 ♂ 5 ♀; Lake Azas, Igi-Chul, open larch forest on the bank: 22,24.VII.2000 – 12 ♂ 3 ♀. Collected by MSFME expedition.

65. *Erebia cyclopius* (Eversman, 1844)

Toora-Khem, left bank: 28.VI.1987 – 1 ♂; Lake Azas, a forest at the Azas River mouth: 12-27.VI.1987 – 6 ♂; the Krasnyi Kamen' cape: 1.VII.87 – 1 ♂; lake surroundings: 19-23.VI.1989 – 1 ♀ (D. V. Logunov leg.). Collected by MSFME expedition.

66. *Erebia rossi* Curtis in Ross, 1834

Choigan, a mountain crest: 13.VII.1988 – 1 ♀.

67. *Erebia embla* (Becklin in Thunberg, 1791)

Lake Azas, the Krasnyi Kamen' cape, 11.VI.1987 – 3 ♂, a larch forest at the Azas River mouth: 14.VI.1988 – 1 ♂. Collected by MSFME expedition.

68.* *Erebia disa* (Becklin in Thunberg, 1791)

Choigan, Izig-Sug valley: 11,12.VII.1988 – 1 ♂ 1 ♀.

* *Erebia dabanensis* Ershov, [1871].

Dongul-Taiga, mountain tundra: 17.VI.2001 – 1 ♂ (R. A. Dudko leg.), 18.VI.2001 – 1 ♂ 1 ♀ (I. I. Lyubechanskii & R. A. Dudko leg.), alpine meadow, 22.VI.2001 – 1 ♀ (I. I. Lyubechanskii leg.); Khertesh-Taiga, 2000-2500 m above sea level: 20.VI.2001 – 3 ♂ (I. I. Lyubechanskii leg.).

This species has not still found in Todzha and was not hitherto reported for Tuva at all. Taking into account that the closest place from where it was earlier known was the East Sayan, joint to the Upland at its eastern end, there is no doubt that it is present through the highlands of the Academician Obruchev Upland system, which borders Todzha from the south.

69. *Erebia edda* Ménétries, 1851

Tuzov et al., 1998: «Tyva, Todzha Region, Krasnoe Lake, 9.06.1986. V. Tuzov leg.» – 2 ♂

Lake Azas, a forest at the Azas River mouth: 15.VI.1988 – 4 ♂; Lower Azas River: 17.VI.1988 – 1 ♂ 2 ♀.

70.* *Erebia discoidalis* (Kirby, 1837)

Lower Azas River, the Kara-Tesh brook valley: 17.VI.1988 – 1 ♂.

71. *Erebia theano* (Tauscher, 1806)

Korshunov, 1979: Toora-Khem, larch/birch taiga, glades: 27.VII.1972 – 10 ♂ 1 ♀.



Toora-Khem, left bank, Arbyk: 3.VII.1987 – 3 ♂, 20.VII.2000 – 1 ♂ 1 ♀

72. *Boeberia parmenio* (Böber, 1809)

Toora-Khem, left bank, stepped hill slopes, 3.VII.1987 – 2 ♀, 28.30.VI.1988 – 1 ♂ 1 ♀; Lake Azas, Ilgi-Chul: 16-18,22.VI.1987 – 5 ♂ 1 ♀; 24,25.VI.1988 – 3♂*; 19-23.VI.1989 – 1 ♂; Lower Azas River, a riparian hill: 30.VI.1987 – 1 ♂. Collected by MSFME expedition.

73. *Aphantopus hyperanthus* (Linnaeus, 1758)

Korshunov, 1979: Toora-Khem, pasture and taiga at the settlement, stepped SE slope on the river left bank, 27-28.VII.1972 – 3 ♂ 3♀; Lake Azas bank, damp meadow, 29.VII – 5 ♀.

Toora-Khem: 20.VII.2000 – 2 ♀; Lake Azas, Ilgi-Chul, a hill slope: 24.VII.2000 – 1 ♀. Collected by MSFME expedition.

