

## New data about *Parnassius charltonius* GRAY, 1852

(Lepidoptera, Papilionidae)

by

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**Summary:** The article summarizes the results of the study and field work devoted to *Parnassius charltonius* GRAY, 1852. Two new subspecies are described: *Parnassius charltonius marusya* **subspec. nov.** (TL: Tadjikistan, Darvas, Obikhingou r.) and *Parnassius charltonius alraschid* **subspec. nov.** (TL: Kyrgyzstan, NE Alai, Gul'cha river). The taxonomic value of the external characters is discussed. A detailed study has shown that the  $\sigma\sigma$  of the *deckerti*-group of subspecies have very different structure of the genitalia compared to those of the  $\sigma\sigma$  of the *romanovi*-group. The normal copulation between *P. c. aenigma* DUBATOLOV & MILKO, 2003 and *P. c. anjuta* J. J. SHCHETKIN & KAABAK, 1985 the distribution areas of which are adjacent seem to be practically impossible (or very difficult). This well corresponds to the absence of specimens with hybrid external characters in the known populations of both subspecies. Accordingly the possible species status of *P. c. romanovi* GRUM-GRSHIMAILO, 1885 can not be excluded but needs more extended investigations.

**Резюме:** В статье суммируются результаты исследований и полевых работ, посвященных *Parnassius charltonius* GRAY, 1852. Описаны два новых подвида: *Parnassius charltonius marusya* **subspec. nov.** (Таджикистан, Дарваз, р. Обихингоу) и *Parnassius charltonius alraschid* **subspec. nov.** (Киргизстан, СВ Алай, р. Гульча). Обсуждается таксономический вес различных внешних признаков. Детальные исследования показали, что самцы подвидов входящих в группу *deckerti* резко отличаются от самцов группы по строению гениталий. Нормальная копуляция между *P. c. aenigma* DUBATOLOV & MILKO, 2003 и *P. c. anjuta* J. J. SHCHETKIN & KAABAK, 1985, ареалы которых граничат друг с другом, практически невозможна. Это хорошо согласуется с отсутствием экземпляров с гибридными внешними признаками в известных популяциях обоих подвидов. Другие подвиды группы *romanovi* показывают результаты генетического обмена и включают в себя экземпляры с гибридными признаками. Таким образом, видовой статус *P. c. romanovi* GRUM-GRSHIMAILO, 1885 не исключен, но требует новых расширенных исследований.

**Introduction:** In the course of the study of gliding *Parnassius* LATREILLE, 1804 (subgenus *Kailasius* MOORE, 1902), we found and studied some new populations of *P. charltonius* GRAY, 1852 and *P. davydovi* CHURKIN, 2006; the new data provide additions and corrections to the previous review (CHURKIN, 2009). We are planning to summarize all facts in a subsequent paper, adding more details on the genitalia and DNA-investigations. However, it is necessary to publish some important information now, as well as the descriptions of two new subspecies.

The holotypes of the new subspecies are deposited in the Darwin State Museum (Moscow). The paratypes are preserved in the collections of the authors, K. ROSE (Mainz), M. DAVYDOV (Moscow), B. KHRAMOV (St.-Petersburg), V. KOROSTELEV (Moscow), O. PETROV (Moscow).

**Abbreviations:** FW - fore wing, HW - hind wing, TL - type locality

**I. Historical aspect:** The territory in study includes the south-western part of Tian-Shan, Alai and Transalai ranges, Ghissar, Turkestan range, the ranges of Darvas (as a zoogeographical district) and Pamirs.

As it was stated in the review (CHURKIN, 2009), this area is populated by several subspecies of *P. charltonius* GRAY. Firstly, *P. c. anjuta* J. J. SHCHETKIN & KAABAK, 1985 is known from the East Pamirian Plateau (we suggested *P. c. mistericus* KAABAK, SOTSHIVKO & TITOV, 1996 as a synonym), it belongs to the *deckerti*-group of subspecies, this fact being not doubtful. The taxon is very close to *P. c. ducalis* BOULLET & LE CERF, 1912 from Pakistan and is often treated as a synonym of it (ROSE & WEISS, 2011). We are unable to discuss this item, but the similarity between the mentioned taxa is obvious; the *deckerti*-group as a whole represents a complex of close relatives.

We united all other taxa (from the studied area) in the *romanovi*-group of subspecies - but SOCHIVKO & KAABAK (2011) proposed to place *P. c. aenigma* DUBATOLOV & MILKO, 2003 in a separate complex, basing only on the distinctions in the colouration. This idea is wrong, as we hope to prove below.

*Parnassius c. aenigma* DUBATOLOV & MILKO is known only from the TL - Kyrgyzian Kyzyl-Su river situated between the eastern edges of Alai and Transalai ranges in the mountain part of Kashgaria. It is clear that this butterfly (or close relatives) will be found at other rivers of this part of the Tarim basin; the distribution area of this subspecies is adjacent to that of *P. c. anjuta* J. J. SHCHETKIN & KAABAK.

The oldest taxon of the complex, *P. c. romanovi* GRUM-GRSHIMAILO, 1885 is known from Alai Valley; the actual known place is Aram-Kungei, the TL according to the lectotype designation (CHURKIN, 2009).

*Parnassius c. sochivkoi* CHURKIN, 2009 was described from North Alai, Ak-Bura River; the areal extends from Ak-Bura to Dugoba river and Aidarken vicinity (SOCHIVKO & KAABAK, 2011). This butterfly is similar to *P. c. romanovi* GR.-GR. but readily differs in the well developed white dots inside the red HW spots and in the absence of the reddish Cu-spot joining the anal spot and M-eye. It was stated that the populations from Isfaramsai and Dugoba might be more similar to *P. c. romanovi* GR.-GR. because of the possible contacts with the *romanovi*-populations living at the southern slopes of Alai. ROSE & WEISS (2011) synonymized these two taxa but this seems not correct because they had not examined sufficient material from the type localities, and they did not pay attention to the weight of different distinctions (which are sometimes small but very important, as it is very well known). This item will be discussed below.

The same authors treated *P. c. ljudmilae* LESIN & KAABAK, 1991 from the southern slopes of Ghissar as a synonym of *P. c. romanovi*

GR.-GR.; that is wrong in all cases - but this very distinctive subspecies is little known and absent in the collections.

*Parnassius c. platon* SOCHIVKO & KAABAK, 2011 was described recently from two localities - both situated at the northern slopes of Turkestansky Range (the holotype was taken from the Kyrgyzian part, while part of the paratypes originated from Yangy-Aryk River in Tajikistan). This small “strong” subspecies has a very interesting combination of characters, including widened submarginal band - this distinction has been known before only for *P. c. ljudmilae* LESIN & KAABAK.

*Parnassius c. eugenia* CHURKIN, 2009 occupies the Muksu river basin, North Darvas, not far away from the type locality of *P. c. romanovi* GR.-GR. The subspecies is represented by relatively small and whitish butterflies with some features of *P. c. aenigma* DUBATOLOV & MILKO and without some important distinctions of *P. c. romanovi* GR.-GR.

The last known subspecies was found in Tian-Shan, Dzhaman-Too - *P. c. varvara* CHURKIN, 2009, with convex costal margin of the FW and joined FW discal spots showing only little relations with the neighbours.

**2. External characters and distribution:** Since 2009, when the review on *P. charltonius* GRAY was published, we have accumulated much more material and found some more populations; intensive study of the genitalia was also productive. It is possible now to clarify some questions and to correct the mistakes.

The first author in his review proposed several distinctions which seemed to be very important, especially for the ♀♀: the degree of the sexual dimorphism, general shape of the wings, density of the ground colour and the development of the additional cubital red spot between the anal spot and M-eye on the HW. The comparative size of the red eyes on the upperside and underside of the HW is one more important character - for both sexes but sometimes more visible among the ♂♂. It was marked that the general colour of the living butterflies (different in different subspecies) is essential also.

