

Revised data on *Parnassius (Kailasius) charltonius platon* SOCHIVKO & KAABAK, 2011 (Lepidoptera, Papilionidae)

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Abstract: Revised data on *Parnassius (Kailasius) charltonius platon* SOCHIVKO & KAABAK, 2011 are provided in this paper. A number of populations of the butterfly was recently discovered in Turkestan, Zeravshan, and Ghissar Ranges (W. Tajikistan). Besides *Corydalis schelesnowiana* REGEL et SCHMALH., 1881, these populations are trophically linked with two more endemic perennial xerophilous *Corydalis* species belonging to section *Strictae* (FEDDE) WENDELBO, 1974 – *Corydalis pseudostricta* M. POP., 1937 and *Corydalis zeravschanica* MIKHAILOVA, 1982. New morphological characteristics of the imago are added.

Keywords: *Parnassius*, *Kailasius*, *charltonius*, ssp. *platon*, *Corydalis*, section *Strictae*, trophic links.

Neue Informationen zu *Parnassius (Kailasius) charltonius platon* SOCHIVKO & KAABAK, 2011 (Lepidoptera, Papilionidae)

Zusammenfassung: In dieser Arbeit werden neue Informationen zu *Parnassius (Kailasius) charltonius platon* SOCHIVKO & KAABAK, 2011 gegeben. Eine Reihe von neuen Populationen des Falters wurden kürzlich in den Turkistan-, Zeravshan- und Ghissar-Gebirgsketten Westtadschikistans entdeckt. Neben der vorher bekannten Raupenfutterpflanze *Corydalis schelesnowiana* REGEL et SCHMALH., 1881 sind diese Populationen auch mit den eher xerophilen endemischen mehrjährigen *Corydalis*-Arten aus der Sektion *Strictae* (FEDDE) WENDELBO, 1974 *Corydalis pseudostricta* M. POP., 1937 und *Corydalis zeravschanica* MIKHAILOVA, 1982 verbunden. Zusätzlich werden neue morphologische Merkmale der Imagines angegeben.

Новые сведения о *Parnassius (Kailasius) charltonius platon* SOCHIVKO & KAABAK, 2011 (Lepidoptera, Papilionidae)

Резюме: В статье приводятся уточненные и новые сведения о *Parnassius (Kailasius) charltonius platon* SOCHIVKO & KAABAK, 2011. В хребтах Туркестанском, Зеравшанском и Гиссарском (Зап. Таджикистан) обнаружен ряд популяций, трофически связанных, помимо *Corydalis schelesnowiana* REGEL et SCHMALH., 1881, еще с двумя эндемичными видами многолетних ксерофитных хохлаток из секции *Strictae* (FEDDE) WENDELBO, 1974 — *C. pseudostricta* M. POP., 1937 и *C. zeravschanica* MIKHAILOVA, 1982. Дополняется список морфологических особенностей имаго.

Introduction – the stages of exploration

For several years the authors have investigated the trophic links between the butterflies of the subgenus *Kailasius* MOORE, 1902 (genus *Parnassius* LATREILLE, 1804: Lepidoptera, Papilionidae) and the plants of the genus *Corydalis* DC., (1805) (*Fumarioideae*, *Papaveraceae*) on the territory of Middle Asia (MIKHAILOVA & SOCHIVKO 2011). We suppose that the result of this activity will provide us with better understanding of their co-adaptation mechanisms. Until today, the host specialization of *Kailasius* has been documented poorly and contradictory in entomological literature, often without any collected herbarium material (ACKERY 1975, HÄUSER et al. 1985,

