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Atalanta (August 2003) **34** (1/2): 47–53, colour plate I, Würzburg, ISSN 0171-0079

Taxonomic notes on *Parnassius phoebus* (Fabricius, 1793) with the description of a new subspecies from South-West Mongolia

(Lepidoptera, Papilionidae)

by

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received 22.IV.2003

Summary: A new subspecies, *Parnassius phoebus tsenguun* subspec. nov., is described from an isolated small mountain range situated in SW Mongolei (Gobi-Altai aimak, 30 km south from Biger somon). This range represents the eastern limit of the mountain system of the Mongolian Altai. The new subspecies is related to *P. phoebus alpestris* Verity, 1911, stat. nov. The last taxon was sometimes treated as an ecological form, but represents a good subspecies, according to new studies.

Zusammenfassung: Von einer kleinen, isolierten Bergkette im Südwesten der Mongolei (Gobi-Altai aimak, 30 km südlich von Biger somon) wird *Parnassius phoebus tsenguun* subspec. nov. beschrieben. Diese Bergkette ist die Ostgrenze frd Gebirgssystems des Mongolischen Altai. Die neue Unterart ist mit *Parnassius phoebus alpestris* Verity, 1911, stat. nov., verwandt. Letzteres Taxon wurde manchmal als ökologische Form behandelt, stellt aber nach neueren Untersuchungen eine gute Unterart dar.

Реюуме: Новый подвид, *Parnassius phoebus tsenguun* subspec. nov., описывается с изолированного горного хребта расположенного в Юго-Западной Монголии (Гоби-Алтайский аймак, 30 км южнее сомона Бигер). Этот хребет представляет собой восточное окончание горной системы Монгольского Алтая. Новый подвид связан с *P. phoebus alpestris* Verity, 1911, stat. nov. Последний таксон прежде часто рассматривался как форма, однако новые исследования подтверждают его подвидовой статус.

Introduction

Parnassius phoebus alpestris was described by Verity in January 1911, as a small form with blackened females from "Tchuja mountains,1800–2400 m". At the same time, the nominotypical form (under the name "*intermedius* Men.") was figured in the same plate from the "Tchuja Valley, 1200–1800 m". The actual type locality of *P. phoebus phoebus* Fabricius, 1793 is Ongudai v. The differences between these two mentioned forms are well known, but the status of *alpestris* has changed many times in different articles. According to the common point of view, *alpestris* is treated as a small high mountain form with reduced red spots, but I have not found real arguments or even serious discussion about the relations between the two taxa together with the situation in other parts of the Siberian areal of *phoebus*. However, such a position seems to be absolutely not correct. The author has checked at least a 1.5 thousand butterflies collected in Saur, South Altai, different parts of Altai, West and East Sayan, Tuva, North Transbaikalia, Yakutia and some other places. It is absolutely certain, that *P. phoebus* does not