It was stated that the density of the ground colour was wrongly ignored in the previous studies. It was a correct conclusion, but this character is more variable than it was supposed. Slight variability was marked only for *P. c. romanovi* GR.-GR. but now we found it for *P. c. eugenia* CHURKIN (this character seems to be much more variable in the *deckerti*-group). A ♀ with semitransparent wings was collected in the type locality of the last taxon (see colour plate 1: 4); the general shape of the butterflies is also more variable than it was known from the small type series. However, even the semitransparent ♀ bears all complex of the main *eugenia*-distinctions (important to note that even this ♀ has obviously more dense and whitish ground colour than it is typical for *P. c. vaporosus* AVINOV, 1913, for example). The absence of the additional Cu-spot demonstrates much more stability.

The reduction of the size of the red eyes represents the most valued and very constant feature. Only very rare individuals (aberrations or specimens looking like hybrids with neighbouring subspecies) may have this character developed in an opposite version compared to what is typical for the taxon. Strictly speaking, only *P. c. romanovi* GR.-GR. has some weak variability, but it represents the most variable subspecies as a whole. A significant reduction of the spots was firstly registered for *P. c. aenigma* DUBATOLOV & MILKO, where the costal eye is practically not decreased in size but M-spot has a typical “bird’s beak” shape. Later it was found in *P. c. varvara* CHURKIN, *P. c. eugenia* CHURKIN and *P. c. platon* SOCHIVKO & KAABAK. It is absent in all old subspecies of the group (including the above marked case of *romanovi*) and *P. c. sochivkoi* CHURKIN.

When the size of the costal spot (eye) is reduced on the upperside, the black border of the bigger underside spot is visible from the upperside as an additional dark line removed from the costal eye towards the wing base. It looks like an additional costal transverse vein, and we proposed to use the name “transverse line” for this distinction. The reduction of the M-spot leads to two phenomena: the bigger underside spot is visible from the upperside as so called “bird’s beak”- spot (see in CHURKIN, 2009), while the upperside M-spot is divided into two components - the latter process has different results in different taxa. Unfortunately, the first author paid more attention to the reduction of the M-spot (because other relatives were described only in his review), while the additional transverse line represents a technically much more useful and absolutely constant distinction for all taxa where it is found.

All old *romanovi*-taxa live in high mountains using giant rocky massifs - as well as *P. c. sochivkoi* CHURKIN, which however can fly much lower. In 2011 we found a population of *P. c. sochivkoi* CHURKIN at 1800-2000 m a.s.l. close to the type locality at Ak-Bura river; the characters of the butterflies were the same (only the size of the HW costal eye became statistically smaller but additional transverse line is not expressed, i.e. the eye became smaller on both sides of the HW).

Other “new” taxa with reduced eyes live at the river sides, at very different altitudes (from 2900 m a.s.l. for *P. c. varvara* CHURKIN to 1500 m a.s.l. for *P. c. platon* SOCHIVKO & KAABAK).

The different variants of reduction of the red spots do not seem to be only ecologically based for many reasons:

- the size of the eyes has a genetic base, as it is well known for *Parnassius*; the normal variability includes changing of the size of spots but in general and on both sides of the wing;
- the character is not correlated with the altitude and, thus, with the microclimate and temperature;
- one taxon has only the M-spot reduced while the costal eye is only very slightly reduced (*P. c. aenigma* DUBATOLOV & MILKO)
- “new” subspecies (i.e. the taxa with transverse line) combine this character with some other characters of “old” neighbouring subspecies; such a situation is possible only when normal genetic exchange exist (or existed not so far in the past) between two very different but related taxa.

The distribution areas of the “new” taxa are often situated between the areas of “normal” old subspecies, and this represents an uncommon pattern of the distribution structure. According to all data mentioned above, only one explanation is logical - we have the results of the spreading of two originally different old races the descendants of which compose a very difficult mosaic complex of subspecies. This conclusion strongly confirms the first reconstruction of the history of this species which was done in the review (CHURKIN, 2009) - but presents the history in a more detailed way. (The opposite explanation is simple - we have two different species inside the *romanovi*-complex; this is very doubtful - but see below).

**3. New subspecies:** The new subspecies which will be described below represents a true logical confirmation of the mosaic subspecific composition of *P. charltonius* GRAY.

In 2011, SERGEI SALUK, a permanent member of our expeditions found a new population of *P. charltonius* GRAY at Obikhingou River, Darvas. The locality is not far away from the type locality of *P. c. vaporosus* Av. (southern slopes of Darvas, Viskharvi), but the butterflies belong to a definitely new subspecies related to *P. c. eugenia* CHURKIN with reduced eyes on the HW upperside and

additional transverse line. Some more interesting populations of *P. charltonius* GRAY were also found in Darvas but, unfortunately, the material is not sufficient to include it in this article. The new taxon combines the characters of *P. c. eugenia* CHURKIN (more correctly, the characters of the *aenigma*-complex, because the shape of the M-spot is similar to that of *P. c. platon* SOCHIVKO & KAABAK, for example), features of *P. c. vaporosus* AV. and even *P. c. lyudmilae* LESIN & KAABAK.

Another new taxon was found not far away from Gulcha village, at the well known "Pamirian highway" Osh - Murgab - Dushanbe, at the northern slopes of Alai. The distribution area of this butterfly is adjacent to that of *P. c. sochivkoi* CHURKIN (the TL is situated less than 20 km of the known populations of this taxon - Ak-Bura r.), while the butterflies are similar to *P. c. platon* SOCHIVKO & KAABAK. Taking into consideration that the distribution area of the latter is situated on Turkestan range (350-450 km in western direction!), the situation became absolutely complicated. SOCHIVKO (2011) specially noted that *P. charltonius* GRAY was absent at the sides of Sokh river (between Alai and Turkestan range) because the foodplants are absent. We can confirm it for Dugoba and Ak-Bura rivers - i.e. the *platon*-like populations are absent in other parts and ranges of North Alai, and the distribution areas of *P. c. platon* SOCHIVKO & KAABAK and the new taxon from Gulcha are widely and fully disjointed. The population from Gulcha needs a special name not only for this reason but because it has a unique combination of the characters which demonstrates a weak but existing (or existed) genetic exchange with *P. c. sochivkoi* CHURKIN and even *P. c. romanovi* GR.-GR. (see description and "Discussion").

Note: A population of *P. davydovi* CHURKIN, 2006, was found at Dzhaman-Too Mts. where this species flies together with *P. c. varvara* CHURKIN (the food plants are the same). Some specimens are very big (FW length sometimes obviously more than 40 mm in ♂♂) and darker than nominotypical. However, they do not need a new name because the main part of the population has typical colouration.

**4. Problems of variability: *P. c. romanovi* GR.-GR.:** An important addition should be made about the situation in the Alai Valley. Only one locality is known for *P. c. romanovi* GR.-GR. - Aram-Kungei, a small tributary of Altyn-Dara river. New material from other places, including Dzhilga in SW Alai where the taxon was originally found by GRUM-GRSHMAILO is absent. Some important characters unite this taxon with *P. c. vaporosus* AV., distributed in West Pamirs and the neighbouring part of Afghanistan: the representatives of both taxa have no additional transverse line, but the ♀♀ are semitransparent with an additional reddish Cu-spot forming the reddish band on the HW. The last character is unique for the complex and the species as a whole. This was the base why TSHIKOLOVETS (with his idea to unite everything) treated *P. c. vaporosus* AV. as a synonym of *P. c. romanovi* GR.-GR., in spite of the fact that these taxa can not be confused because of very different general colouration.