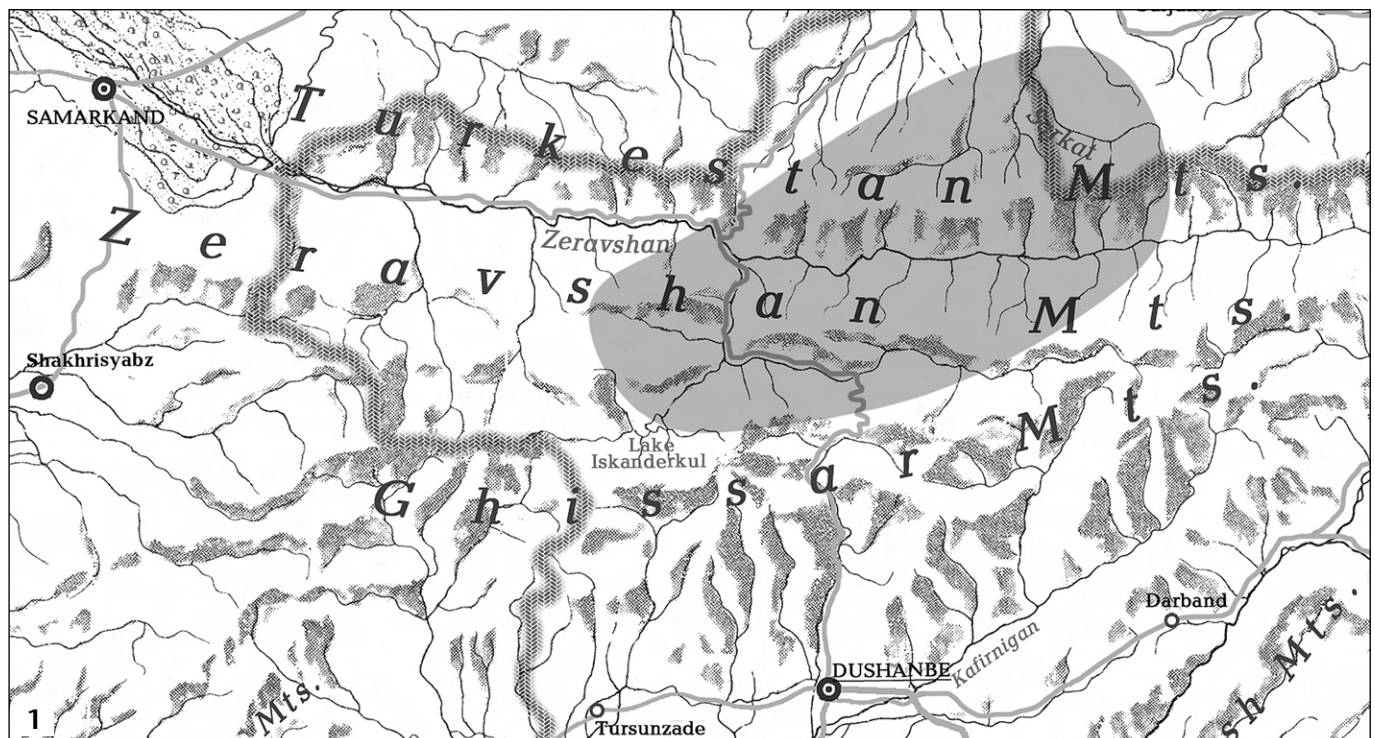


Fig. 1: Distribution area of *Parnassius (Kailasius) charltonius platon* SOCHIVKO & KAABAK 2011.

