

CORRESPONDENCE

Butterfly fauna (Lepidoptera: Rhopalocera) of the Peter the Great Mountain range (Tajikistan)

Abdulaziz Davlatov^{1,2}, Gexia Qiao^{1*}, Chunsheng Wu^{1*}

¹Key Laboratory of Zoological Systematics and Evolution, the National Zoological Museum, Institute of Zoology, Chinese Academy of Sciences, Beijing 100101, China; E-mail: abdulaziz@ioz.ac.cn

²University of Chinese Academy of Sciences, Beijing 100049, China

*Corresponding authors, E-mail: qiaogx@ioz.ac.cn, wucs@ioz.ac.cn

Abstract The article provides new data on the butterfly fauna of the Peter the Great Mountain range, especially the first reports of the analysis of the quantitative accounts on the number of butterflies. However, the presented species in the work (51 species) is not the final, as not all parts of the mountain range were visited.

Key words Tajikistan, Peter the Great Mountain range, quantitative accounts, population, distribution.

During the summer of 2013 and 2014, a joint research project (Study on Animal Species Diversity of the Republic of Tajikistan) was done sponsored by the Institute of Zoology, Chinese Academy of Sciences and Institute of Zoology and Parasitology, Academy of Sciences of the Republic of Tajikistan. During the project, we visited one of the most interesting and extremely peculiar area of the Peter the Great Mountain range.

The Peter the great Mountain is one of the highest ranges of the Pamirs (territory of Tajikistan). It extends 180 km from the confluence of Surkhob and Obihingou rivers in east to the ridge of the Academy of Sciences in west, at the junction which is located at the highest peak in Badakhshan Pamir—the peak of Somoni (7594 m).

The Peter the Great Mountain is divided into eastern, central and western parts (Gvozdetsky & Golubchikov, 1987). The east part of ridge is the highest, and extends 38 km from Somoni peak (7495 m) in east, located at a joint of ridges of the Peter the Great Mountain and Akademiya Nauk, to crossing of Peshiy (4255 m) in west, connecting meridionally oriented valleys of the rivers Kirgizob (the right to Obihingou's influx) and Sugran (the left influx of Muksu rivers). The central part of ridge of the Peter the Great Mountain is separated from east part by the depression, passing across valleys of the rivers Kirgizob and Sugran. It extends 37 km from a crossing Peshiy (4255 m) in east to a plateau Tupchek (3160 m) in west. The central part is separated from the western part of ridge of Peter by the deep gorge of the river of Shaklysu (the right influx of Obihingou) and the valley of one of its sources—Karashur's rivers, of which the upper courses is located the plateau Tupchek. The western part of ridge stretches on the 114 km from a plateau Tupchek in east to confluence of Obihingou and Surkhob rivers in west.

Materials in this work were collected and observed by the author during 2013 and 2014 in the Peter the Great Mountain range. In 2013, investigations were done in the eastern part, northern slope of the ridge on the territory of two districts (Tojikobod and Jirgital) on the elevation of 2650–3000 m. The distance between the slopes is up to 55 km. These slopes have rich vegetation with narrow gorges. On the elevation of 3000 m, many different types of glaciers slowly melt and meet to form small lakes.

In 2014, collection was made in the eastern part, northern slope of ridge and in the territory of Jirgatal district, which is close to the state border of Kyrgyzstan at the elevation of 2700 m and away from the previous slopes (in the vicinity of the village Layhsh). Noticeably, the investigated place is different from the previous place by has colder weather and poorer

vegetation, mainly the bushes of brier (Rosaceae) and the short grasses. The investigation was also covered on the northern part, eastern slope of the range (the territory of Tavildara district), on the elevation of 1700–1890 m, with small channels of the river and different species of trees and arboreal-shrubs, among which the junipers are dominate.

For convenience, these places of the investigation were put under a number as point 1, 2, 3, 4, indicated the collecting points. The quantity of butterflies was partitioned into following groups:

VR—very rare, only 1–2 species were collected or met in the entire period of research;

R—rare, 3–10 species;

U—usual, 10–20 species;

N—numerous, more than 20 species.

Butterflies were caught by net trapping and manual catching. Once the specimen was caught, the elevation of the locality would be marked by GPS (HOLUX Technology Inc.).