The unique characters are a true base to suppose that these two taxa had a joined distribution area in the past and a long time of intensive genetic exchange. The contacts between the populations of *P. c. romanovi* GR.-GR. and *P. c. vaporosus* AV. are possible only through the mountains of North-West Pamir, a famous area with the maximum development of the glaciers and high mountain tops. Such contacts are too difficult now and were not possible during the glacier periods.

Theoretically, earlier it was possible to explain the similarity between *P. c. romanovi* GR.-GR. and *P. c. vaporosus* AV. because of possible genetic exchange through Peter the Great range and/or Surkhob-Vakhsh river valleys. However, now such populations are discovered, and both of them belong to another complex (*P. c. eugenia* CHURKIN and the new one from Obikhingou have reduced red Cu-spot but have an additional transverse line).

Thus, the simple genetic exchange between *P. c. romanovi* GR.-GR. and *P. c. vaporosus* AV. is possible only through the high mountain area - and definitely it was intensive only long time ago. This hypothesis is logical, because it agrees with the fact that both taxa inhabit high mountain rocks - thus, they do spread not along the rivers but using the mountain massifs.

This also agrees with a hypothesis about two different waves of the spreading of the *P. charltonius*-populations in Central Asia. Certainly, the highmountain *P. charltonius*-subspecies became widespread along the ranges and reached Ghissar and North Alai during the warmest era between two glacier periods or (maybe) even before the last active mountain recovery. These butterflies, as a rule, are greyish, green-bluish or yellowish in nature - with one exception: *P. c. romanovi* GR.-GR. (The first author pointed out in his review that this subspecies has a geographically unique position and unique combination of the characters being the permanent exception in all principles and rules).

The last conclusion breaks the opinion that the ancestor of *P. c. romanovi* GR.-GR. originated in the Alai valley - it originated in the mountains of Transalai/Northern Pamirs. Thus, the first widespread of the taxon was along the ranges from West Transalai to SW Alai and then to Central Alai. It means that *P. c. sochivkoi* CHURKIN from Ak-Bura represents the opposite end of former cline and, thus, the most different *P. charltonius*-population from Alai compared to the true *P. c. romanovi* GR.-GR. Obviously, this cline is interrupted now (as practically all contacts between different subspecies of the *romanovi*-group). Theoretically, it is possible to limit the distribution area of *P. c. sochivkoi* CHURKIN by the Ak-Bura basin and a special *Corydalis* foodplant growing only in this basin, but other Alaian butterflies are definitely closer to this subspecies than to *P. c. romanovi* GR.-GR. and can not be simply united with the latter.

To continue the logical observation of the *romanovi*-case we must remember about the similarity between *P. c. eugenia* CHURKIN and *P. c. aenigma* DUBATOLOV & MILKO. It means that some time in the past such a population with reduced upperside red spots lived in the Alai Valley; then, during the glacier period(s) it was erased and mixed with the mountain population of the *romanovi*-ancestor. This hypothesis will be an important addition to the history of the subspecies published in the review (CHURKIN, 2009) and present an additional explanation of the unusual variability of *P. c. romanovi* GR.-GR. It means that the latter represents the result of the merging of the highmountain ancestor and *eugenia*-like populations which lived at the bottom of the valley.

We can not exclude that it is possible to prove this hypothesis simply - if some *eugenia*-like populations survived in other parts of the Alai Valley, we can find them.

Actually, 99% of the *romanovi*-specimens were collected on a scree under a giant rocky massif at the end of the Aram-Kungei valley at the altitude 3400-3500 m a.s.l. However, the most experienced collectors know that a very small population lives on a clay hill at the beginning of the valley where it flies on a small scree near broken rocks at the altitude 2900-3000 m a.s.l. It was a very small place which might be fully destroyed now - the collectors who visited Aram-Kungei during the last years informed us that all vegetation on the hill was eliminated by sheeps. However, 20-25 years ago when the first author visited Aram-Kungei, this hill was full of life.



The expedition partner of the first author, Dr. D. ZAMOŁODCHIKOV (Moscow) collected here a *P. charltonius* ♀ in a “wrong” year - 1989. This ♀ looks as a typical *P. c. eugenia* ♀ (see colour plate 3: 2), including the shape of the red eyes and the features of the blackish pattern, even the transverse line is visible (colour plate 3: 2).

(Besides of all, this ♀ raises the problem of the differences between the even- and odd- generations. This problem is practically not studied, while it can lighten the status of some taxa and true relations between them. It is absolutely clear that the genetic exchange between such generations is very difficult and the butterflies flying in different years can be different - especially if the neighbouring subspecies is more numerous in another year as it is between *P. c. romanovi* GR.-GR. and *P. c. eugenia* CHURKIN. In our opinion, the differences between the even and odd populations of *P. c. sochivkoi* CHURKIN also exist).

Interesting, that the *aenigma*-population (the distribution area of which is separated from the Alai valley by a high watershed) includes very rare specimens relatively similar to *P. c. romanovi* GR.-GR. (or maybe *P. c. eugenia* CHURKIN) - such a ♂ is in ROSE's collection, one more in CHURKIN's collection (colour plate 3: 1), and we have to study 3 smoky semitransparent ♀♀ with very unusual colouration. At the same time, the *aenigma*-specimens with the characters similar to or only mixed with those of another neighbouring subspecies - *P. c. anjuta* SHCHETKIN & KAABAK - are absolutely absent. The same is true for the opposite case - *aenigma*-like specimens are absolutely unknown among *anjuta*- or *mistericus*-populations. These facts will be discussed below, together with the characters of the genitalia.

Note. The first author found in the collection of KLAUS ROSE (Mainz) several ♀♀ of *P. c. romanovi* GR.-GR. with unusual characters - reduced Cu-spot and uncommonly dense ground colour. They are not fully similar to the *P. c. eugenia* ♀♀, and such a colouration is known for the taxon (see in the review), but is rare. The presence of 3 such forms in a small series from Aram-Kungei is abnormal. We suggest that ROSE synonymized *P. c. sochivkoi* CHURKIN with *P. c. romanovi* GR.-GR. exactly based on this series. That was logical for ROSE as the development of the reddish Cu-spot and the density of the ground colour seemed to be not a constant and important character for him.

Such a position seems to be wrong. Firstly, this series does not agree with the typical characters of the subspecies based on hundreds of studied specimens. Secondly, as we stated above, the development or absence of the Cu-spot is very stable in many other populations discovered. Thirdly, a population must include some forms similar to other subspecies (sometimes even not neighbouring subspecies) - in the other case we need to discuss the species status for this population.

Worth to note, that the photos of the *P. c. romanovi*-specimens published by DIETZ (2002) are definitely wrong; the figured specimens belong to *P. c. vaporosus* Av.

*Parnassius charltonius marusya* subsp. nov. (colour plate 1: 5-8)

Holotype ♂: Tadjikistan, Obikhingou r., 18-25.07.2011, S. SALUK leg.

Paratypes: 52 ♂♂, 12 ♀♀, Tadjikistan, Obikhingou r., 18-25.07.2011, S. SALUK leg.

**Description and diagnosis:** The butterflies have extended wings and expressed sexual dimorphism.

The ♂♂ represent a *eugenia*-version with visible additional transverse line, but the black pattern is well developed (definitely more than in both neighbouring subspecies), the M-spot is divided at the inner side. The ♀♀ externally look more similar to those of *P. c. vaporosus* Av. but the FW black pattern is more developed while the HW blackish submarginal area is reduced (the transverse line and bird's beak are developed as in the ♂♂). In general, the butterflies look dark and striped, easily differing from all relatives. The submarginal bluish spots are more expressed as it is in *P. c. ljudmilae* LESIN & KAABAK.