74. *Minois dryas* (Scopoli, 1763)

Korshunov, 1979: *Satyrus dryas sibirica* Staudinger, Toora-Khem, a stepped SE slope, 27.VII.1972 – 8 ♂ 1 ♀; Lake Azas, riparian meadows and birch forest, 29.VII – 2 ♂.

Lake Azas, Ilgi-Chul, stepped hill slopes: 22,24.VII.2000 – 11 ♂ 5 ♀. Collected by MSFME expedition.

75. *Hipparchia autonoe* (Esper, 1784)

Korshunov, 1979: *Hipparchia autonoe sibirica* Staudinger, Toora-Khem, a steep stepped SE slope above a brook, 27.VII.1972 – 14 ♂ 8 ♀.

Toora-Khem, damp floodland meadow on the Toora-Khem River right bank at its mouth (!, a very worn out specimen) and left bank, stepped hill slopes: 20,25.VII.2000 – 2 ♂ 1 ♀; Lake Azas, Ilgi-Chul, stepped hill slopes: 24.VII.2000 – 1 ♀. Collected by MSFME expedition.

76. *Oeneis (nanna)* (Ménétries, 1859) *brunhilda* A. Bang-Haas, 1912

Korshunov, 1998: *brunhilda* ?f. *diluta* V. Lukhtanov, 1994; Tuzov et al., 1998: *Oeneis nanna nanna*, «Tyva, Todzha Region, Urgamysh, 10.06.1986. V. Tuzov leg.» – 1 ♀.

Toora-Khem, left bank, Arbyk: 3.VII-1987 – 1 ♂.

Our specimen has no sex brands on its wings. The main diagnostic character differing the taxon *brunhilda* A. Bang-Haas, 1912 from *nanna* s. str. was thought to be just vagueness, up to absence, of the sex brands in males [Tuzov et al., 1998; Korshunov, Gorbunov, 1995]. In the collection of Siberian Zoological Museum at the Institute of Systematics and Ecology of Animals, Novosibirsk, there is a large series of butterflies, collected by S. L. Nikolaev at Shuurmak, the East Tannu-Ola Mt. Range northern slope, in June 1971, which exhibits a continual variation from very distinct brands to their complete disappearance. This challenged a species rank of *brunhilda*. which, however, was retained by Y. P. Korshunov [1998]. V. K. Tuzov has kindly communicated to us that, as different from the opinion published in [Tuzov et al., 1998], he now consider *Oeneis brunhilda* as *bona species* differing from *nanna* by: (I) larger size; (II) lighter wing upperside ground colour; (III) absence or reduction of the sex brand; (IV) bleached marbled pattern and (V) vague central band margins on the hind wing underside; (VI) two weeks later shifted flight period. He also communicated that both taxa are sympatric in Central Tuva and



Yakutia but in Todzha only *Oe. brunhilda* occurs. In [Tuzov et al., 1998] a female from Todzha was captioned as *Oeneis nanna nanna* but V. K. Tuzov communicated us personally that it was an error and the female in fact belonged to *brunhilda*.

In the same work [Korshunov, 1998], Y. P. Korshunov mentioned the male collected at Toora-Khem as 'resembling' the taxon *diluta* Lukhtanov, 1994, in the Table 12 (page 54) he even wrote «?f. diluta V. Lukhtanov, 1994». This is some nonsense: the ground colour in our male is quite dark ochre while the main diagnostic feature of *diluta*, described from the Turan Hollow of Tyva, is a whitish ground colour [Tuzov et al., 1998; Korshunov, Gorbunov, 1995].

77. *Oeneis urda* (Eversmann, 1847)

Tuzov et al., 1998: *Oeneis urda mongolica* Oberthur, «Tyva, Todzha Region, Urgamysk, 8.06.1986. V. Tuzov leg.» – 2 ♂ 1 ♀

Toora-Khem, left bank, hills: 28.VIII.1987 – 1 ♀ ; Lake Azas, Ilgi-Chul and Okunevyi Bay, hills 16,18,27.VI.1987 – 2 ♂ 4 ♀, 4,25.VI.1988 – 2 ♂; Lower Azas River, riparian hills: 30.VI.1987 – 2 ♂.

