

Extended Abstract

Significance of Genus-Level Taxonomic Composition of Alpine Leaf Beetles (Coleoptera, Chrysomelidae) for Zoogeographic Studies[†]

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Abstract: Composition of subfamilies in leaf beetles can be used for faunistic comparisons of large zoogeographic units. In the Arctic and alpine regions of Palaearctic subfamily Chrysomelinae is dominating and composition of its genera (subgenera) is very peculiar. Several genera are typically and exclusively alpine, others include alpine species in exact subgenera. The most speciose genus *Oreomela* Jcbs. (over 80 species) is distributed throughout the high mountains of Central Asia, with the centre of diversity in Tien-Shan and its northern limit in the mountains of South Siberia. Genus *Xenomela* Weise (11 species) is restricted to Tien-Shan, *Parambrostoma* Chen (7 species) is distributed in the southern slope of the Himalayas. Genus *Oreothassa* Jcbs. with two species and monotypic *Apterocuris* Jcbs. are endemic to Altai Mts. Genus *Suinzona* Chen (20 species) is distributed mainly in the Hengduan Mountain region of China. *Sclerophaedon* Weise demonstrates unique situation with three centers of diversity, in Europe, China (Sichuan, Gansu) and Nepal. True alpine communities in Europe host the diverse genus *Oreina* Chev. (24 species). Outside European mountains two alpine species of *Oreina* are represented Altai-Sayan Mountains. In alpine zone of the Urals represented by alpine tundra communities *Oreina* is absent but *Chrysolina* demonstrates peculiar composition of subgenera: *Pleurosticha* + *Arctolina* + *Pezocrosita* + *Crositops*. Both *Pleurosticha* and *Arctolina* are typical arctic-alpine subgenera of Northern Asia. West Sayan hosts endemic subgenus *Paraheliostola* L.Medv. and composition of *Chrysolina* subgenera there is *Pleurosticha* + *Paraheliostola* + *Chrysocrosita*. *Chrysocrosita* is common for the Sayans with Mongolian Altai and the Far Eastern mountains. Therefore genus-level taxonomic composition of alpine leaf beetles reveals both distinguishing features of exact mountain systems and their interconnections.

Keywords: alpine communities; leaf beetles; taxonomic composition; mountains of Eurasia

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Since Lev Medvedev [1] demonstrated that composition of the subfamilies in leaf beetles (Chrysomelidae) can be used for faunal comparisons of the zoogeographic units of different scales this approach keeps its value but is quite rarely in use. My 25-years' experience of examination of alpine insect communities and alpine species of leaf beetles partly in the frame of international mountain biodiversity networks ALPNET, GMBA and GLORIA enables me to present a review of taxonomic composition worthy usage. In the Arctic and alpine regions of Eurasia only one subfamily Chrysomelinae is dominating and composition of its genera is especially peculiar. In the megadiverse genus *Chrysolina* Motschulsky only exact subgenera include alpine species therefore composition of such subgenera is important. Several genera are typically and exclusively alpine, among them the most speciose is *Oreomela* Jacobson with over 80 species distributed

throughout the high mountains of Central Asia with the center of diversity in Tien-Shan and its northern limit in the mountains of South Siberia [2]. Genus *Xenomela* Weise (11 species) is restricted to Tien-Shan, *Parambrostoma* Chen (7 species) is distributed in the southern slope of the Himalayas [3] and *Suinzona* Chen (20 species) – mainly in the Hengduan Mountain region of China [4]. Genus *Oreothassa* Jacobson with two species and monotypic *Apterocuris* Jacobson are endemic to Altai Mountains. *Sclerophaedon* Weise demonstrates [5] three isolated centers of diversity, in Europe, Nepal and Sichuan and Gansu provinces of China. The historic ties between these centers are intriguing but still have not investigated.

Vegetation types of alpine zone influence the composition of herbivores as well. The true alpine communities of European mountains host 24 species of *Oreina* Chev. This genus is absent in the Caucasus and only two species are known from Altai-Sayan Mountains, where true alpine communities are less common than alpine tundra. In the Urals and all Siberian mountains alpine tundra communities predominate in the highest parts. In the Urals *Chrysolina* demonstrates peculiar composition of subgenera: *Pleurosticha* + *Arctolina* + *Pezocrosita* or *Crositops*. Both *Pleurosticha* and *Arctolina* are typical arctic-alpine subgenera of Northern Asia and they are known throughout the whole range of the Urals, from its highest peaks in the South up to the North Polar Circle. *Pezocrosita* from North Urals and *Crositops* from South Urals, both found by me only recently [6], show historical connections between these parts of the Urals with West Altai and West Sayan respectively (Fig. 1). West Altai is peculiar with the endemic subgenus *Sibiriella* L. Medvedev and the composition of *Chrysolina* subgenera there is *Sibiriella* + *Pleurosticha* + *Pezocrosita*. West Sayan hosts the endemic subgenus *Paraheliostola* L. Medvedev and the composition of *Chrysolina* subgenera there is *Pleurosticha* + *Paraheliostola* + *Chrysocrosita*. *Chrysocrosita* is common for the Sayans with Mongolian Altai and the mountains of the Pacific coast of Eurasia (Fig. 1).

Clearly the taxonomic composition of leaf beetles from the highest mountains such as Himalaya, Tibet, Yunnan is especially interesting for understanding the evolutionary interconnections of Asian alpine biota. But the specific problem arises for *Chrysolina*, where the system of generally recognized subgenera cannot be applied exactly for these extremely high mountain species as illustrated in Nepal Himalaya [7]. In this case the provisional “species groups” can be used instead of subgenera for *Chrysolina*. The further problem is to find relations of these “species groups” to generally recognized subgenera; it can be solved only by means of molecular phylogenetic studies.

The presented review of known cases of genus-level taxonomic composition of alpine leaf beetles reveals both distinguishing features of exact mountain systems and their interconnections. Our knowledge of alpine leaf beetles as well as other Coleoptera families in high mountains is incomplete and a lot of undescribed species are still waiting for their collectors. The obtained data shows possible scenarios of historical formation of alpine biota that gives a general overview only and could be verified by both molecular approaches and fossil findings.



Figure 1. Several examples of the composition of *Chrysolina* subgenera tracking the interconnections between the greater mountains of Asia.

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