♂: The FW length is 38 mm in the holotype, 37-40 mm in the paratypes (usually 38-39 mm), i.e. statistically but obviously larger than in *P. c. vaporosus* Av. The ground colour is whitish but not true milky-whitish as in *P. c. romanovi* GR.-GR. and *P. c. eugenia* CHURKIN; it has a slight distinct yellowish-grey hue. The FW semitransparent marginal band is the same as in neighbouring subspecies, the submarginal band is statistically wider than in *P. c. eugenia* CHURKIN (and even wider than in *P. c. vaporosus* Av.), more wavy and contrasting, especially in the Cu-zone. This band is often reduced in *P. c. eugenia* CHURKIN, while the representatives of the new taxon have this band complete, only sometimes the Cu2-2A spot is absent and very rarely the band is interrupted near M3 vein. The FW postdiscal band: costal series is well developed as it is in *P. c. vaporosus* Av. but wider than in *P. c. eugenia* CHURKIN. This band is moved away from the discal spots towards the submarginal band as it is typical for the complex. The Cu-spots of this band are visible as a suffusion of dark scales along the veins - similar to *P. c. eugenia* CHURKIN and in contrast to *P. c. vaporosus* Av. where these spots/suffusion are reduced and even absent, as a rule. The discal spots are distinctly narrower than in *P. c. eugenia* CHURKIN but wider than in *P. c. vaporosus* Av. - the widths of these spots are intermediate, but 35% of the specimens have these spots joined (as in *P. c. varvara* CHURKIN); the last character being absent in both neighbours.

The HW with developed blackish pattern on the underside which is visible from the upperside and creates a more darkened appearance than usually: dark costal spot is visible at the base of the HW as well as d-vein at the end of the cell. Such characters are common for *P. c. ljudmilae* LESIN & KAABAK but absent or very rare among the neighbouring subspecies. Both red eyes have deep colour similar to that of *P. c. eugenia* CHURKIN (in contrast to *P. c. vaporosus* Av.), the upperside eyes are reduced. The costal eye on the underside is twice larger so that its black inner border is visible from the upperside as an additional transverse dark line (white dot is absent, as a rule). The M-eye with “bird's beak” (which however is not very contrasting and big), i.e. this eye has a triangular shape on the underside while its inner border is reduced on the upperside. Worth to note, that the general shape of the M-spot on the upperside is unusual and similar to that of *P. c. platon* SOCHIVKO & KAABAK: the spot is divided into two parts, and each part is tooth-shaped from the inner side; only one well expressed white dot is developed. This character is slightly variable, but the ♂♂ with *eugenia*-like transversally stretched M-eye are very rare. The ♂♂ of *P. c. vaporosus* Av. have the same size of the red spots on both sides of the HW, and the general shape of the M-spot is oval with widened black inner border.

The submarginal pattern is similar to that of *P. c. vaporosus* Av. (in contrast to *P. c. eugenia* CHURKIN and all other taxa of the *romanovi*-group), but the bluish spots are enlarged and bluish suffusion is more expressed (similar even to *P. c. ljudmilae* LESIN & KAABAK and unlike both relatives, where the specimens with well expressed blue spots represent rare aberrations). The spot between the M-eye and anal spot is absent, as a rule (only 3 exceptions among the type series, all without reddish scales in this spot).

The blackish marginal lines along the HW margin are usually well expressed as it is in both neighbours.

The genitalia are similar to those of *P. c. eugenia* CHURKIN or *P. c. aenigma* DUBATOLOV & MILKO (see below).

♀: The FW length is 38-41 mm. The ground colour is semitransparent with yellowish shades (but not so strongly as in *P. c. vaporosus* Av.) in contrast to white ♀♀ of *P. c. eugenia* CHURKIN. The main characters of the FW as in the ♂♂. The blackish pattern is even more developed than in the ♂♂ (uncommon for the *romanovi*-group as a whole). The submarginal band is very wavy, especially in the Cu-zone. The postdiscal band is more or less complete (in the darkened forms - fully complete and well expressed). The HW submarginal pattern is similar to that of *P. c. vaporosus* Av., with expressed and enlarged blackish area around the bluish spots. However, this area is not so widened but separated from the red M-spot by a distinct whitish strip. In *P. c. vaporosus* Av. the blackish area extends to the M-spot or, in rare cases, is joined with the M-spot by a dark-grey not contrasting strip. The developed FW black pattern easily distinguishes the new ♀♀ from the ♀♀ of *P. c. vaporosus* Av., which (as the ♂♂) also have no additional transverse line and have another shape of the M-spot.

**Variation:** One paratype ♂ looks identical to *P. c. platon* SOCHIVKO & KAABAK, only more greyish in general. Another ♂ is very similar to *P. c. vaporosus* Av., having oval M-spot without white dots, fully reduced Cu-spots in the FW postdiscal band and even without additional transverse line (i.e. the differences in size of the red spots on the upperside and underside of the HW are very small). One ♀ has maximally enlarged blackish submarginal area which touches M-spot as it is in *P. c. vaporosus* Av. - and one more ♀ demonstrates intermediate position between this pattern and the typical form. Both cases represent the forms with significantly enlarged black pattern, so that the FW bands are widened and even joined forming very unusual colouration - i.e. if the HW becomes more similar to that of the *P. c. vaporosus* Av. ♀♀, the FW, in contrast becomes absolutely different.

**Distribution and biology:** Known only from the TL. Without any doubts, will be found in other places of the valley. The foodplant is *Corydalis* sp. The distribution area must be bordered (or bordered in the past) on the area of *P. c. eugenia* CHURKIN through the Surkhob valley and neighbouring slopes of Peter the Great range. A strange population of *vaporosus*-like butterflies was found 12 km from the type locality of this new subspecies; this fact needs further investigations. The present comparison was done basing on the *P. c. vaporosus* Av. population from West Pamirs.

**Etymology:** The subspecies is named after MARIA BELOVA.

*Parnassius charltonius alraschid* subsp. nov. (colour plate 2: 5-8)

Holotype ♂: NE Alai, Gulcha river, 13.- 23.07.2011, S. CHURKIN leg.

Paratypes: 5 ♂♂, 3 ♀♀, NE Alai, Gulcha river, 13.- 23.07.2011, V. PLETNEV & V. KOROSTELEV leg.

Note: As we marked above, the new taxon easily differs from the neighbour, *P. c. sochivkoi* CHURKIN distributed at the main part of North Alai. However, in reality it represents a relative of *P. c. platon* SOCHIVKO & KAABAK from Turkestansky range which is also included in the analysis. We do not add special comparison with *P. c. romanovi* GR.-GR. and *P. c. varvara* CHURKIN from Tian-Shan: their areas may theoretically border on the possible distribution area of the new subspecies but the differences are obvious; only the main distinctions will be listed.

**Description and diagnosis:** The butterflies are most similar to *P. c. platon* SOCHIVKO & KAABAK, being white with slight sexual dimorphism, but the postdiscal FW band is very narrow, the red M-spot without two teeth at the inner border. In addition, the underside demonstrates very well expressed blackish pattern, while the marginal blackish lines on the HW are practically fully reduced.

♂: The FW length is 39 mm in the holotype, 36-40 mm in the paratypes, statistically but distinctly more than in *P. c. platon* SOCHIVKO & KAABAK (worth to note, that SOCHIVKO gives similar size of the latter in the original description - 34-39 mm; we have several types at our disposal and a very large series - more than 200 specimens - of topotypes: the FW length varies from 33-38 mm in the ♂♂, the common size being 35-36 mm).