Species were identified based on 3 books (Tuzov *et al.*, 1997; Korshunov, 2002; Tshikolovets, 2003). The taxonomical nomenclature follows Tshikolovets (2003) and Korb (2012). The collection was identified by the first author, and rechecked by the last author.

In addition, some species of butterflies were not find in this research, which were present in the previous works. Thus, considering that our investigation was imperfect, these species are treated as inhabited species.

Result and discussion

The first information about Lepidoptera of the Peter the Great Mountain range was from the voluminous work of Grum-Grshimailo (1890), which have very fragmentary data on the species composition, phenology and distribution since it was just a primitive research. The species compositions of Lepidoptera of some parts of the Peter the Great Mountain range (23 species) were given by Stshetkin & Stshetkin (1975), while the issue of vertical distributions (90 species) were given by Stshetkin (1975, 1981), and the biology and injurious of some diurnal and nocturnal Lepidoptera (70 species) were given by Degtyareva (1981). However, it is obvious that specific composition of Lepidoptera in this range is not studied quite well. Recently, a new butterfly species (*Leptidea litania* Churkin, 2004) and two new subspecies (*Clossiana hegemone ancilla* Churkin, 2004; *Anthocharis cardamines callisto* Churkin, 2002) were described from this range, that testifies its unique natural conditions as a habitat and speciation of animals. However, the above works does not include the information on the quantitative accounts of butterflies.

Despite of the short time of the investigation on different parts of the Peter the Great Mountain range, we tried to recheck the specific composition and the quantitative accounts the butterflies of this range. During our investigation, 51 butterflies belonging to 6 families were collected (Table 1).

The faunistic list of the butterflies in the Peter the Great Mountain range is constituted by two dominated families, Lycaenidae (16 species) and Pieridae (11 species), and four subordinate families, Nymphalidae (9 species), Satyridae (8 species), Papilionidae (3 species) and Hesperidae (4 species). On the most parts of the investigated territory, the most usual species are: *Colias erate*, *C. staudingeri*, *Metaporia leucodice*, *Pontia daplidice* (Pieridae), *Paralasarana candica* (Satyridae), *Melanargia parce* (Nymphalidae).

The population in all collection points is pretty uneven. The richest species composition of butterflies was observed on the first and second collection points, located on the eastern part, northern slope of the Peter the Great Mountain range (Table 1). In these points, 37 species are recognized. The diverse specific composition of butterflies in these two points may be due to the weather, plant cover which are various and mostly characterized as the wet meadows. Naturally, such places are more favorable biotopes and attract more insects. Moreover, the endemic butterfly of Highlands Tian-Shan and Pamir, *Colias staudingeri pamira*, was observed on stony slopes (elev. 3000 m). There were also data about *C. staudingeri* from the Hissar range, but populations from the Hissar range is possibly represented a clear subspecies (Tuzov *et al.*, 1997). At the same elevation (3000 m) around the small lakes, another butterfly, *Leptidea sinapis*, was found by Stshetkin (1975), which was met to 2500 m by us. Special attention is also paid to *Metaporia leucodice*, which was observed as its host plants, *Berberis* spp., were grown there. In most of the time, the butterflies gather and fly around their host plants.

In the third of collection point, 12 species are recognized, of which most are representatives of the family Lycaenidae (5 species). Compared with the previous two points, the point is insignificant. Although the third point is away from them, it is inseparable as its cool weather. The butterfly was rarely observed even in daytime under such natural condition.

In the last collection point, 18 species are recognized. As well as previous collection points, the butterflies are mostly from the family Lycaenidae (7 species), and rarely from other families (2–4 species) (Table 1). The collection point planted well widespread trees and bushes, and placed with streams, in which the butterflies gathered there in hot days.

Table 1. Butterfly fauna (Lepidoptera, Diurna) of the Peter the Great Mountain range.

