

Abstract

Beetles (Coleoptera) constitute the most numerous and one of the most diverse animal orders on Earth. Beetle species differ significantly from each other in the terms of both external morphology and ecological requirements. On one hand, they play an important role in many crucial ecological processes, but on the other hand, some members of this order are considered serious pests in agriculture, horticulture, and forestry. The main aim of the research was to quantify the patterns of morphological variation in selected groups of beetles, characterized by a significant ecological and economic importance in forest ecosystems. The variation has been described with geometric morphometrics. The effect of selected ecological (e.g. introduction to a new habitat) and evolutionary (e.g. geographic isolation, sexual selection) factors have been tested. The obtained results indicate that the variation, both within and between the studied species, has been shaped mostly by their phylogenetic history. Nevertheless, in the case of some morphological traits, the significant homoplasy among unrelated groups has been described. It has also been shown that some morphological features can change rapidly in a new environment, as a result of, for example, stressor influence. Moreover, the results indicated that sexual selection may have a significant influence on intra-species variation. Another factor that shapes the patterns of herbivorous beetles' variation is the host plant availability. The conducted research confirms that the geometric morphometrics constitutes a useful and universal method in studies on beetles' morphological variation, and can be used for both solving general biological problems, as well as for applied research.

Key words: beetles, geometric morphometric, morphology, variation