The ground colour is true whitish as it is in *P. c. romanovi* GR.-GR. and *P. c. eugenia* CHURKIN (*P. c. platon* SOCHIVKO & KAABAK is whitish with grey hue) in contrast to greyish-yellowish *P. c. sochivkoi* CHURKIN. The FW shape with angled - even sharpened - apex, black pattern considerably reduced, red HW eyes on the upperside are also reduced; all these characters are strongly different from those of the typical representatives of *P. c. romanovi* GR.-GR. or *P. c. sochivkoi* CHURKIN; while *P. c. platon* SOCHIVKO & KAABAK has reduced eyes but the apex is not angled.

We have one abnormal specimen of *P. c. sochivkoi* CHURKIN with narrow and angled wings and another one with additional transverse line, whitish ground colour and reduced black pattern (colour plate 2: 2-3) but specimens with more or less complete number of *alraschid*-characters are not known. It means that the distinctions discussed are genetically based and can not be completely changed because of ecological/microclimatic conditions). The costal FW margin is straight as it is typical for the species (in contrast to *P. c. varvara* CHURKIN).

The FW is semitransparent; the marginal band is the same as in neighbouring subspecies, the submarginal band is very narrow and wavy, but contrasting; this band is often disjoined (broken) at the M3-vein and narrower than the postdiscal band. *P. c. platon* SOCHIVKO & KAABAK has the submarginal band widened, that is unusual for the species but similar to the neighbouring *P. c. ljudmilae* LESIN & KAABAK. Moreover, the new subspecies has this band moved from the discal spots towards the submarginal band as it is typical for the complex, while in *P. c. platon* SOCHIVKO & KAABAK the distance between the inner d-spot, external d-spot, costal series of the postdiscal band and costal series of the submarginal band are equal, as a rule (exceptions are very rare). The discal spots are large and visibly more blackish than all other elements of the pattern; the external spot is often enlarged and loses true geometrical shape (similar to *P. c. romanovi* GR.-GR. and *P. c. eugenia* CHURKIN). The anal spot of the postdiscal band is not dense and has no distinctive oval shape, in contrast to *P. c. platon* SOCHIVKO & KAABAK and, even more sharply, *P. c. sochivkoi* CHURKIN/*P. c. varvara* CHURKIN.

HW whitish with reduced black pattern, marginal blackish line is reduced - as a rule, totally absent, very rarely traces of these lines are visible. *Parnassius c. platon* SOCHIVKO & KAABAK has this line moderately developed in the nearest populations from the Kyrgyzian part of Turkestansky range, while the Tajikian populations have it more reduced and sometimes similar to the feature of *P. c. alraschid* subsp. nov. Thus, we have an opposite cline of one unique character inside of the distribution area of *P. c. platon* SOCHIVKO & KAABAK (the simple explanation of this interesting fact is wanted).

Together with the reduction of the upperside black pattern, HW demonstrates more developed underside black pattern which

seems similar to that of the neighbouring *P. c. sochivkoi* CHURKIN and *P. c. marusya* **subspec. nov.**: a dark costal spot is distinct at the base of the wing and d-vein at the end of the cell. *Parnassius c. platon* SOCHIVKO & KAABAK shows an opposite version: grey butterflies have moderately developed underside spots only if the upperside black pattern is obviously more expressed than usually; in the typical variant the basal costal spot and d-line are absent. This distinction is the base of significant external differences between the males of these two similar taxa (together with the wing shape).

Both red eyes have deep and nice red colour. The costal eye on the underside is practically twice larger than on the upperside - so that an additional transverse dark line is distinct (the white dot is usually absent or only faintly expressed). The M-eye with "bird's beak", the inner border of the spot is relatively straight, as it is in *P. c. eugenia* CHURKIN, while *P. c. platon* SOCHIVKO & KAABAK has another shape of the spot - with two teeth. The M-eye has two enlarged bright white dots as it is typical for *P. c. sochivkoi* CHURKIN, while practically all other neighbouring taxa have only one whitish dot or the dot is reduced (*P. c. platon* SOCHIVKO & KAABAK commonly also has only one dot; in all cases the dots are not so expressed and bright). Sometimes a dark spot joins red eyes on the HW (typical for *P. c. varvara* CHURKIN and very rare for *P. c. platon* SOCHIVKO & KAABAK).

The submarginal pattern as in *P. c. romanovi* GR.-GR. or *P. c. eugenia* CHURKIN, but bluish spots are larger. Compared to *P. c. platon* SOCHIVKO & KAABAK the bluish spots are not narrowed towards the margins but oval (the *P. c. platon* SOCHIVKO & KAABAK ♂♂ have these spots even pointed towards the margins).

The genitalia are similar to those of *P. c. eugenia* CHURKIN or *P. c. aenigma* DUBATOLOV & MILKO (see below).

♀: The FW length is 40-43 mm, i.e. considerably more than in the ♂♂ - this is typical for the species, while the ♀♀ of *P. c. platon* SOCHIVKO & KAABAK are not distinctly larger than the ♂♂. The main features are the same as in the ♂♂; the sexual dimorphism is not very great but expressed. The ground colour is whitish (without yellowish hue which is often found in the *P. c. sochivkoi* CHURKIN ♀♀), not so dense as in the ♂♂ but not actually semitransparent. The FW submarginal band is wider than in the ♂♂ - as a result the difference from the *P. c. platon* SOCHIVKO & KAABAK ♀♀ is not so sharp; however, this band is very wavy (in contrast to the last taxon). HW with developed dark underside pattern (despite of the semitransparent colour); the bluish submarginal spots are not reduced compared to the ♂♂ (to avoid the confusion with the ♀♀ of *P. c. romanovi* GR.-GR.). The anal red spot is well developed, but the Cu-spot is only weakly expressed (worth to remember that the Cu-spot is fully absent in the neighbouring taxa, as a rule). All 3 known ♀♀ have an additional spot joining the red eyes; in one case this spot has some reddish scales.

**Distribution and biology:** Known only from the TL, a small valley. The foodplant is *Corydalis pseudoadunca* M. Pop. This plant is known from different parts of the Gulcha valley and grows at different altitudes, according to the botanical data, but our efforts to find the butterflies in the known localities were not successful during several years (each year since 2008). The butterflies are rare and local. The altitude is more than 2000 m a.s.l., i.e. obviously more than the lower known altitudes for *P. c. sochivkoi* CHURKIN (1800 m a.s.l.).

Worth to note that the same food plant is recorded for *P. c. varvara* CHURKIN (M. MIKHAILOVA, pers. comm.), while the food plant of *P. c. sochivkoi* CHURKIN is *Corydalis heterophylla* MIKHAILOVA (in the TL at Ak-Bura river).

As we noted above, the type locality is situated very close to the type locality of *P. c. sochivkoi* CHURKIN - the distance is less than 20 km. The identical situation is with the localities of *Paralasa kusnezovi* Av. (populating Gulcha river and Tian-Shan as a whole) and *Paralasa jordana* (STAUDINGER, 1982) (populating Alai and Ghissar; a strong subspecies *P. j. khramovi* CHURKIN & PLETNEV was described from Ak-Bura). Zoogeographically, Ak-Bura belongs to true North Alai, while Gulcha and the eastern edges of Alai are much closer to Tian-Shan and must be united with the south-western part of this mountain system in a separate district. CHURKIN (2009) made an error when he included Ak-Bura into this district together with Gulcha in his review on *P. charltonius* GRAY, but this mistake is being corrected in the review on *Paralasa* (CHURKIN & PLETNEV, 2012).

We found one specimen (♂) collected in Dugoba valley (ex coll. D. ZAMOLODCHIKOV, leg. A. ALIKHODZHIN) which has practically full number of the *platon-alraschid* characters, a true confirmation that such a genetic combination is present inside the *P. c. sochivkoi* CHURKIN population (of course, as a deeply recessive variant).

