New data on some high-altitude protected insect species in northern Transbaikalia

Yu A Bazhenov
Institute of Natural Resources, Ecology and Cryology Siberian Branch of RAS, 16a, Nedorezova Street, Chita, 672014, Russian Federation

E-mail: uran238@ngs.ru

Abstract. The paper presents data on registration of two regionally protected insects in the north of Zabaykalsky krai. Observations were made in summer 2019-2021 in Kalarsky district of Zabaykalsky krai on the Ridges Udokan and Kodar. Parnassius eversmanni and Parnassius phoebus are characteristic and common species of high alpine meadows of the study area, especially at the Kodar Ridge between the Apsat and Sredny Sakukan Rivers. This area is not part of the Kodar National Park and requires attention for conservation of rich high altitude ecosystems that include the studied insect species.

1. Introduction
Hard-to-reach high altitude areas of northern Zabaykalsky krai remain practically unstudied entomologically. The aim of the study is to summarize new unpublished data on several regionally protected high altitude insects of Zabaykalsky krai. These species may be indicators of the state of high mountain ecosystems exposed to accelerated development of mining industry in Zabaykalsky krai.

2. Materials and Methods
The data were collected during field research in 2019-2021 in Kalarsky district of Zabaykalsky krai. The results presented in the article were collected during the survey of high mountain landscapes of the Udokan and Kodar Ridges: from the subalpine zone (~1700–1900 m) to the bald mountain zone (maximum ~2700 m). Survey routes at the Udokan Ridge ran in the upper reaches of the Nirungnakan River, in the watershed of the Naminga and the Saku Rivers and along the right bank of the upper reaches of the Saku River. At the Kodar the Sredny Sakukan River basin was surveyed: its right tributary the Eksa River, and the left bank from the Khavagda River to the Shanga River. On the eastern edge of the Ridge (Arbakalir Lake area) Berezovy Creek was surveyed.

3. Results and Discussion
Parnassius eversmanni Menetries, 1850 is listed in the Red Data Book of Zabaykalsky krai under Category 3 (rare). It is a member of the family Papilionidae, order Lepidoptera. Parnassius eversmanni is found from the mountains of north-eastern Kazakhstan and southern Siberia to Japan and Chukotka, as well as in North America. In Zabaikalsky Kray, the species is found at the Udokan and Kodar Ridges, where it was recorded from the upper border of the forest up to the bald mountain zone, and in Chita region from Mount Saranakan [1].

Content from this work may be used under the terms of the Creative Commons Attribution 3.0 licence. Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.
Published under licence by IOP Publishing Ltd
In late June–early July 2020 *Parnassius eversmanni* (figure 1d) was observed at the surveyed area of the Kodar Ridge from the Khavagda River to the Shanga River. Flying adults of this species were found from the upper boundary of taiga zone (1700 m sea level) to the nival belt (over 2200 m sea level). The species is most common in areas of alpine high-mountain meadows dominated by Dryas. On June 20, 2021, this species was recorded in the easternmost part of the Kodar Ridge, in the head of the Berezovy Creek flowing into the Chara River just below Lake Arbakalir. Adult insects were recorded at the border of the sub-bald mountain and bald mountain zones at the altitude of 1600-1800 m sea level. At the Udokan Ridge *P. eversmanni* was encountered only once in late June 2019 on the watershed of the Nirungnakan River and the Kamenny Creek in the shrub-dryad tundra at the altitude of 1950 meters sea level.

*Parnassius phoebus* (Fabricius, 1793) is included in the Red Data Book of Zabaykalsky krai under Category 3 (rare). It is a member of the family Papilionidae, order Lepidoptera. According to the revision [2], it was renamed to *Parnassius corybas* Fischer von Waldheim, 1823 [3], this name we will use further on. *P. corybas* occurs in the mountains of Eurasia from the Alps in the west to the mountains of Kamchatka in the east. In Zabaykalsky krai, it is known only from the Udokan and Kodar Ridges [4], where it was recorded as rare species on bald mountain slopes and as common species in the sub-belt of mountain taiga of reduced development [5].