78. *Oeneis sculda* (Eversmann, 1851)

Toora-Khem, left bank, Arbyk, 3.VII.1987 – 1 ♀ ; Lake Azas, Ilgi-Chul and Okunevyi Bay, hills: 12,16,22.VI.1987 – 2 ♂ 2 ♀, 1-15.VI.1988 – 2 ♂ 4 ♀; Azas tourist base, hills surrounded by forest: 31.V.1988 – 1 ♂ 1 ♀; Lower Azas River, riparian hills, 17.VI.1988 – 2 ♀. Collected by MSFME expedition.

79. *Oeneis jutta* (Hübner, [1806])

Lake Azas, riparian bogs: 27.VI.1987 – 1 ♂, 24.VI.1988 – 1 ♀.

80. *Oeneis magna* Graeser, 1888

Collected by MSFME expedition.

81. *Oeneis norma* (Becklin in Thunberg, 1791) *altaica* Elwes, 1899

Choigan, mountain slopes in the Izig-Sug River valley, 11.VII.1988 – 1 ♂ 1 ♀. Collected by MSFME expedition.

82**Oeneis melissa* (Fabricius, 1775) *tunga* Staudinger, 1894

Collected by MSFME expedition. Dongul-Taiga, highlands: 17.VI.2001 – 1 ♂, 18.VI.2001 – 1 ♂ 1 ♀, 22.VI.2001 – 1 ♀ (I. Iyubechanskii, R. A. Dudko, A. A. Dudko leg.)

This taxon was described from the East Sayan. These mountains outline Todzha from the East and, hence, this was not a surprise to find it here. Besides, in 2001, *Oe. m. tunga* was collected on the western spurs of the Academician Obruchev Upland.

Lycanidae

83. *Callophrys rubi* (Linnaeus, 1758)

Toora-Khem, left bank: 28.VI.1988 – 1 ♀ ; Lake Azas, Ilgi-Chul and Okunevyi Bay, bushes at foothills: 16,18,22.VI.1987 – 4 ♀, 4.VI.1988 – 1 ♀.

84. *Lycena helle* (Denis et Schiffermüller, 1775)

Toora-Khem, left bank, meadows: 3.VII.1987 – 1 ♂, 28.VI.1988 – 1 ♂; Lake Azas, Ilgi-Chul and Okunevyi Bay, riparian meadows: 12,16,18.VI.1987 – 3 ♂ 3 ♀, 3,4,16,20.VI.1988 – 4 ♂ 4 ♀

85. *Heodes virgaureae* (Linnaeus, 1758)



Korshunov, 1979: Toora-Khem, taiga: 27.VII.1972 – 2 ♂ 1 ♀; Lake Azas, W bank, a damp meadow: 30.VII.1972 – 2 ♂.

Toora-Khem, left bank, a meadow between the Arbyk brook and Bii-Khem River: 20.VII.2000 – 1 ♂, a damp meadow at the Toora-Khem River left bank: 26.VII.2000 – 1 ♂.

86. *Maculinea arion* (Linnaeus, 1758)

Korshunov, 1979: Azas tourist base, a stepped hill surrounded by taiga on the W bank: 29.VII.1972 – 1 ♀.

87. *Scolitantides orion* (Pallas, 1771)

Lake Azas, Ilgi-Chul and Okunevyi Bay, screes on hills at the bank: 12-21.VI.1987 – 11 ♂ 9 ♀, 1,11,18.VII.1988 – 4 ♂ 2 ♀.

88. *Glaucopsyche lycormas* (Butler, 1868)

Lake Azas, Ilgi-Chul, hills: 14,16,18,21.VI.1987 – 6 ♂ 3 ♀.

89. *Cupido minimus* (Fuessly, 1775)

Toora-Khem, left bank, Arbyk: 3.VII.1987 – 1 ♀; Lake Azas, Ilgi-Chul and Okunevyi Bay, stepped hills: 14-27.VI.1987 – 8 ♂ 2 ♀, 11,13.VI.1988 – 4 ♂; Lower Azas River, southern hill slope: 17.VI.1988 – 1 ♀. Collected by MSFME expedition.