**Etymology:** Harun al-Raschid - the fifth Arab Abbasid Caliph and a hero of The Book of One Thousand and One Night.

**4. Structure of the genitalia. The status of *P. c. romanovi* GR.-GR.:** No comparative analysis of the genitalia of the *P. charltonius*-subspecies has ever been actually done. The butterflies are so easily recognizable, that it seemed not necessary. The first author included some figures in his description of *P. davydovi* CHURKIN (CHURKIN, 2006: figs. 2a, 4a, 5a, 5d). At the first look, the details of the structure were similar to those published by other authors. Worth to note, that all figures were relatively schematic because absolutely accurate shapes of the sclerites seemed not important - the *P. charltonius*-genitalia are very different from those of other representatives of *Kailasius* MOORE. *Parnassius charltonius* GRAY represents a definitely separate evolutionary line (and can not be united with other relatives in one subgenus, in our opinion, but the questions of the generic systematics are out of the limits of the present paper). The unique characters of the sphragis outline the exceptional position of the taxon.

During the preparation of the review (CHURKIN, 2009), it was suddenly found that the genitalia of some *P. charltonius*-subspecies are very different. This fact was unexpected; a short information about it was included in the review.

The further detailed work with practically all known *P. charltonius*-taxa strongly confirmed the previous results. The genitalia distinctions between the *deckerti*- and the *romanovi*-groups are quite serious and assume species status. However, some questions still exist, and we are unable to publish the full results of the work: the additional studies of some western (especially distributed in the southern Pamirs and Afganistan) and eastern (the *charltonius*-group) taxa are wanted to complete the work. We also plan to compare the morphological data with the data of the DNA-studies. Thus, we do not change the status of the taxa now and use the species name "*charltonius*".

A detailed study of two key-taxa is given below. They are *P. c. anjuta* SHCHETKIN & KAABAK and *P. c. aenigma* DUBATOLOV & MILKO. As we already noted, the distribution areas of these taxa must be contiguous at the eastern edges of the Pamirs, and we have not found any traces of hybridization between them. The genitalia of the first taxon are absolutely typical for the whole rather uniform *deckerti*-group [in addition we studied the genitalia of *P. c. deckerti* VERITY, 1879 from two localities, *P. c.* (form?) *corporaali* BRYK, 1935, *P. c. ducalis* BOULLET & LE CERF, 1912, *P. c. flaugeri* EISNER, 1978 as well as a series of *P. c. mistericus* KAABAK, SOTSHIVKO & TITOV, 1996. The genitalia of *P. c. romanovi* GR.-GR., *P. c. eugenia* CHURKIN, *P. c. varvara* CHURKIN, *P. c. ljudmilae* LESIN & KAABAK, *P.*



*c. sochivkoi* CHURKIN and both new taxa described in the present article are identical or similar to those of *P. c. aenigma* DUBATOLOV & MILKO. However, some complicated variability was found, while *P. c. vaporosus* AV. demonstrates a case of uncommon characters. The representatives of the third group of subspecies - the *charltonius*-group - *P. c. charltonius* GRAY, 1852 and *P. c. bryki* Haude, 1912 seem to be more close to those of the *deckerti*-group, but the number of dissections is not sufficient.

The uncus represents the most valuable sclerite of the ♂ genitalia of *Parnassius* LATR., and this is true for the *P. c. charltonius*-taxa. *Parnassius c. anjuta* SHCHETKIN & KAABAK has a very large uncus composed of two parts, and each part has 1-3 (or more) well developed teeth. Rarely, the teeth are small (but practically always present); in this case the uncus is relatively slender being slightly thinner than usually (fig.1: a2). Usually the uncus is thick and the teeth are large (fig.1: a3). This variability is not high, and the total length of the uncus is obviously more than the length of the central part of the short reduced tegumen (fig.1: a1). *Parnassius c. aenigma* DUBATOLOV & MILKO has the uncus with the same shape as in the previous taxon, but much smaller, slender, usually with very small teeth or without the teeth (fig.1: b2). Some other taxa of the *romanovi*-group have the uncus slightly more developed (*P. c. romanovi* GR.-GR. has “typical” small uncus, see fig.1: b3), but in all cases its total length is less than the total length of the central part of tegumen from the base of the uncus up to the ventral end of the tegumen.

The valvae of both taxa have relatively the same size, as well as the harpe (fig. 1: a4, b4). As a result, in the case of *P. c. anjuta* SHCHETKIN & KAABAK the uncus extends much further than the ends of the harpe, while in *P. c. aenigma* DUBATOLOV & MILKO the uncus does not extend further than the ends of the harpe (dorsal view). Mechanically, we have two very different compositions which work in different ways. For the schematic lateral figures of two versions observed see fig. 2: a1, b1.

In addition, the valvae are joined on the ventral side of the genitalia: in *anjuta*-type the valvae are joined shortly (so that it is more or less easy “to open” the genitalia from the ventral side), while in *aenigma*-type the valvae are widely joined (and it is very difficult “to open” the genitalia from the ventral side, that is possible only after severe injury). There is no doubt that two different versions in attaching the valvae correspond to two above marked mechanical types. The shape of the valvae is variable, but the valva of *P. c. anjuta* SHCHETKIN & KAABAK is gradually tapering to the end, while the valva of *P. c. aenigma* DUBATOLOV & MILKO has a relatively rectangular form.

The harpe is more or less similar in both taxa, but the juxta (directly involved into the work of valvae and aedeagus during the copulation) is definitely different: big and well sclerotized in *anjuta*-type but weak in *aenigma*-type (fig. 2: a2, b2).

The aedeagus is also different, but it is very hard to use it for taxonomic purposes: it is practically straight and without obvious widening at the end in *anjuta*-type, and wavy with slight widening at the end in *aenigma*-type (fig. 2: a3, b3).

The normal copulation between ‘*aenigma*’ and ‘*anjuta*’ seems impossible, except maybe some aberrative individuals which always exist. The morphological differences listed above are much more than in many other species of butterflies. They were not found before only because parnassiologists practically ignored detailed examination of the genitalia, as well as because it is not so easy to compare the ratio uncus/tegumen using the figures of separate sclerites made by different authors.

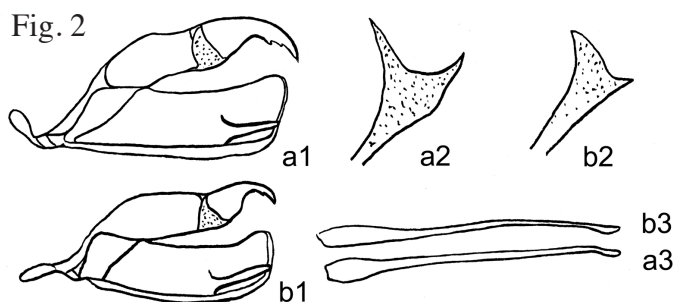
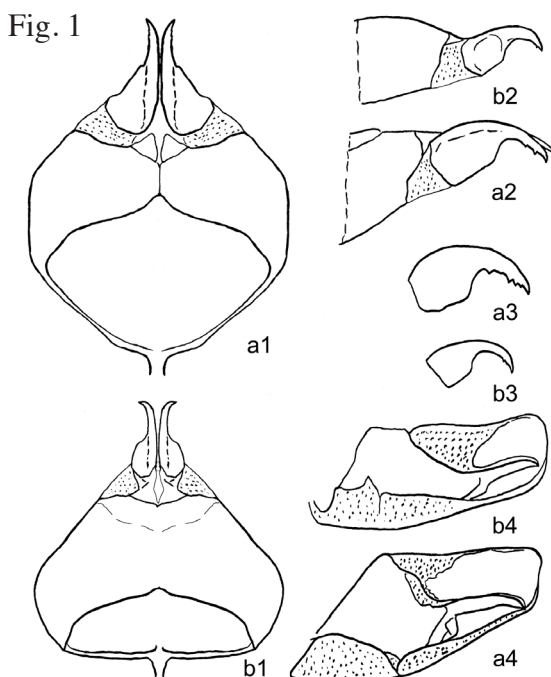


Fig.1: *Parnassius* spp., ♂ genitalia (a: *P. c. anjuta* SHCHETKIN & KAABAK, East Pamirs, Mynkhandzhir, topotype; b1, b2, b4: *P. c. aenigma* DUBATOLOV & MILKO, Kyzyl-Su r., topotype; b3: *P. c. romanovi* GR.-GR., Aram-Kungei, topotype). 1: dorsal view; 2: uncus and tegument, lateral view; 3: uncus, lateral view; 4: valva, inside lateral view.

