

Multidisciplinary Approaches to Systematics

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Evolution of the Enigmatic Plumariidae (Insecta: Hymenoptera: Chrysidoidea)Denis J. Brothers¹ and Alexandr P. Rasnitsyn²¹*School of Botany and Zoology, University of Natal Pietermaritzburg, Private Bag X01, Scottsville, 3209 South Africa.*²*Paleontological Institute, Russian Academy of Sciences, Moscow 117647, RUSSIA.*

The phylogeny of the Hymenoptera, and particularly the Aculeata, has recently been investigated critically by several authors. All agree that the aculeates comprise two monophyletic lineages, the Chrysidoidea and the (Apoidea + Vespoidea). All also agree that the Plumariidae is the sister group of the remaining Chrysidoidea. As chrysids, modern plumariids are unusual, the males having a relatively rich wing venation. *Plumarius* Philippi, *Plumaroides* Brothers and *Maplurius* Roig-Alsina occur in arid areas of South America and *Myrmecopterina* Bischoff and *Myrmecopterina* Day in arid areas of southern Africa. Phylogenetic analyses have shown that each southern African genus is most closely related to one or more of the South American genera rather than being most closely related to each other. The distribution is unusual and putatively Gondwanan, with each of the two primary lineages occurring on both continents and therefore having arisen before the breakup of Gondwanaland.

Within the Chrysidoidea, the family which apparently arose next is the Scolebythidae. This also has a putatively Gondwanan distribution based on modern representatives in the neotropics, Australia, South Africa and Madagascar. Again, the closest relationships are between genera

separated by long distances. The combination of these two apparently Gondwanan distributions for the two most basal families of the Chrysidoidea could lead to the assumption that the superfamily also arose in that area. However, fossil species of Scolebythidae have been found in early Cretaceous Lebanese amber, Eocene Baltic amber and Tertiary Dominican amber.

No fossil Plumariidae have yet been described, but two conspecific male specimens from late Cretaceous amber of New Jersey were recently recognised as members of the family. These belong to a new genus which differs most strikingly from all modern genera in having simpler wing venation. This poster presents a putative phylogeny of the genera of Plumariidae taking into account the new information now available; it is unclear whether the fossil genus is basal to the rest or whether it is the sister group of one of the other two lineages. If nothing else, the presence of specimens in North America in the past requires reassessment of ideas on the geographic origin of the group and the Chrysidoidea.

Relationships within the Pentaschistis Clade (Poaceae: Danthonieae).

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The generic relationships of the 19 genera of the Danthonieae have been examined using a range of molecular data sets, but little molecular work has been done to examine relationships within the genera. *Pentameris*, *Prionanthium* and *Pentaschistis* share various morphological characteristics and previous molecular work suggests a close relationship between these genera,

which have been referred to as the "Pentaschistis Clade". This study used rpoC2 & ITS sequence data to elucidate the relationships of selected species from each of these three genera. These representative species were selected on the basis of their range in macro- and micro-morphology, (in particular gland structure).

Systematics of *Tetradenia* (Lamiaceae).

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The African / Malagasy Genus *Tetradenia* is well-marked within the Family Lamiaceae, possessing numerous distinctive features. The species-level taxonomy of the genus in Madagascar and some parts of Africa is well understood. However no attempt has been made to examine the relationship between the Malagasy and the African species, and to explore the evolutionary patterns of its unusual features. A single species of the genus, *T. barberae*, stands out in certain respects. It is anomalous and unique in having relatively large hermaphrodite flowers in a reduced inflorescence, large nutlets with distinctive surface features and a somewhat disjunct distribution with respect to other African species with an

unusual habitat preference. This study is part of a broader project which will use morphological and the DNA sequence data in an attempt to resolve phylogenetic relationships within *Tetradenia* and with other related members of the Lamiaceae, making use of the selected species of other related genera as outgroups. Results of a preliminary analysis of the morphological data set has enabled us to develop a phylogenetic hypothesis for the genus which is consistent with current thinking about variation within the genus and biogeographic relationships. Placement of the anomalous *T. barberae* as a basal taxon is confirmed.