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provide expressed ecological forms in Siberia or Russian Far East, as it was clearly stated in the detailed study of the *phoebus*-populations distributed in Dahuria and Russian Far East published by GLUSCHENKO & MARTYNENKO (2000). In addition, I have examined material originating mainly from the Altai-Sayan mountain system and received the same result. For example, 400 specimens of *phoebus sedakovi* MEN. collected in Tunkin Range (Tunkinskye Goltzy) at very different altitudes (1600–2650 m) have practically no differences—the average size is practically identical, only the size of the red spots being very slightly smaller at the highest altitudes (but absolutely not 2–3 times less in diameter as it is in *alpestris*), and we can find more forms with reduced red colour in the spots, but this is also only a small statistical difference. It is absolutely impossible to separate a high mountain form in Sayan. Noteworthy, that the highland specimens are not similar to *alpestris* (I found only one female looking more or less similar), what should be if *alpestris* was only an highland form, because the highest altitudes in Tunkin are even more than those known for the populations of *alpestris*.
The same picture was found in Khamar-Daban, after searching of a great typical series of *P. phoebus badmaevi* MARTYNENKO & GLUSCHENKO (2001), collected also at very different altitudes (this subspecies is very close to *sedakovi* and can be treated as a synonym, but this requires a special study).
In addition, the author has some very rare material – 3 specimens of *P. phoebus sauricus* LUKHTANOV, 1999 collected not in the highlands of Saur (2200 m) but at much lower altitudes (1700–1800 m), slightly higher than the known populations of *Parnassius ariadne* EV. These slopes represent habitats quite different from the highlands of Saur (where I collected twice and found a typical population of *sauricus*), this is a much warmer and dryer place. In spite of this fact, all three specimens adefinitely represent the ssp. *sauricus*, the differences being very small.
It might be possible to suppose that an ecological form appears—for some strange and unexplained reasons—only in South-East Altai, but even in this case we cannot regard *alpestris* as an ecological form but an ecological subspecies, according to ICZN (there are no great numbers of intermediate forms in different populations). However, the real situation looks more simple, if we take into consideration that SE Altai represents a separate part of the Altai system, as it has been shown in a lot of botanical and zoological publications. Concerning the lepidopterofauna, we know many complexes which are represented by different subspecies (sometimes not described even now) or species in SE Altai compared to the neighbouring territories, for example, different subspecies of *Melitaea iduna* (I will publish another article about this species), different forms of *Clossiana frigga* (sometimes one can hear the opinion that these two forms even represent different species; this seems to be not correct, but this question is practically not studied); *Plebejus (idas) ongudai* TUTT is known from Ongudai up to Aktash, while from the highest altitudes of SE Altai (including Aktash!) *P. (idas) sailjugemica* ZHDANKO & SAMODUROV is known.
The fact that SE Altai represents a small but different zoogeorgaphical region in the Altai-Sayan system is well known in Russia, and this information was published even in the books and papers devoted to the fauna of Rhopalocera of Russia (GORBUNOV, 2001; BONDARENKO, 1999), but it is not correlated with serious investigation of the taxonomy of the real species distributed in Altai. Moreover, P. GORBUNOV, who marked SE Altai as a separate small region in the zoogeographical introduction of his book "The butterflies of Russia", treated practically all taxa described from SE Altai as synonyms (for example, *sailjugemica*, this fact indicating the absence of a real detailed study) or limited his conception by several words – "probably, pres-

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ents different ecological forms". It looks absolutely not logical, to select a region, based on many botanical and climatic publications, and then not to find any endemic races! (it is easy to find that this combination of words – "ecological form" – is commonly used in many publications not for the real explanation of some "strange" facts but as a mask in the cases when the author has not spent time and efforts for real hard work).
Another important fact is that the hiatus between ssp. *phoebus* and ssp. *alpestris* is obviously more, than between *phoebus* and *sedakovi, badmaevi* or subspecies (probably, undescribed) distributed in Tuva.
In general, ignoring known and proven zoogeographical data is a very common case in lepidopterological publications, because such data belong not to taxonomy sensu stricto but represent a result of botanical or other biological studies. On the other hand, the scientist who works with *Parnassius*, usually does not work with other groups of Rhopalocera and cannot find that the geographical structure of some other species or subspecies complexes is identical. These two facts are the base of the wrong position of *alpestis* in the subspecific structure of *P. phoebus*.
On the other hand, it is clear, that all recently existing subspecies of *phoebus* are the result of historical-climatic conditions and have the same genotype. High mountain forms of a single population are really smaller, the spots are reduced—but the differences are very slight and numerous intermediate forms exist; real ecological differences are much smaller and not so contrasting as between ssp. *phoebus* and ssp. *alpestris*. Some very rare specimens looking more or less similar to other subspecies can be found in all populations—but it must be among the subspecies with the same genotype. Thus, it is impossible to use slight ecological differences found in Siberian *phoebus* during this work for an explanation, why in some parts of the areal of *phoebus* one "ecological" form constitutes 99.9% of the populations while in another part of the areal it is practically absent even within the same latitudes and climate. In the case of *phoebus* (as in many other cases) we have a situation when ecological differences between some ancestral populations result in a system of different historically formed subspecies.

This information is enough to cancel the problem with *alpestris*; the real differences from the nominotypical form are very well known and it is not necessary to describe them once again. Some rare intermediate forms (it is interesting that I practically have not found such forms, only in the vicinity of Aktash, where such forms are rare) must exist at the border of the areals of both subspecies. Intermediate forms were not found in the Shebalino populations (nominotypical), for example, or in Chikhacheva and Sailugem Ranges (SE Altai). It means that the real intergradation zone is very narrow, this strongly suggesting the actual hiatus between ssp. *phoebus* and ssp. *alpestris*.