Species	Distribution and number in the points of collection			
	1	2	3	4
Family Hesperiiidae				
<i>Spialia orbifer lugens</i> (Staudinger, 1886)	-	-	R	VR
<i>Thymelicus alaicus alaicus</i> (Filipjev, 1931)		R	-	R
<i>T. lineolakushana</i> (Wyatt, 1961)	-	-	-	R
<i>Muschampia lutulenta lutulenta</i> (Grumm-Grshimailo, 1887)	R	-	R	-
Family Papilionidae				
<i>Papilio machaon centralis</i> (Staudinger, 1886)	R	VR	VR	VR
<i>Parnassius mnemosyne gigantea</i> (Staudinger, 1886)	-	R	-	-
<i>P.jacquemontii chitralensis</i> (Moore, 1902)	R	-	-	-
Family Pieridae				
<i>Leptidea sinapis sinapis</i> (Linnaeus, 1758)	R	-	-	-
<i>Pieris rapae rapae</i> (Linnaeus, 1758)	U	U	-	-
<i>P. ochsenheimeri ochsenheimeri</i> (Staudinger, 1886)	VR	-	-	-
<i>P. canidia palaeartica</i> (Staudinger, 1758)	R	-	-	-
<i>P. brassicae ottonis</i> (Röber, 1907)	VR	-	-	-
<i>Pontia daplidice daplidice</i> (Linnaeus, 1758)	U	U	R	U
<i>P. callidice kalora</i> (Moore, 1865)	P	-	-	-
<i>Metaporia leucodice leucodice</i> (Eversmann, 1843)	-	U	-	U
<i>Aporia crataegi crataegi</i> (Linnaeus, 1758)	R	R	R	R
<i>Colias erate erate</i> (Esper, 1805)	U	U	R	U
<i>C. staudingeri pamira</i> (Grumm-Grshimailo, 1887)	-	U	-	-
Family Lycaenidae				
<i>Celastrina argiolus argiolus</i> (Linnaeus, 1758)	-	R	-	R
<i>Glaucopsyche alexis alexis</i> (Poda, 1761)	-	R	-	-
<i>Polyommatus icarus bienerti</i> (Bálint, 1993)	R	U	-	-
<i>P. icadius icadius</i> (GrummGrshimailo, 1887)	-	VR	-	VR
<i>P. venus venus</i> (Staudinger, 1886)	VR	-	VR	R
<i>P. magnifica magnifica</i> (GrummGrshimailo, 1887)	-	-	VR	-
<i>P. melania melania</i> (Staudinger, 1758)	-	-	R	-
<i>P. poseidonides rickmersi</i> (Forster, 1956)	R	R	R	-
<i>P. eumedon eumedon</i> (Esper, 1780)	R	VR	-	-
<i>P. rutilansrutilans</i> (Staudinger, 1886)	-	R	-	VR
<i>P. artaxerxes transalaica</i> (Obraztsov, 1935)	-	R	-	R
<i>P. ripartiiripartii</i> (Freyer, 1830)	R	-	VR	-
<i>Neolycaena tengstroemi carbonaria</i> (GrummGrshimailo, 1887)	-	-	VR	-
<i>N. sinensis lunaria</i> (Zhdanko, 1998)	-	-	-	R
<i>Hurcanana sartha sartha</i> (Staudinger, 1886)	-	-	-	VR
<i>Satyrium sassanides sassanides</i> (Kollar, 1849)	R	-	-	R
Family Nymphalidae				
<i>Vanessa cardui cardui</i> (Linnaeus, 1758)	-	R	-	R

Table 1 (continued)

Species	Distribution and number in the points of collection			
	1	2	3	4
<i>Argynnis pandora pandora</i> (Denis & Schiffermüller, 1775)	VR	-	-	VR
<i>A. niobe orientalis</i> (Alphéraky, 1881)	R	-	-	R
<i>A. aglajavitatha</i> (Moore, 1875)	-	R	-	-
<i>Limenitis lepechini lepechini</i> (Erschoff, 1874)	VR	-	-	VR
<i>Melitaea pallas pallas</i> (Staudinger, 1886)	-	R	R	-
<i>M. kotshubeji kotshubeji</i> (Shelhuzhko, 1929)	R	-	R	-
<i>Nymphalis xanthomelas fervescens</i> (Stichel, 1908)	-	R	-	-
<i>Issoria lathonia lathonia</i> (Linnaeus, 1758)	-	VR	-	R
Family Satyridae				
<i>Melanargia parce parce</i> (Staudinger, 1882)	U	-	VR	R
<i>Paralasa maracandica maracandica</i> (Erschoff, 1874)	R	U	-	U
<i>Coenonympha nolckeni nolckeni</i> (Erschoff, 1874)	VR	-	VR	-
<i>Pararge eversmanni unicolor</i> (Grum-Grshimailo, 1893)	R	VR	-	-
<i>Hyponephele naubidensis naubidensis</i> (Erschoff, 1874)	VR	R	-	R
<i>H. maureri maureri</i> (Staudinger, 1886)	-	-	-	R
<i>Chazara heydenreichi shandura</i> (Marshall, 1882)	-	R	VR	-
<i>Chazara briseis fergana</i> (Staudinger, 1886)	-	-	R	-

