



Phylogeny of the weevil genus *Rhinusa* Stephens based on adult morphological characters and host plant information (Coleoptera: Curculionidae)

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Abstract

A phylogenetic analysis of the species belonging to the weevil genus *Rhinusa* Stephens, 1829 (Coleoptera: Curculionidae: Curculioninae: Mecinini) was carried out. *Rhinusa* weevils feed on plants of the closely related families Scrophulariaceae and Plantaginaceae. Based on a cladistic analysis of six outgroup and 33 ingroup taxa, and 39 adult morphological and 8 ecological characters, eight well supported species groups and two monobasic groups belonging to three separate and more inclusive assemblages were recognized. The first assemblage (A) includes nine species belonging to two groups (*R. bipustulata* and *R. tetra* groups), whereas the second and third assemblages (B and C) include a total of 14 species belonging to two groups (*R. antirrhini* and *R. linariae* groups) and six groups (*R. pilosa*, *R. herbarum*, *R. neta*, *R. vestita*, *R. mauritii* and *R. melas* groups), respectively. Two of the three main assemblages (A and B) are well supported as monophyletic entities, whereas the third assemblage (C) has weak support contingent in part upon the exclusion of host plant associations. Assemblage A includes all species living on species of Scrophulariaceae, with two groups occurring on two closely related plant genera, *Scrophularia* (*R. bipustulata* group) and *Verbascum* (*R. tetra* group), respectively. The other two assemblages include species living exclusively on species of the family Plantaginaceae, tribe Antirrhineae. These patterns suggest a well conserved and phylogenetically congruent association among the weevils and their hosts. Optimizing host plant preferences onto the morphological phylogeny indicates that feeding on Plantaginaceae was the plesiomorphic condition for the genus *Rhinusa*. In general there are no strict relationships between groups of weevils and their specific feeding habits; however, species of the *R. antirrhini* group are all feeding on seed capsules. In contrast, in other groups the larvae of closely related species display significant variations in host plant parasitism. Some species of the *R. tetra* group feed on seed capsules whereas others are stem borers. In turn, certain species of the *R. neta* group feed on seed capsules yet others areinquilines of gall forming species of *Rhinusa*. The latter habit is present in multiple convergent groups such as the *R. linariae* and *R. pilosa* groups.

Key words: Curculionidae, host plants, Mecinini, morphology, *Rhinusa*, phylogenetics, species groups

Introduction

The weevil genus *Rhinusa* Stephens, 1829 is a member of the tribe Mecinini (Curculionidae, Curculioninae) and is composed of approximately 40 species with a Palearctic distribution (Reitter 1908; Caldara 2001). The taxonomic classification of species within *Rhinusa* has proven difficult given that there are few morphologically informative character systems. A division of *Rhinusa* into four groups was proposed by Reitter (1908) and generally accepted without criticism (Hustache 1931; Hoffmann 1958; Smreczyński 1976; Lohse & Tischler 1983). Reitter (1908) divided the species into groups based only on a few characters of the vestiture and the shape of the rostrum. A recent taxonomic treatment based on morphology suggests that *Rhinusa* is monophyletic and sister to *Gymnetron* Schoenherr, 1825 (Caldara 2001). As highlighted by Caldara (2001), it is noteworthy that neither *Rhinusa* nor *Gymnetron* have clear apomorphies supporting their monophyly with respect to their presumed sister taxa (*Rhinumiarus* Caldara 2001 + *Cleopomiarus* Pierce