

# Unique chemotaxonomical markers of Apiaceae family for the identification of inter-species, inter-genera and inter-family relations

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Complex ecological interactions between the plant and predator species are the driving force of evolution that ultimately yields the formation of a new species via phenotypic and genetic changes. Plant secondary metabolites play a crucial role in these interactions as defense compounds and insect attractants to ensure survival of the plant species (Gutzeit and Ludwig-Müller, 2014). Although general structures of the secondary metabolites are well defined, each plant species produces unique compounds that suit its specific purpose during the ecological interactions with another species.

The Apiaceae is one of the most complex flowering plant families; identification of the boundaries of various clades within the subfamily Apioideae is still under discussion. Various phylogenetic analyses such as the cDNA *rps16* intron and the nrDNA ITS sequences, as well as serotaxonomical analyses of seed storage proteins, have been carried out (Shneyer *et al.*, 1992; Downie *et al.*, 2001; Ajani *et al.*, 2008; Downie *et al.*, 2010). Nevertheless, some inconsistencies still remain with the placement of certain genera into these clades.

While investigating the secondary metabolites of *Petroedmondia syriaca* (Boiss.) Tamamsch. and various *Heptaptera* species, we isolated several unique coumarin derivatives that clearly delineate the placement of these genera into the Opopanax clade as well as their association with the other neighboring genera. Advances in computer and analytical instrumentation technologies during the last couple of decades streamlined the phylogenetic analysis via DNA sequence determination. The very same technologies also simplified and expedited the isolation and structure elucidation of secondary metabolites at such a level as to provide rapid critical information to corroborate or revise the taxonomical status of each genus/species. Taking unique secondary metabolites into account during the taxonomical classification provides direct evidence since their sole purpose of existence is the regulation of inter-species interactions.

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