In all points of our research, 51 butterfly species belonging to 6 families were found. Despite of the numerous numbers, species of the family Lycaenidae (16 species) does not reach the usual level but characterized as rare or very rare species. Besides family Lycaenidae, most species from other families also appeared rare or very rare species. Usual species are also not present on all the collection points. For example, *Pontia daplidice*, *Colias erate* (Pieridae), *Paralasa maracandica* (Satyridae) in one collection point were observed as a usual species, but rare species in other collection points. Marked usual species as rare species is most found in the third collection points, which has the natural conditions differ from other three points. It should be noted that numerous species levels was not found by us.

Funding This study was supported by the Minister of Science and Technology of the People's Republic of China (2015DFR30790) and the External Cooperation Program of BIC, Chinese Academy of Sciences (GJHZ201311).

Acknowledgements The first author very thanks Prof. Jun Chen and Mr. Peng He (Institute of Zoology, Chinese Academy of Sciences) for the organization of this expedition to Tajikistan and collection specimens for this study, and CAS-TWAS President's Fellowship Programme.

References

- Churkin, S.V. 2004a. New taxa of butterflies (Lepidoptera, Phopalocera) from Peter the Great Range. *Hellios*, 5: 131–136.
- Churkin, S.V. 2004b. A new species of *Leptidea* Bulberg, 1820 (Lepidoptera, Pieridae) from Peter the Great Range. *Hellios*, 5: 137–141.
- Degtyareva, V.I. 1981. Lepidoptera of the fruit of Karategin. *Entomological Review of Tajikistan*, 1981: 82–158.
- Grum-Grshimailo, 1890. *Le Pamir et faune lepidopterologique*. Mem. s. l. lep. Rom. IV. 575 pp.
- Gvozdetsky, N.A., Golubchikov, Yu.N. 1987. *Mountains*. Moscow, "Misl" pp.
- Korb, S.K. 2012. *Butterflies (Lepidoptera, Papilioniformes) of the Northern Tien-Shan. Part 1. Families Hesperidae, Papilionidae, Pieridae, Libytheidae, Satyridae*. Tula. 86 pp.
- Korshunov, Yu.P. 2002. *Diurnal Lepidoptera of Northern Asia*. Moscow. 429 pp.

- Stshetkin, Yu.Yu. 1975. Vertical distribution of *Phopalocera* in the gorge of Darai-Nazarak on Northern slope of the Peter the Great mountain Range. *Entomology of Tajikistan*. Dushanbe: 161–164.
- Stshetkin, Yu.Yu. 1981. Analysis of the subalpine fauna of Durnal Lepidoptera (Rhopalocera) in the Central part of the Peter the mountain ridge. *Zoological Journal*, Tome 9: 856–865.
- Stshetkin, Yu.L., Stshetkin, Yu.Yu. 1975. Species of Papilionoidea and Pieridae of the basin the river of Surkhob in Tajikistan. *Entomology of Tajikistan*. Dushanbe: 142–160.
- Tshikolovets, V.V. 2003. *The Butterflies of Tajikistan (Lepidoptera, Rhopalocera)*. Tshikolovets, Brno-Kyiv. 500 pp.
- Tuzov, V.K., Bogdanov, P.V., Churkin, S.V., Dantchenko, A.V., Devyatkin, A.L., Murzin, V.S., Samodurov, G.D., Zhdanko, A.B. 1997. *Guide to the Butterflies of Russia and Adjacent Territories. Vol. 1. Hesperidae, Papilionidae, Pieridae, Satyridae*. Pensoft, Sofia, Bulgaria. 480 pp., 78 pls.