90. *Everes argiades* (Pallas, 1771)

Toora-Khem, left bank, Arbyk, 3.VII.1987 – 1 ♀; Lake Azas, the Krasnyi Kamen' cape: 11.VI.1987; Ilgi-Chul and Okunevyi Bay, bushes at foothills: 14,16,18,22.VI.1987 – 7 ♂ 2 ♀, 11.VI.1988 – 1 ♀.

91. *Tongeia fischeri* (Eversmann, 1843)

Toora-Khem, the settlement environs: 30.VI.1988 – 1 ♀; Lake Azas, Ilgi-Chul, screes on hills on the bank: 16,18,22.VI.1987 – 4 ♂; rocky stepped slopes and wet ground on the lake bank: 22,24.VII.2000 – 15 ♂.

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

Lake Azas, Ilgi-Chul and Okunevyi Bay, foothills: 11.VI.1987 – 1 ♂, 1.VI.1988 – 2 ♂.

93. *Aricia allous* (Geyer, 1837)

Korshunov, 1979: *Polyommatus allous*, Toora-Khem, a steep stepped slope over the river: 27.VII.1972 – 3 ♂

Toora-Khem, Arbyk, an herbaceous meadow on an eastern mountain slope: 20.VII.2000 – 2 ♂, the settlement environs: 26.VII.2000 – 1 ♂; Lake Azas, Ilgi-Chul, hill southern slopes: 22,24.VII.2000 – 1 ♂ 1 ♀.

94. *Aricia nicias* (Meigen, 1830)

Korshunov, 1979: *Polyommatus nicias*, Azas tourist base, the lake W bank: 29.VII.1972 – 1 ♀.

95. *Eumedonia eumedon* (Esper, 1789)

Lake Azas, a southern hill slope: 24.VII.2000 – 1 ♀. Collected by MSFME expedition.

The specimen has no white beam on the hind wing underside.

96. *Vacciniina optilete* (Knoch, 1781)

Toora-Khem, abundant on edges and openings of spruce and larch taiga: 20.VII – 7 ♂ 2 ♀, 26.VII – 1 ♀; Lake Azas, Ilgi-Chul and the Azas River mouth, the



same habitats, also lake banks: 21, 22, 24.VII – 6 ♂ 3 ♀. Collected by MSFME expedition.

97. *Lycaeides argyrognomon* (Bergsträsser, 1779) s. l.

Korshunov, 1979: *Plebejus argyrognomon*, Azas tourist base, meadows and stepped slopes: 29.VII.1972 – 2 ♀.

This record needs a corroboration, since it is not easy to identify this species by females only. Moreover, recently the former species *L. argyrognomon* has been claimed to have embraced a number of good sibling species, *L. argyrognomon* s. str. not entering Siberia [Tuzov et al., 1998]. The butterflies inhabiting dry steppes of S Siberia were attributed to the species *Lycaeides maracandicus* (Erschoff, 1874), and no more species of this group has been mentioned to Central Siberia. Dry steppes as such are absent from Todzha, but steppen patches are quite frequent on southern mountains slopes and banks of major rivers. Besides, in Khakasia, butterflies which should be attributed to *L. argyrognomon* s. l. occurs not only in steppes but as well on meadows on hill tops, as a rule with abundant *Hedysarum gmelinii*, where they fly simultaneously with representatives of *Lycaeides idas* group (observations by the second author). Therefore, occurrence of some representatives of the *L. argyrognomon* group in Todzha is quite probable.

98. *Lycaeides (idas* (Linnaeus, 1761)) *subsolanus* (Eversmann, 1851)

Korshunov, 1979: *Plebejus cleobis* Bremer, Toora-Khem left bank, steep stepped slopes with legumes: 27.VII.1972 – 8 ♂ 1 ♀; Lake Azas W bank, 29-31.VII.1972: – 4 ♂ 3 ♀.

Toora-Khem, left bank, Arbyk, 3.VII.1987 – 1 ♂.