Whereas at the Udokan Ridge *P. corybas* was found locally in the interfluves of the Naminga and Saku Rivers, at the Kodar Ridge it was found in all surveyed areas except for the upper reaches of the Shanga River (figure 1e). Our two-year observations showed that adult species of *Parnassius corybas* are most common in high alpine meadows, and in bald mountain and subalpine communities they are recorded sporadically. This may be the reason for the greater number of occurrences of this species at the Kodar Ridge compared to the Udokan Ridge, where alpine meadows are poorly expressed or absent. At the Udokan Ridge, numerous adult *P. corybas* were observed in the mountain area (2412 m sea level) between the Saku and Naminga Rivers, where alpine meadows dominated by dryad are well expressed. Irregularity of encounters was also noted by seasons: *P. corybas* in large numbers was encountered in August until the first ground frosts at the end of the month, and very rarely in the end of June - first half of July. Apparently, the mass flight of the *P. corybas* at the Kodar Ridge begins in mid-July. Camera-traps installed on terraces with alpine meadows at altitudes of 1800-2000 m above sea level during this period recorded numerous large white butterflies. Considering that no similar species were encountered in the highlands at this site during our visit, we can attribute these observations to *P. corybas*.

Both protected butterfly species are most abundant in the Kodar Ridge. Here both species live above the forest edge, predominantly in alpine meadows. An initial survey of the flora and fauna of the Kodar Ridge showed that the high-altitude area between the Apsat and Sredny Sakukan rivers is characterized by rich plant and animal communities. Rich alpine meadows are noted in the interfluve of the Apsat and Middle Sakukan on the southern macro-slope of the Kodar Ridge (figure 1a, 1b). The species-rich alpine plant communities include regionally protected species such as *Rhododendron redowskianum*, *R. aureum* and *Rhodiola pinnatifida*. Rich highland plant communities play an important role not only for insects, but also for mammals, including protected. Snow sheep (*Ovis nivicola*) and black-capped marmots (*Marmota camtschatica*) graze in alpine meadows. Both of these mammal species are listed in the Red Book of Russia. Unfortunately, the southern macro-slope of the Kodar Ridge between the Apsat and Kodar rivers has no protected area status (figure 1c). When the Kodar National Park was created in 2018, the territory in question was not included in its composition. This is a great omission in the conservation of wildlife and rare animal and plant species in the north of Transbaikalia.

4. Conclusion

Insect species discussed in the article, encountered at the Kodar and Udokan Ridges can be considered common and characteristic in the corresponding high-altitude habitats of the north of Zabaykalsky krai. At the Kodar Ridge characterized by high absolute altitudes and more diverse plant communities,
including well-developed alpine meadows, these insect species are more abundant. Part of the highlands of the Kodar Ridge is now included in the Kodar National Park. Unfortunately, one of the most important areas of the Kodar Ridge with well-developed ecosystems of alpine meadows: the interfluve of the Apsat and Sredny Sakukan Rivers was not included in the National Park. The highest diversity of high-mountainous flora, including protected plant species, was revealed in this area. It is here that the discussed species of high-mountainous insects reach the highest numbers. Therefore, maximum efforts should be made to preserve this section of the Kodar Ridge intact, for example, by annexing it to the national park.

![Kodar National Park and Kodar Ridge](image)

**Figure 1.** Schematic of the territory of the Kodar National Park and an important area for the conservation of rare animal and plant species that was not included in the park (c); Kodar's high mountain landscapes (a, b); *Parnassius eversmanni* (d); *Parnassius corybas* (e).

### References

[1] Dubatolov V V, Gordeev S Yu, Streltsov A N and Bessolitsina E P 2012 Eversmann's parnassian *Red Data Book of Zabaikalsky Krai. Animals* (Novosibirsk: Novosibirsk Publishing House) pp 279–80

[2] Hanus J and Theye M L 2010 *Nachrichten des Entomologischen Vereins Apollo* 1-2 7–84

[3] Korb S K and Bolshakov L V 2011 *Eversmannia* 82 124

[4] Gordeev S Yu, Dubatolov V V and Streltsov A N 2012 Phoebus Apollo *Red Data Book of Zabaikalsky Krai. Animals* (Novosibirsk: Novosibirsk Publishing House) pp 278–9

[5] Martinenko A B and Churkin S V 2002 Alti-biome-biotopic distribution of butterflies (Lepidoptera, Diuma) in the north-eastern Stanovoi Plateau *The animal world of the Far East* vol 4 (Blagoveshchensk: Blagoveshchensk State Pedagogical Univ. Publ.) pp 67–192