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# COMPOSITION AND STRUCTURE OF THE EARTH BEETLE (COLEOPTERA, CARABIDAE) FAUNA OF THE ZARAFSHAN MOUNTAIN RANGE

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**Abstract**
This article examines the composition, ecological structure, and geographical distribution of the earth beetle (Coleoptera: Carabidae) fauna in the Zarafshan mountain range. The research was conducted in 2023 using pitfall-trap and hand-picking methods at various altitudes. The results show that 45 species of ground beetles are found in the Zarafshan mountain range, with species such as Carabus, Pterostichus, Nebria, and Calosoma constituting the main group. Changes in altitude affect the number of species and their distribution in ecological zones.
It is noted that this territory is important for ensuring biological diversity and ecological balance for the fauna of earth beetles. The research results can serve as a basis for the development of environmental monitoring and environmental protection programs.

**Keywords:** Zarafshan mountain range, earth beetles, Carabidae, ecological structure, biodiversity, altitudinal distribution.

## Introduction

Ground beetles (Coleoptera: Carabidae) belong to the class of insects that play an important ecological role in maintaining interplant balance. They actively participate as a means of biological control, pest regulation, and in soil aeration and nutrition processes [5]. The Zarafshan mountain range is an important area for biodiversity due to its unique geographical location and climatic conditions.

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Therefore, the study of the Carabidae fauna in this area makes an important contribution to environmental monitoring and nature conservation.

This article is aimed at studying the composition of earth beetle species inhabiting the Zarafshan mountain range, their ecological structure, and geographical distribution

Studies were conducted in the spring and summer of 2023 at various altitudes of the Zarafshan mountain range. Pitfall traps (ground-mounted trapping devices) were used for sampling, and manual collection was also carried out [4]. The discovered specimens were identified in the laboratory using morphological and taxonomic methods [1].

During the research, 45 species of ground beetles were identified in the Zarafshan mountain range. Among them, species such as Carabus, Pterostichus, Nebria, Calosoma are considered the most common. Changes in altitude have a significant impact on the composition of ground beetles: the number of species is high in low-desert and forest zones, and decreases in high-mountain areas. This indicates that earth beetles live in various ecological niches [3].

**Composition and proportion of earth beetle species (Carabidae) of the Zarafshan mountain range.**

| Species name | Number of species | Percentage % | Most common altitudes (m) | Ecological zones |
|---|---|---|---|---|
| Carabus spp. | 12 | 26,7 | 1000-2000 | Forest, foothill |
| Pterostichus spp | 10 | 22,2 | 1500-2500 | Forest, high-mountain zone |
| Nebria spp. | 8 | 17,8 | 2000-3000 | Mountain deserts, elevation |
| Calosoma spp. | 5 | 11,1 | 1200-2000 | Forest, meadow |

The composition of the Carabidae fauna of the Zarafshan mountain range has similarities and differences compared to other mountain ranges of Central Asia. For example, Carabus and Pterostichus species are also widespread in the Tian Shan and Pamir regions [2]. Also, the influence of altitude determines the activity of earth beetles and the level of interspecific competition. This is an important

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factor in understanding their role in ecological systems and the sustainability of biodiversity.

The study of population dynamics clearly showed that the number and activity of ground beetles change depending on the season. In spring and summer, their activity is high, during which they are more active in finding food and reproduction. Also, anthropogenic factors, including agricultural activities and environmental pollution, can negatively affect the reduction in the number of species.

In the future, as a result of climate change, there is a high probability of a change in the distribution and species composition of earth beetles in the Zarafshan mountain range. With climate change, altitudinal zones can shift, which affects the ecological niches of earth beetles. Therefore, it is important to monitor these changes through environmental monitoring and genetic research.

Within the framework of ecotourism and nature conservation, it is necessary to develop a set of measures for continuous monitoring of the earth beetle fauna and restoration of the natural environment to preserve the biodiversity of the Zarafshan mountain range [2]. This is especially important for environmental education and increasing the responsibility of the population towards the natural environment.

A comprehensive study of the ground beetle fauna of the Zarafshan mountain range serves as an important indicator for assessing the ecological stability of the region. Since ground beetles are sensitive indicator organisms, they can be used to determine soil chemical conditions and the level of biodiversity. The species identified during this research act as significant ecological criteria for evaluating the natural potential of the area. Each species has its own ecological role and functions as an effective agent in protecting plants from pests. The variation in their distribution across different altitudes provides an opportunity to thoroughly analyze their adaptation strategies. In addition, changing climatic conditions may have a direct impact on the life cycle of ground beetles. Therefore, long-term monitoring is vital for observing the state of their populations. Modern genetic methods offer wide possibilities for identifying phylogenetic relationships within

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the Carabidae family. The use of molecular markers provides additional accuracy in species identification [7]. Applying GIS technologies in future research will allow the creation of digital maps of species distribution. This, in turn, helps to predict ecological risks in advance. Protecting certain rare species found in the Zarafshan mountain range remains one of the urgent tasks. Comprehensive measures aimed at reducing anthropogenic pressure help preserve biodiversity. The results of this study can serve as a scientific basis for shaping environmental policy. The obtained data can also be used as additional educational material to develop environmental education in schools and higher education institutions.

As a result, the earth beetle fauna of the Zarafshan mountain range serves as the main resource for the stability of ecological systems, biological control, and nature conservation. In the future, more in-depth research based on modern methods and technologies should be conducted in this area.

In conclusion, it should be noted that the earth beetle fauna of the Zarafshan mountain range is an important source of biodiversity and ecological balance. The species identified in this area can serve as a basis for the development of environmental monitoring and environmental protection programs. In the future, it is recommended to conduct even more extensive environmental research.

**References**

1.Bousquet, Y. (2012). Catalogue of Geadephaga (Coleoptera, Adephaga) of America, north of Mexico. ZooKeys, 245, 1-1722. https://doi.org/10.3897/zookeys.245.3416

2.Kryzhanovsky, O. L. (1983). Carabidae of the USSR and adjacent countries. Nauka Publishing.

3.Lindroth, C. H. (1985). The Carabidae (Coleoptera) of Fennoscandia and Denmark. Brill Academic Publishers.

4. Luff, M. L. (2007). The Carabidae (ground beetles) of Britain and Ireland. Royal Entomological Society.

5.Thiele, H. U. (1977). Carabid beetles in their environments. Springer-Verlag.

6. Rainio, J., & Niemelä, J. (2003). Ground beetles (Coleoptera: Carabidae) as

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**Website:** usajournals.org


bioindicators. Biodiversity & Conservation, 12(3), 487–506.

7. Lövei, G. L., & Sunderland, K. D. (1996). Ecology and behavior of ground beetles (Coleoptera: Carabidae). Annual Review of Entomology, 41, 231–256.

8. Luff, M. L. (2007). The Carabidae (ground beetles) of Britain and Ireland.\ Handbooks for the Identification of British Insects. Royal Entomological Society.