99. *Plebejus argus* (Linnaeus, 1758)

Korshunov, 1979: Toora-Khem, left bank valley, sparse taiga, on wet ground: 27.VII.1972 – 31 ♂ 12 ♀

Toora-Khem, left bank, stepped hill slopes: 20.VII.2000 – 60 ♂ 21 ♀; Lake Azas, Ilgi-Chul, stepped hill slopes and the wet ground on the lake bank: 21.22.24.VII.2000 – 110 ♂ 53 ♀. A disproportionally great number of the specimens collected is due to a special interest in this group. Collected by MSFME expedition.

In the evening these butterflies choose as perches for overnighing almost exclusively silvery plants of *Artemisia frigida*, well contrasting to the rest green vegetation, on which they tend to concentrate to dozens on several adjacent plants.

100. *Plebicula amanda* (Schneider, 1792)

Korshunov, 1979: *Polyommatus amandus*, Toora-Khem, SE steep slope, on legumes: 27.VII.1972 – 2 ♂

Toora-Khem, left bank, Arbyk: 3.VII.1987 – 2 ♂; 28.VI.1988 – 1 ♂; Lake Azas, Ilgi-Chul, hills: 16.VI.1987 – 1 ♂, 22.24.VII.2000 – 3 ♂. Collected by MSFME expedition.

101. *Plebicula thersites* (Cantener, 1834)

Collected by MSFME expedition.

102. *Cyaniris semiargus* (Rotteburg, 1775)

Lake Azas, Ilgi-Chul, hills: 18.VI.1987 – 1 ♂. Collected by MSFME expedition.

103. *Agrodiaetus damon* (Denis et Schiffermüller, 1775)



Lake Azas, Ilgi-Chul, stepped hill slopes and, mostly, wet ground on the lake bank: 22.24.VII.2000 – 9 ♂ 1 ♀.

104. *Polyommatus icarus* (Rottemburg, 1775)

Korshunov, 1979: Toora-Khem, left bank, herbaceous meadow, 27.VII.1972 – 3 ♀.

Lake Azas, Ilgi-Chul and Okunevyi Bay, meadows at foothills: 16,18,21,22.VI.1987 – 3 ♂ 1 ♀, 15.VI.1988 – 1 ♂, stepped hill slopes: 21,24.VII.2000 – 7 ♂ 3 ♀. Collected by MSFME expedition.

The specimens collected in 1972 and 1988 were included by P. Y. Gorbunov into the paratypes of his *Polyommatus icarus korshunovi* P. Gorbunov, 1995 [Korshunov, Gorbunov, 1995], while the holotype and other paratypes originated from the Central Tuvinian and Ubsu-Nur Hollows and SE Altai. The characteristic features of the subspecies were indicated as follows: smaller, wings narrower, wing underside ground colour whitish in males and grayish in females, orange submarginal spots on wing underside small and isolated from each other, in females the wing upperside is usually strongly suffused with blue scales. The author referred to his subspecies as the butterflies of arid regions. According to our observations, specimens from Central Tuvinian and Ubsu-Nur Hollows are very peculiar and fit well to this description, being indeed quite different from those of more humid areas of Siberia, mostly by a light background and small and isolate but very bright and distinct submarginal orange spots in males, with the same trend seen in females in which, however, the ground colour is darker and the orange spots often contact to each other. Moreover, in our specimens collected in Central and Southern Tyva in July, the subspecies characters are even better expressed than in the holotype and those paratypes which were collected in May. One female collected by the second author at Erzin has a bright-blue wing upperside, on both wings with a diffuse dark areas along the costa and dark submarginal spots accompanied inside with diffuse dark chevrons but with no orange spots. It is interesting that the females from the highlands of the Yuzhno-Chuiskii Mt. Range in SE Altai, collected by V. Ivonin and O. Kosterin [Ivonin, Kosterin, 2000], are all deep blue above, but the wing underside do not show the characteristic features of the subspecies in question and resembles that of the typical one (so, it was an error of the second author when he identified and depicted them as ssp. *korshunovi* in [Ivonin, Kosterin, 2000]).