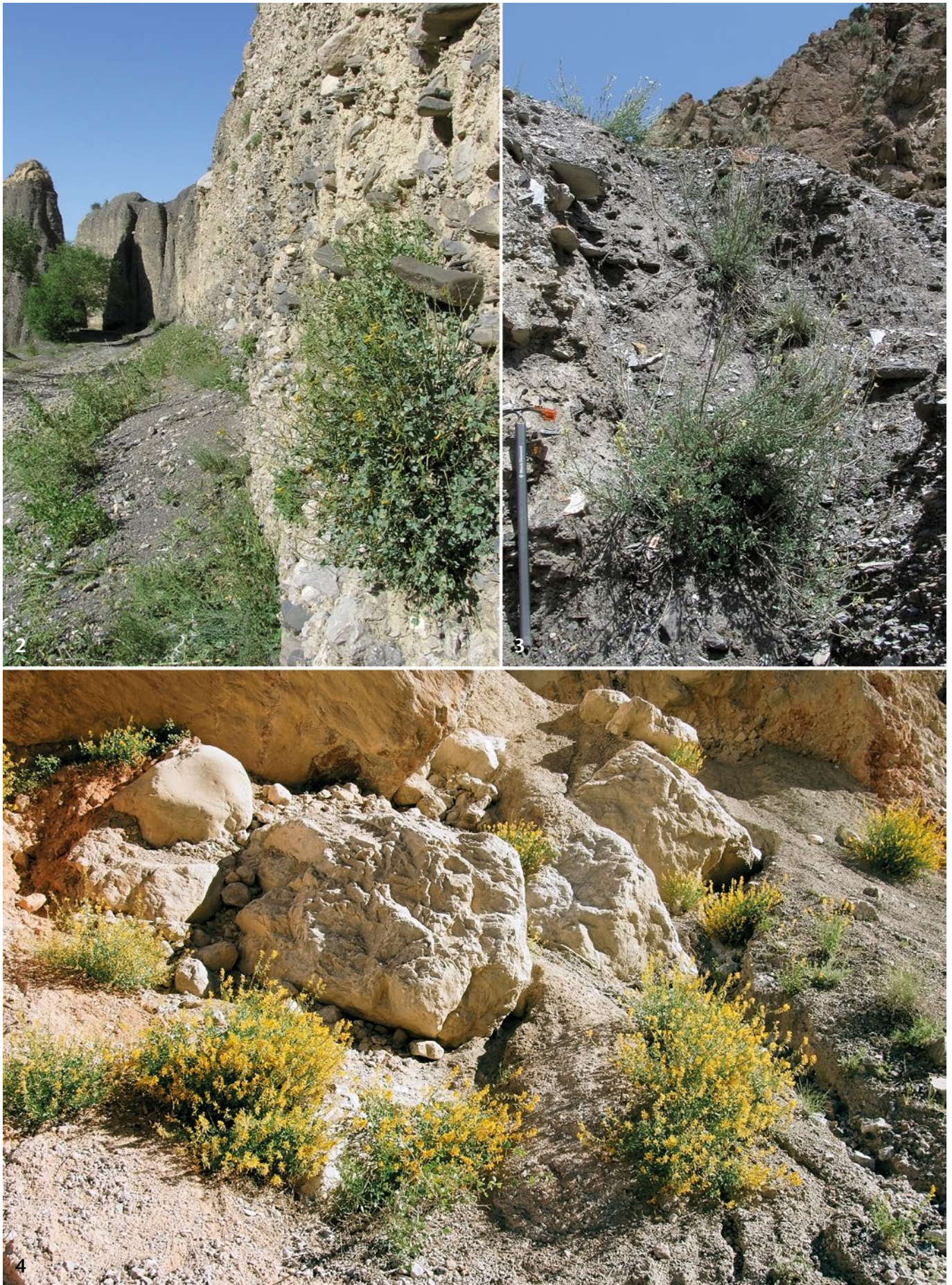


Plate 1: Larval host plants of *P. charltonius* and their habitats. — **Fig. 2:** *Corydalis schelesnowiana*: NW Tajikistan, Istaravshan Distr., Turkestan Range, Yangiaryk R., 1800 m, 27. vii. 2010. **Fig. 3:** *Corydalis pseudostricta*: NW Tajikistan, Istaravshan Distr., Turkestan Range, Argly R., Ovchi vill. vicin., 2200 m, 23. vii. 2010. **Fig. 4:** *Corydalis zeravschanica*: W. Tajikistan, Ghissar Range, Iskanderdariya R., Narvad vill. vicin., 2200 m, 20. vi. 2013. — All photos A. SOCHIVKO.