Unfortunately, the main question with *alpestris* in reality is slightly different—the areal of this butterfly seemed obscure because it included practically only a few localities near Aktash (the geographic distribution of *alpestris* has never been seriously discussed)—and this was another base for the unclear situation with *alpestris*.
Such a strange case, when the areal of a race seems quite small, while all neighbouring great massifs are inhabited by the populations representing obviously related races, needs an explanation. However, the explanation is absolutely simple—it is not true that the areal of *alpestris* is small: in fact, it includes all ranges of SE Altai (Yuzhno-Chuisky Range, Chikhacheva, Tabyn-Bogdo-Ula, Mongun-Taiga, Sailugem Mts.). Moreover, the wrong opinion mentioned is based on the fact that Russian entomologists mostly work with the butterflies of Russia and usually

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do not regard material from other countries in their studies. It is very easy to find that SE Altai represents a border with the great Mongolian Altai, the highlands of which certainly have a very similar fauna.

The fauna of the Mongolian Altai is not well studied, and the main material was collected many years ago and is absent in modern collections. Only during the last years a new exploration of Mongolia was started, especially by Japanese entomologists. In the last years the author organized an expedition to the eastern limit of the Mongolian Altai, a small mountain massif situated 30 km south from Biger somon in Gobi Altai. In some maps this small range (unfortunately, the name was not found at all) was included in the Gobi Altai Mountains, but usually—in the system of the Mongolian Altai; this is true because the main highland fauna is closely related with that of the Altai. Some alpine species provide here the same subspecies as in the whole Altai and Sayan, some are the same as in SE Altai and some represent new subspecies, which however are closely related to the races distributed especially in SE Altai (the actual cases will be published in separate articles devoted to other species found in Mongolia). The new subspecies of *phoebus* which will be described here, has a distinct relation to *alpestris* but is different from all other known neighbouring races. Actually, *P. phoebus* was not known from this territory, and southern Mongolia was not included in the distribution of the species at all. I know a small series which was collected by R. Yakovlev (pers. comm.) in NW Mongolia, at the opposite side of the Mongolian Altai; these specimens seem to be much more similar to typical *alpestris*. *Parnassius phoebus halasicus* Huang & Murayama, 1992 described from the neighbouring north-western edges of the Mongolian Altai represents a synonym of ssp. *alpestris* which was not mentioned in the description, where *halasicus* was compared to the nominotypical *phoebus* figured under the name "*intermedius* Menetries, 1849". The description is very short and bad, but the photo of the holotype and the mentioned distinctions provide a clear picture of *alpestris*.
No material from the southern part of the Mongolian Altai is available; thus, it is impossible to suppose, if we have a cline between *alpestris* and the new subspecies, or the intergradation zone is narrow as between *alpestris* and the nominotypical *phoebus*. Even in the case of a cline, it is necessary to describe this new Mongolian race as its opposite end, according to the normal taxomic practice. The differences, especially those between the females, are very distinct and are not less than between the races belonging to the nominotypical complex of subspecies (*phoebus, sedakovi*, undescribed subspecies from Tuva).
At present it is clear that *alpestris* represents not a form but a part of the subspecies complex which covers 1000 km of mountain ranges—the direct distance between Aktash and Biger is about 900 km.
It is necessary to note some correlation between the infraspecific structure of *P. apollo* and *P. phoebus* in Siberia (which cannot be identical because these two species inhabit very different altitudes and habitats) where both species are not so variable and do not provide so many races and forms as in Europe.
The holotype of the new taxon and part of the paratypes will be deposited in the State Darwin Museum (Moscow); other paratypes are in the author's collection.

Abbreviations
FW – forewing
HW – hindwing
TL – type locality

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Parnassius phoebus **tsenguun subspec. nov.**
(colour plate I, figs. 1, 4, 6, 7, 10)

Holotype ♂: South Mongolia, Gobi-Altai Aimak, 30 km south Biger Somon, 2700–3000 m, 3.–10.VII.2002, S. Churkin leg.
Paratypes: 65 ♂♂, 38 ♀♀, same data, S. Churkin, V. Pletnev & S. Chastilov leg.; 5 ♂♂, same loc., 29.VI.2002, S. Churkin leg.; 23 ♂♂, 5 ♀♀, S. Mongolia, Govi-Altai aimak, Tzakhir Khalgyn Nuruu, Detyin Davaa Pass, 3000–3400 m, 2.VII.2002, Churkin S. leg.