Fig.2: *Parnassius* spp., ♂ genitalia (a: *P. c. anjuta* SHCHETKIN & KAABAK, East Pamirs, Mynkhandzhir, topotype; b: *P. c. aenigma* DUBATOLOV & MILKO, Kyzyl-Su r., topotype). 1: schema, lateral view; 2: juxta (increased); 3: aedeagus.

**Discussion:** 1. The study confirms that the *P. charltonius*-taxa had two “waves” of spreading in the northern Central Asia. One wave was represented by highmountain rock-living butterflies, while the other wave was represented by river-side and limestone populations inhabiting mainly lower altitudes. As a result, the structure of the *romanovi*-group demonstrates a mosaic complex of relatives and is much more complicated than the structure of the *deckerti*-group.

The nominate taxon of the group - *romanovi* GR.-GR. - originated from a highmountain ancestor but later was seriously modified because of the mixing with whitish populations living in the Alai valley; the history of this valley was another reason for the unusual variability of this taxon (see in CHURKIN, 2009).

2. The ♂ genitalia of the *romanovi*-group have a number of considerable distinctions which match a species status. It is not doubtful

that “*P. romanovi* GR.-GR.” (the oldest name) represents - if it is confirmed - a young species, which originated due to a long isolation between the northern and the southern branches of the *charltonius*-ancestor. The last conclusion is based on a considerable similarity between *P. c. anjuta* SHCHETKIN & KAABAK from the Eastpamirian Plateau and the Pakistanian representatives of the *deckerti*-group (*P. c. ducalis* BOULLET & LE CERF, 1912, see in ROSE & WEISS, 2011). Such a similarity might have only one base: if the *deckerti*-like butterflies occupied East Pamirs only recently. It means that the northern *P. c. romanovi* GR.-GR. and *P. c. aenigma* DUBATOLOV & MILKO populations had no contacts with the southern relatives during long time in the past - and a possibility of the contacts appeared only recently, after (re-)colonization of East Pamirs. According to all known facts, the contacts are absent or not productive - but the process is going on right now.

The situation at the western line of contacts between the *deckerti*- and *romanovi*-groups represents a definitely more complicated case and needs additional investigations.

The external differences between “*deckerti*” and “*romanovi*” are well known: the different shape of the bluish spots (narrowed in “*romanovi*”) and the development of the dense postdiscal blackish spots under the cell. So, it is easy to distinguish the representatives of two “species”.

The position of the third group of taxa (*charltonius* sensu stricto) needs clarification.

3. Zoogeographically, the areal of “*P. romanovi* GR.-GR.” is quite logical, while the representative of another species is known only from the East Pamirs: a typical situation when a southern species penetrates the northern (Russian) Central Asia using mountain deserts of the Pamirian Plateau. Many complexes of species in different families have such a subdivision.

4. The hiatuses between the taxa belonging to the *romanovi*-group are much more than those in the *deckerti*-group; some characters which seem variable in the *deckerti*-populations are much more constant in the northern part of Central Asia; and, on the contrary, some constant characters of the southern races are not important for the *romanovi*-taxa.

This may be based on two reasons:

- if “*romanovi*” represents a young but good biological species, its inner subspecific composition and lines of variability could be not identical to those of the vicariant;
  - as it is well known, the glacier era suppressed the fauna of the northern Central Asia much more than in the southern territories; the isolation time was longer, the natural barriers and catastrophic events were more numerous, the climatic changes were severe.
- The last reason can be the base for the faster and relatively abrupt evolution of the northern “*charltonius*”-populations.

Further investigations are necessary. The genitalia studies must be completed. Some more unknown populations can be found during the field work, as well as the areas of the contacts between the two “subspecies” of the *romanovi*-group (with an additional transverse line and without it) must be carefully explored.

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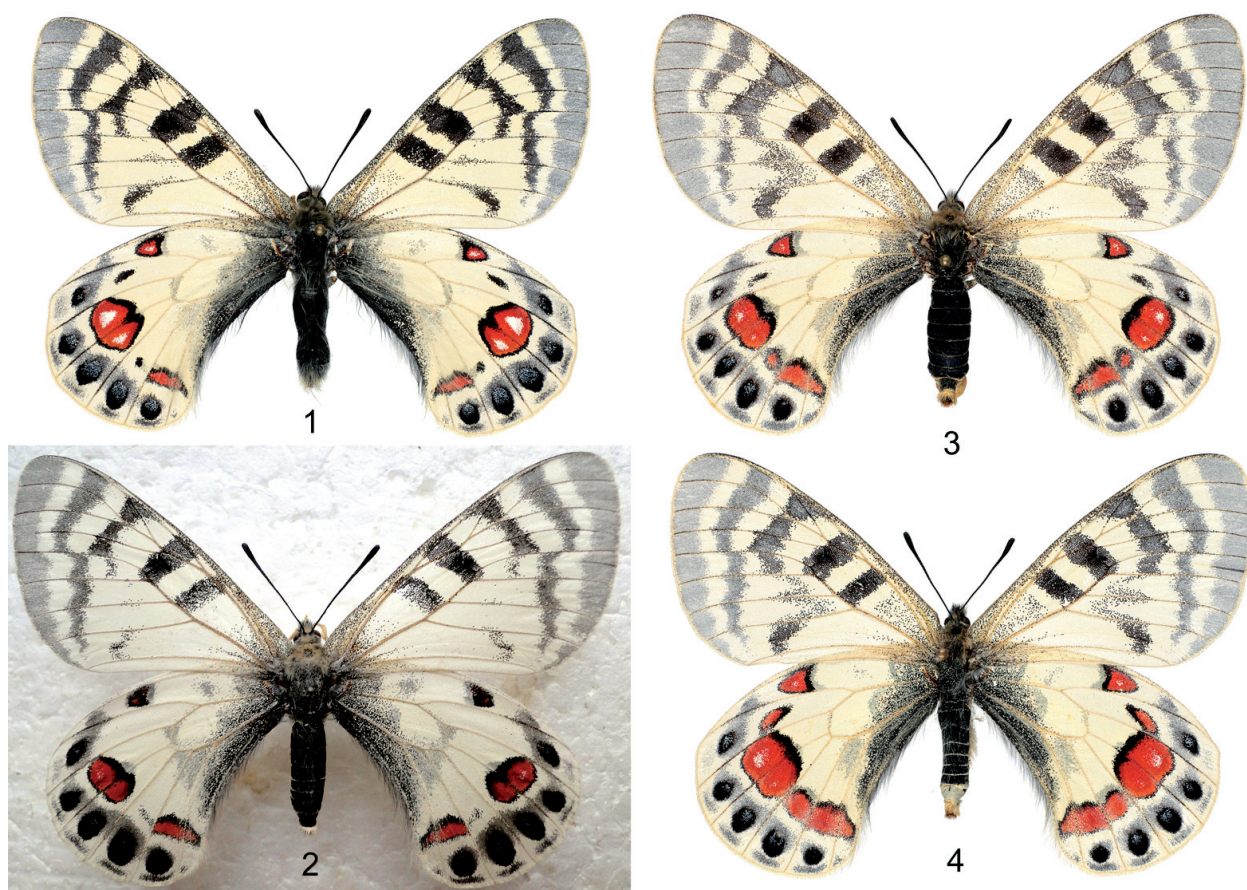
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Colour plate 3

