



Comparative morphology of internal reproductive systems in leaf beetles of the Donaciinae and Criocerinae (Coleoptera: Chrysomelidae) and its implication for the phylogeny

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Abstract

We compared the morphology of the internal and external reproductive organs of both sexes among species of the leaf beetle subfamily Donaciinae and its sister taxon Criocerinae. Using nine characters of the reproductive system, we attempted to reconstruct the phylogenetic tree for the two subfamilies combined. For this study, we used 11 Japanese species (including 2 subspecies) of 2 genera in the Donaciinae and 16 Japanese species of 4 genera in the Criocerinae. Morphological comparison revealed that the internal reproductive system exhibits a large diversity even in each subfamily. In particular, the morphology of the spermathecal organ varies greatly among genera or subgenera. In the subgenus *Lema*, we found a marked apomorphic state, that is, an extremely extended spermathecal duct in females and a similarly extended filiform structure on the internal sac in males. Phylogenetic analysis yielded two most parsimonious trees, which differ in criocerine relationship. In seven of the nine characters, the evolution of an apomorphic state was consistent with previous phylogenetic hypotheses.

Key words: internal reproductive system, *Crioceris*, *Lema*, *Donacia*, *Plateumaris*, phylogeny

Introduction

The family Chrysomelidae, a highly diverse group in the order Coleoptera, includes about 20 subfamilies and more than 35,000 species. In the Chrysomelidae, the adult external morphology and life cycle vary greatly among the subfamilies. Several attempts have been made to reconstruct the chrysomelid phylogeny based on external and internal morphology (reviewed by Schmitt 1996; Suzuki 1996). However, until the early 1990s,