Description and diagnosis

Male
FW length is 29 mm in the holotype, 28–32 mm (28–29.5 mm, as a rule) in the paratypes; in *alpestris* (col. pl. I, figs. 2, 3) 27–34 mm, usually 29–30.5 mm. The average size is even slightly smaller than in *alpestris*. The red ocelli on the HW are reduced and very small as in *alpestris*, but the number of males with strongly reduced red colour in the ocelli (i. e. with totally black ocelli) is much less: only 4 specimens in the whole series, representing an aberration where other elements of the pattern are also more or less reduced, while in the *alpestris*-populations such form is common (35–40% of the population, 75 butterflies examined). The submarginal and marginal blackened pattern on the FW looks more contrasting, representing a very interesting characteristic; this is because the density of the black scales is higher. Very important, that the shape of the wings is different, being more narrowed and extended; this distinction is very clearly seen in a series. The postdiscal spots on the FW much more often contain red colour, especially the costal spot. It is important also that the dark spot between veins A and Cu2 on the FW, which is very rarely present in all known subspecies of *phoebus* (and practically always absent in *alpestris*—I found only one specimen with a small and not dense spot), is present in 35% of specimens of the new taxon; this spot is very often compact and dense, even if the size is small.

Female
FW length is 28–32 mm (usually 28.5–29.5 mm, as in the males); the females of *alpestris* (col. pl. I, figs. 5, 8, 9) are even smaller, 26.5–30 mm.
The appearance looks similar to that of *alpestris* (thus, being very different from *phoebus phoebus* or *phoebus sedakovi*) but the dark scales are practically absent in the central part of the wing (between veins M3 and Cu2), as well as the marginal side of the HW is also much paler than in *alpestris*. Only one female (this darkest specimen is figured at the colour plate) with conspicuous shading of the central part of the wing was found in the type series, but the density of the scales is also not so high as in *alpestris*.

Taxonomic notes
The nearest known subspecies is distributed 900 km from the type locality of *tsenguun*, and this new population definitely presents the southern limit of the whole giant areal of *phoebus*. The males of the new subspecies looks similar to *alpestris* because of very small red ocelli but in reality, after examination, it is impossible to confuse these two races, even the males—except very rare cases of the specimens with strong reduction of the whole pattern. Some strange

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characteristics (more contrasting black pattern and the development of the A-Cu2 spots) seem also very interesting and need further investigation and explanation.
Noteworthy, that we have not found appearing of any characters which could be treated as a cline between *P. phoebus* and *P. ruckbeili* DECKERT, distributed in Karlik-Shan (China), except—probably—the development of an additional A-Cu2 spot (the submarginal row of spots on the HW upperside is not more developed than in other subspecies of *P. phoebus*).

Distribution
Known only from type locality. The two known typical populations are certainly totally isolated from the others which must inhabit the main chain of the Mongolian Altai: the nearest places with altitudes suitable for the habitats of *phoebus* are situated at least 150 km to the northwest. I suppose, that the areal of *alpestris* includes SE Altai and the whole main chain of the Mongolian Altai (see in the "Introduction") while this new taxon occurs only in isolated small ranges between the Mongolian Altai and Gobi Altai chains.

Habitat and biology
Open dry stony slopes, usually around small springs; not found in the highest alpine grassland at the altitudes about 3300–3400 m. Local. Flight period: 2–3 weeks from the end of June. Host plant: a local *Rhodiola* spec.

Etymology
The subspecies is named after TSENGUUN ODBAYAR, the tragically deceased son of my friend ODBAYAR TSERENPIL, a Mongolian entomologist and a good man.

Acknowledgements
Many thanks to ADYYA YANSANJAV, the scientific secretary of the Biology Institute of the Academy of Science (Mongolia) and Mr. ODBAYAR TSERENPIL who supported our expedition in Mongolia, as well as to our guide and driver Mr. LHAGVAJAV NYAMSUREN.
I am much indebted to Mr. K. ROSE (Germany), Mr. J.-C. WEISS (France) and Mr. J. GRIESHUBER (Germany) for support during the work, advices and help with bibliography.
Thanks to ALEXEY DEVYATKIN for assistance with the English version of this article.

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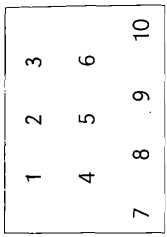
Explanation of colour plate I (p. 255):

Fig. 1: *P. phoebus tsenguun* subspec. nov., holotype, data in the text.
Fig. 2: *P. phoebus alpestris*, ♂, Altai, Sailjugem Mts., upper stream of Dzhumaly River, 2700 m, 11.VII.1991, SAMODUROV G. leg.
Fig. 3: *P. phoebus alpestris*, ♂, same data as fig. 2.
Fig. 4: *P. phoebus tsenguun* subspec. nov., paratype, ♀, same data as fig. 1.
Fig. 5: *P. phoebus alpestris*, ♀, same data as fig. 2.
Fig. 6: *P. phoebus tsenguun* subspec. nov., paratype, ♂, same data as fig. 1.
Fig. 7: *P. phoebus tsenguun* subspec. nov., paratype, ♀, same data as 1.
Fig. 8: *P. phoebus alpestris*, ♀, same data as fig. 2.
Fig. 9: *P. phoebus alpestris*, ♀, same data as fig. 2.
Fig. 10: *P. phoebus tsenguun* subspec. nov., paratype, ♀, same data as fig. 1.