Plate 2: *Parnassius (Kailasius) charltonius*. — **Figs. 5–6:** *P. (K.) ch. platon*, W. Tajikistan, Ghissar Range, Iskanderdariya R., Narvad vill. vicin., 2200 m, 10.–11. vii. 2011, SOCHIVKO A. leg. **Fig. 5:** ♂. **Fig. 6:** ♀. — **Figs. 7–8:** *P. (K.) ch. platon*, NW Tajikistan, Istaravshan Distr., Turkestan Range, Argly R. bass., Ovchi vill. vicin., 2200 m, 24.–26. vii. 2010, SOCHIVKO A. leg. **Fig. 7:** ♂ (variation). **Fig. 8:** ♀ (variation). — **Figs. 9–10:** *P. (K.) ch. sochivkoi*. **Fig. 9:** ♂, SW Kyrgyzstan, Khaidarken Town vicin., Alai Mts., Allauddin R., 2850–3000 m, 1.–12. vii. 2007, SOCHIVKO A. leg. **Fig. 10:** ♀, SW Kyrgyzstan, Alai Mts., Kadamzhai distr., Eki-Daban R. (Aksu R. trib.), 3000 m, 26. vii. 2009, SOCHIVKO A. leg. — Specimens approx. natural size. All photos A. SOCHIVKO.

SAKAI 2002, TSHIKOLOVETS 1997, WEISS 1991). Reliable data which, however, require revision were published by A. V.-A. KREUZBERG only (KREUZBERG 1984, 1985, 1987a, b, 1989, KREUZBERG & PLJUSHCH 1989, KREUZBERG & DJAKONOV 1993). The bringing together of botanical and entomological data resulted in the discovery of new populations of papilionids, *Parnassius (Kailasius) charltonius* GRAY, 1853 among them. After the finding of the local and dense population of this species in Turkestan Range, on Sarkat River (SOCHIVKO & KAABAK 2011), the field work was continued in West Tajikistan and the neighboring territories of SE Uzbekistan (see Map, Fig. 1).

In the third decade of July 2010 the first author of the present paper investigated the populations of *Parnassius charltonius* in the central part of the Turkestan Range (Istaravshan Distr., NW Tajikistan). Two ende-

mic perennial xerophilous *Corydalis* species belonging to section *Strictae* (FEDDE) WENDELBO, 1974 are growing in the upper stream valley of the Yangiaryk River: *C. schelesnowiana* REGEL et SCHMALH., 1881 and *C. pseudostricta* M. POP., 1937 (MIKHAILOVA 1981, 1982). It was found that *P. charltonius* colonizes the stations of both plant species. The stations are located in just a few km distance from each other and are divided by rather narrow valleys and rock ridges with lush wood-shrubby and meadowy vegetation, where these *Corydalis* are absent.

The habitats of these plants are significantly different (Figs. 2, 3). *C. schelesnowiana* grows at conglomerate walls of the rivers canyons at the altitudes 1500–1900 m (Sarkat Riv., Kyrgyzstan) and 1700–1850 m above sea level (Yangiaryk Riv., Tajikistan). *C. pseudostricta* occurs at the rubble-loamy mountain slopes at the elevation of

2100–2300 m (Ovchi vill. vicin., Argly Riv. bass.; Ughuk vill. vicin., Shagan Riv. bass., Tajikistan).

Herbarium material of the above mentioned *Corydalis* species and a quantity of *P. charltonius* specimens were collected for further study. It is noteworthy that the butterflies are divided into two groups with regard to their morphological features. Most of the specimens from the *C. pseudostricta* habitat are somewhat larger, and both sexes usually demonstrate a characteristic hw. pattern: dark marginal strokes are partly or entirely absent (Figs. 7, 8). The butterflies with the wide, entirely clear marginal field look quite peculiar. Such form sometimes can be found among individuals of other subspecies, but practically only among females.

During the same month – July 2010 – the first observations on *P. charltonius* were made in the Zeravshan Range, between the villages of Takfon and Remon (Yagnob Riv. bass.). This is one of the known stations of *Corydalis zeravschanica* MIKHAILOVA, 1982, which also belongs to the section *Strictae*. It occurs here at altitudes of 2000–2100 m. The ovipositions of the previous year were found in the middle of July; two weeks later, on 29. VII., a single ♀ was collected. It was a large specimen (fw. length 42 mm, wsp. 75 mm) clearly different from the neighboring subspecies, *P. ch. ljudmilae* LESIN & KAABAK, 1991 (see LESIN & KAABAK 1991). In contrary, some characters of this ♀ were in correlation with Alaian and Turkestanian populations of *P. charltonius*.