The specimens from Todzha are very different from those of arid Central and Southern Tyva: their wing underside ground colour is grayish in males and brownish-gray in females, the submarginal spots are large and contact each other but in males often very bleached, yellowish and almost lacking the colour. The females show no blue suffusion above. No doubt, their inclusion into the type series of ssp. *korshunovi* is nonsense. This fact is in line with Todzha being far from an arid region.

The name *korshunovi* should be attributed, hence, to an indeed clear-cut subspecies of arid regions of Central and southern Tyva (the holotype originates from the Erzin River floodland) and the adjacent regions of Mongolia. Recently Tuzov et al. [2000] referred to *korshunovi* as a synonym of the taxon *szabokyi* Bálint, 1990, described from the southern Mongolia as a species but considered them as a subspe-



cies of *Polyommatus (icarus) kashgarensis* Moore, 1878, earlier known as *Polyommatus persicus* Bienert, [1869], nom. praecoc. We had an opportunity to examine the two paratypes, a male and female, of *P. szabokyi* preserved in Siberian Zoological Museum, with the labels "MONGOLIA, Jh – Bogd., Orog-Nuur, 1988 – VIII, 3, leg. Szaboky Cs.". These butterflies exhibit an extreme expression of the same trend of reduction of the submarginal spots and lightening of the wing underside ground colour. The type series of *korshunovi* (excluding the Todzha specimens) are about intermediates between the "true" *icarus* and *szabokyi*. This fact indicates that most probably there exists a cline of character change among conspecific forms from rather humid ranges of Siberia through Central and South Tyva to the most arid Central Asia. Hence, we would not synonymize *korshunovi* and *szabokyi* and doubt in species independence of *Polyommatus kashgarensis* from *P. icarus*.

105. *Polyommatus erotides* Staudinger, 1892

Korshunov, 1979: *Polyommatus eros erotides*, Toora-Khem, left bank, steep stepped slope: 27.VII.1972 – 17 ♂ 2 ♀; Lake Azas, a stepped hill in taiga: 29-31.VII.1972 – 1 ♂ 1 ♀.

Toora-Khem, left bank, stepped hill slopes: 20.VII.2000 – 6 ♂ 1 ♀, high stepped right bank of the Bii-Khem River: 26.VII.2000 – 2 ♂ 1 ♀; Lake Azas, Ilgi-Chul, stepped hill slopes:

22,24.VII.2000 – 5 ♂ 3 ♀.

Thus, at present 105 butterfly species are recorded for the Todzha Hollow. The list is still undoubtedly incomplete and should include somewhat about 20 species more (especially highland ones). So, it is too early to undertake a formal analysis of the fauna. However, at this stage we can conclude with certainty that the fauna revealed is perfectly East Siberian, that well corresponds to the physiognomical appearance of Todzha which represents the East Siberian taiga landscapes, so different from mostly arid landscapes of Central Asian type of the West, Central and South Tyva.

ACKNOWLEDGEMENTS

The authors are very grateful to the consequent Directors of the Azas State Nature Reserve, Sergei Aleksandrovich Okamov and Vladimir Ak-Oolovich Kol, and, most of all, to the Scientific Vice-Directors Andrei Andreevich Vasil'chenko and Nina Iosifovna Molokova for their hospitality, a permission to work on the territory of the Reserve and a great help in the course of this work. Special gratitude is expressed to Vasili Konstantinovich Tuzov for kindly providing us with the list of species collected in 1989 by the Moscow Specialized Forest Management Enterprise and for his valuable comments. We are indebted to Dr. Ilya Igorevich Lyubchanskii who kindly allowed to mention the materials collected by their expedition of



June 2001 to the Khertesh-Taiga and Dongul-Taiga mountain ranges. The first author is grateful to Yurii Petrovich Korshunov for his great help in species identification. The second author expresses his gratitude to Prof. Dr. Tomoo Fujioka (Tokyo) for a financial support of his trip, to Dr. Dmitrii Nikolaevich Shaulo for promotion the collaboration with the Reserve and his unvaluable help during the expedition to Tyva Republic, and to his satellite Natalya Priidak for permanent help in the field.

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