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Colour plate I

CHURKIN, S.: Taxonomic notes on *Parnassius phoebus* (FABRICIUS, 1793) with the description of a new subspecies from South-West Mongolia (Lepidoptera, Papilionidae). – Atalanta **34** (1/2): 47–53.

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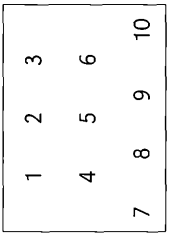

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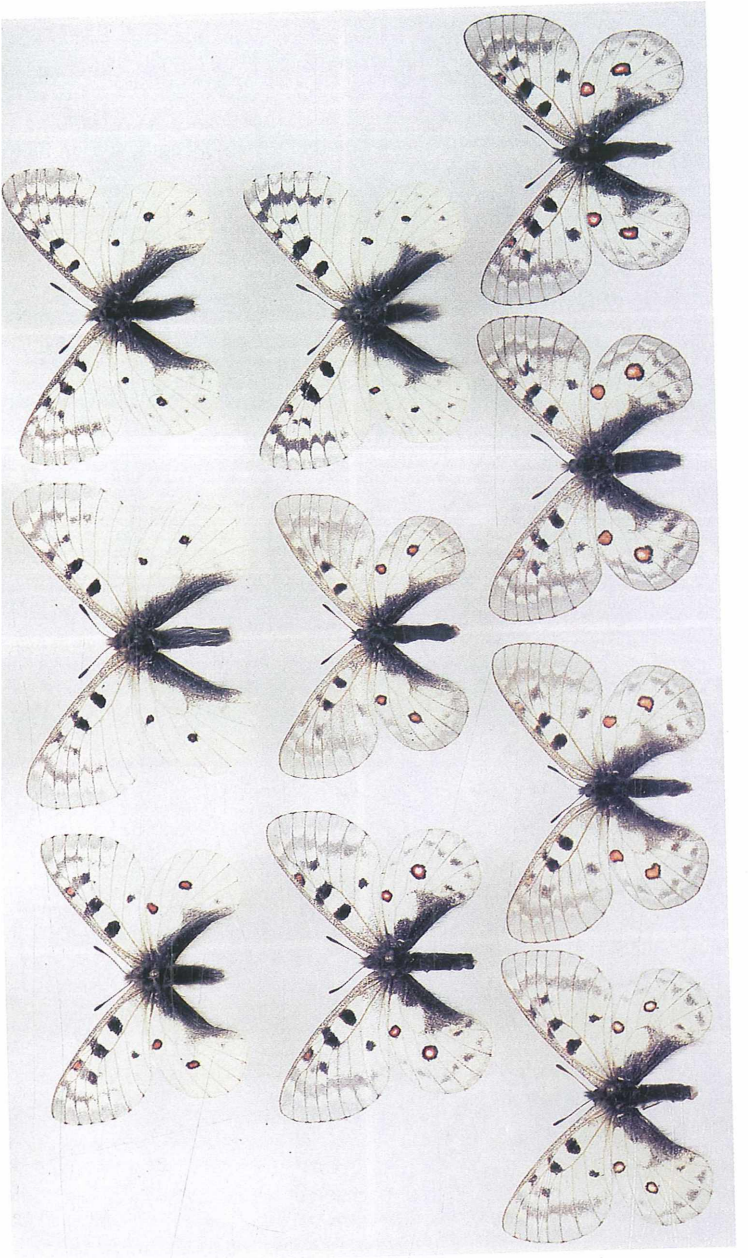
Colour plate I



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Zeitschrift/Journal: Atalanta

Jahr/Year: 2003

Band/Volume: 34

Autor(en)/Author(s): Churkin Sergei V.

Artikel/Article: Taxonomic notes on Parnassius phoebus (Fabricius, 1793) with the description of a new subspecies from South-West Mongolia (Lepidoptera, Papilionidae) 47-53