The observations on the populations of *P. charltonius* were continued in the Zeravshan and Ghissar Ranges in 2011.

In the second decade of July A. SOCHIVKO managed to collect representative series of the species from the above-mentioned locality between the villages of Takfon and Remon (15 ex.) and from Iskanderdariya valley, vicinity of Narvad vill. (45 ex.). The complex of external features of practically all individuals, especially ♂♂, clearly suggests their identity to *P. ch. platon*. The specimens with clear hw. marginal field, similar to the ones from Turkestan Range, were also observed there, but quite rarely.

The local ♂♂ significantly vary in size: fw. length lies in the range of 33–40 mm (wsp. 60–72 mm); the ♀♀ are more stable in size: fw. length is 37–42 mm (wsp. 70–76 mm). It is remarkable that the localization of *Corydalis zeravschanica* stations in this area has a pin-point character, the butterflies being tightly associated with the plant; thus, no flying individuals of *P. charltonius* were observed just in a short distance from them. The habitats of both plants and butterflies are located within an elevational belt of only 200 m in width (2000–2200 m, Fig. 4). This could explain the fact why *P. charltonius* was never found before in such a travelled region.

Besides, the distance between Narvad vill. and the nearest known population of *P. ch. ljudmilae* is about 20 km only. But this taxon is clearly confined to the alpine and subnival belts of the western part of the main Ghis-

sar Range (3500–3900 m), southern macroslope, were it is trophically linked with the high-mountain plant *Corydalis onobrychis* FEDDE, 1912. Since *P. ch. ljudmilae* was described, hardly any material ever was rediscovered because the habitats are rather hard to reach, the weather in West-Ghissar highlands is often unstable, and the population density is low. Besides that, the imagines fly in odd years only. No butterflies have ever been found in even years; a several weeks long visit of A. SOCHIVKO and the team to the type locality (upper reaches of Diakhandara River) in the beginning of August 2010 was also ineffective. The attempts to obtain *P. ch. ljudmilae* were unsuccessful both in the first decade of August 2011 and in July–August 2013. Not a single specimen was even observed in spite of good weather, normal vegetation and abundance of host plants. Thus, more observations are required in the future to explain this strange fact.

In the summer of 2012 we confirmed that *P. charltonius* flies each year in stable quantity in Ghissar and Zeravshan Ranges. New populations were discovered in the valley of Pasruddariya Riv. neighboring to Iskanderdariya Riv. The altitude of 2380 m was the highest recorded point where the butterflies and *Corydalis zeravschanica* were both collected (Kante vill. vicin.).

The attempts to trace the cohabitation of *P. charltonius* and *C. zeravschanica* along a broad range were not successful. The plant occurs along Yagnob Riv. up to Magrib vill. (2100 m), but the butterflies were absent there. The fieldwork conducted along the wide valley of Zeravshan Riv. from the mouth of Fandariya Riv. down to Penjikent Town area near Tajikistan and Uzbekistan borderline gave zero result: neither butterflies nor their assumed host plants were found there. Exploring of the Zeravshan Riv. basin in its middle and upper part – from Fandariya Riv. mouth towards Matcha mountains knot – was canceled for technical reasons. We can extrapolate the existence of the butterfly along this extended part of Zeravshan range since the first author observed suitable biotops in 2010; in addition, there is some data on *Corydalis zeravschanica* from this region.

The summer season of 2013 was dedicated to determination of the western borders of *P. charltonius* areal. It was assumed (SOCHIVKO & KAABAK 2011) that the species could inhabit the extreme western part of the Middle-Asian mountain upland. This hypothesis was based on sporadic findings of xerophilous *Corydalis* plants on the territory of the neighboring Republic of Uzbekistan (MIKHAILOVA 1981).