- 1: *Parnassius charltonius aenigma* DUBATOLOV & MILKO, 2003, topotype ♂, Kyrgyzstan, Chinese Kyzyl-Su R., 12.07.2009 (transitional to *romanovi*).
- 2: *Parnassius charltonius romanovi* GRUM-GRSHIMAILO, 1885, topotype ♀, West Transalai, Aram-Kungei loc., 19.07.1989, 3000 m, D. ZAMOLODCHIKOV leg. (*eugenia*-form).
- 3: *Parnassius charltonius romanovi* GRUM-GRSHIMAILO, 1885, topotype ♀, West Transalai, Aram-Kungei loc., 8.07.1994, 3500 m, L. CHURKINA leg. (typical form).
- 4: *Parnassius charltonius romanovi* GRUM-GRSHIMAILO, 1885, topotype ♀, West Transalai, Aram-Kungei loc., 12.07.1992, 3500 m, S. CHURKIN leg. (form with complete reddish HW band).

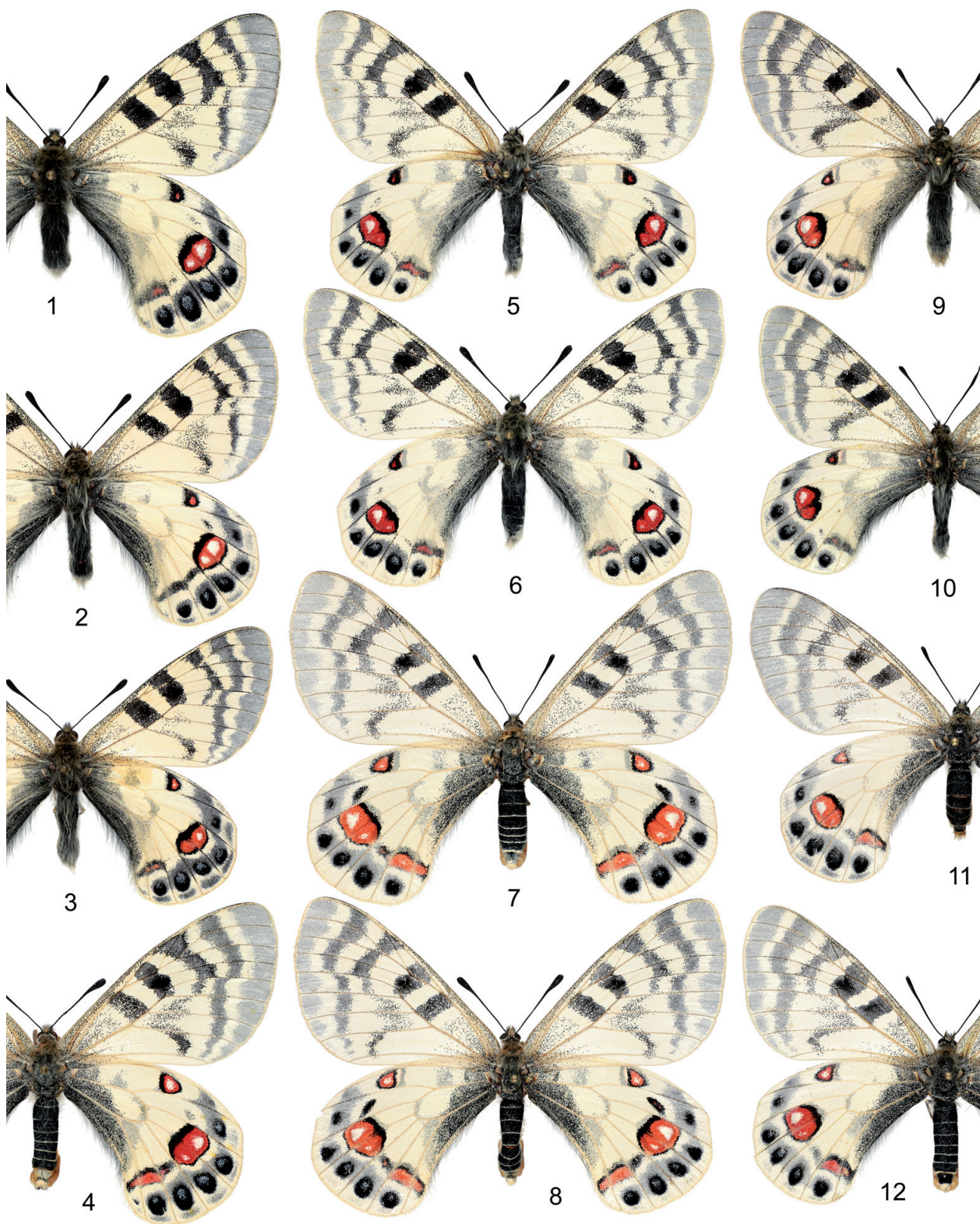




Colour plate 1

- 1-4: *Parnassius charltonius eugenia* CHURKIN, 2009. (1) paratype ♂, Tadjikistan, Muksu R. 15.08.2009, S. SALUK leg.; (2) paratype, ♂, same data as 1; (3) paratype ♀, same data as 1; (4) ♀, same loc. as 1, 8.08.2011.
- 5-8: *Parnassius charltonius marusya subsp. nov.* (5) Holotype ♂, Tadjikistan, Obikhingou r., 18-25.07.2011, S. SALUK leg.; (6) paratype ♂, same data as 5; (7) paratype ♀, same data as 5; (8) paratype ♀, same data as 5.
- 9-12: *Parnassius charltonius vaporosus* AVINOV, 1913. (9) ♂, Tadjikistan, W. Pamirs, Vanch Mts., Gyschkhun valley, 1.-5.08.1991, S. CHURKIN leg.; (10) ♂, Afghanistan, Badakhshan, 5 km fr. Shiva L., 3700 m, Merim-Bisti loc., 18.-20.07.2011, O. PAK leg. (topotype of *kabiri* EISNER & NAUMANN, 1980); (11) ♀, same data as 9; (12) ♀, same loc. as 9, 12.-20.07.2001, A. PETROV leg.





Colour plate 2

- 1-4: *Parnassius charltonius sochivkoi* CHURKIN, 2009. (1) paratype ♂, North-East Alai, Ak-Bura River, 2600-2700 m, 25.06.-2.07.2009, S. Churkin leg.; (2) ♂, North-East Alai, Ak-Bura River, 1800 m, 25.06.2011, S. CHURKIN leg.; (3) ♂, North-East Alai, Ak-Bura River, 2600-2800 m, 25.-27.06.2011, V. PLETNEV leg.; (4) ♀, same data as 13.
- 5-8: *Parnassius charltonius alraschid* subsp. nov. (5) Holotype ♂, E Alai, Gul'cha river, 13.-23.07.2011, S. CHURKIN leg.; (6) paratype ♂, same loc. as 5, 13 - 23. 07.2011, V. PLETNEV leg.; (7) paratype ♀, same loc. as 5; (8) paratype ♀, same loc. as 5, 13.-23. 07.2011, V. KOROSTELEV leg.;
- 9-12: *Parnassius charltonius platon* SOCHIVKO & KAABAK, 2011. (9) Paratype ♂, SW Kyrgyzstan, Turkestansky Mts. Range, Sarkat River, 1500 m above s. l., 15. 07.2009, A. SOCHIVKO leg.; (10) topotype ♂, Tadjikistan, Yangi-Aryk r., 11.07.2011, 1800-2200 m, S. SALUK leg.; (11) paratype ♀, same data as 9; (12) topotype ♀, same data as 20.



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