Our team set off from Samarkand exploring stepwise the mountain ranges of Southern Uzbekistan (Kugitang, Babatag) and S. Tajikistan (Gardani-Ushti, Surkh), then the research continued in Uzbekistan again along the northern and southern slopes of Baisuntau range, Sarykiya mountain chain and the western border of Ghissar Nature Reserve (Kyzylitariya Riv. bass.). As a result, comprehensive herbarium material of all known local taxa of *Corydalis* was collected: *Corydalis microphylla* MIKHAI-

LOVA, 1982, *C. gypsophila* MIKHAILOVA, 1982, *C. pseudostricta* M. POP., 1937.

Surprisingly, neither the butterflies nor their life traces were found on the plants at the entire explored territory.

Abbreviations used:

fw. – forewing; hw. – hindwing; wsp. – wingspan.

Discussion and conclusions

It took almost two years (summer 2009–spring 2011) to collect the entomological and botanical material and to describe *P. (K.) charltonius platon* SOCHIVKO & KAABAK, 2011. Let us recall that the type series includes a bit less than a hundred of specimens originating from two localities (approx. 20 km apart) on the northern slope of Turkestan range. The majority of type specimens demonstrates specific external complex of characters addressed in the description at full length.

The authors of the description decided not to include the butterflies trophically linked with *Corydalis pseudostricta* into the type series; we did that in spite of a very short distance between “typical” and “non-typical” populations – a few km only, as it was stated in the beginning of the present paper. Such an uneasy and even attackable solution was made since we could not find the reasoned answer why the neighboring populations demonstrate visible morphological differences and how it can be used in constructing of the evolutionary and taxonomical model of *P. charltonius* as a species.

Recent dynamic research of the Pamir-Alai and Tien Shan entomofauna (CHURKIN 2009, CHURKIN & PLETNEV 2012, MIKHAILOVA & SOCHIVKO 2011, SOCHIVKO & KAABAK 2011) resulted in the discovery of big number of new populations of *Parnassius* butterflies belonging to subgenus *Kailasius* – *P. (K.) davydovi* CHURKIN, 2006, *P. (K.) autocrator* AVINOV, 1913, *P. (K.) charltonius* GRAY, 1853. Obviously, their distribution areas are wider than it seemed before, and the disjunctions between the populations are not so great. *P. (K.) charltonius* is evolutionary the youngest and most variable among these species. Its distribution area is far larger and it overlaps with a number of *Corydalis* species. The northern macroslopes of Alai and Turkestan Ranges can serve the example of the territory with high level of endemism and morphogenesis. The endemic species of *Corydalis* are known from the basins of many more or less big rivers, and all of them are host plants of *P. charltonius*. The multiple populations of variable butterflies from the entire northern macroslope of Alai Range should be united under the name of *P. (K.) ch. sochivkoi* CHURKIN, 2009. The western neighbour of this species, *P. ch. platon*, has more stable characters.

New data shall be added to the morphological features of *P. ch. platon*: the hw. marginal area both in ♂♂ and ♀♀ sometimes lacks dark elements entirely. The size range of the butterflies increases disproportionally in favour of females: in ♂♂ fw. length varies from 33 mm to 40 mm (wsp. 60–72 mm), in ♀♀ fw. length from 37 to 42 mm (wsp. 67–76 mm).

Note. The predominance of imagines with a white hw. marginal area in a single population trophically linked with *C. pseudostricta* can be treated as a secondary character. It is supported by the low percentage of such individuals in other populations of *P. ch. platon* and equally in the populations of other subspecies except maybe *P. ch. alraschid* CHURKIN & PLETNEV, 2012 which inhabits the limited territory in the upper stream of Gulcha Riv. in Eastern Alai, as it was stated by the authors of the description. The ♂ and ♀ of *P. charltonius* shown on Figs. 9, 10 are the common forms in Western Alai but could be encountered in Eastern Alai also.

The updated altitude range inhabited by the butterfly is 1500–2400 m.

The distribution area of *P. ch. platon* shown on the Map (Fig. 1) is congruent with three endemic *Corydalis* species: *Corydalis schelesnowiana* REGEL et SCHMALH., 1881, *C. zeravschanica* MIKHAILOVA, 1982 and *C. pseudostricta* M. POP., 1937. The populations of the butterflies are very local but often quite dense at the middle altitudes of Turkestan, Zeravshan and Ghissar Ranges.

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