Rhamnaceae Juss. is well represented in Australia with about 240 species. Over 90% of these belong to Pomaderreae Reissek ex Endl., the second largest tribe of Rhamnaceae, which is endemic to Australia and New Zealand. The defining characters of the tribe are the presence of stellate hairs on stems, leaves and/or flowers and schizocarpic capsular fruits. Individual fruitlets are indehiscent or release the seed through an opening or slit.

Pomaderreae currently consist of seven genera in Australia, of which only one (Pomaderris Labill.) extends to New Zealand. The limits of the genera were confused by many botanists over the last 150 years, with two to seven genera being accepted over time. This thesis aims to clarify the generic limits and resolve the position of several atypical species.

Parsimony analyses of two DNA regions, the Internal Transcribed Spacer (ITS) from nuclear DNA and the trnL-F region from chloroplast DNA, were conducted separately and combined. The combined data-set contained 69 taxa of Pomaderreae; it was analysed with successive weighting to down weight base positions that changed excessively and resulted in a well-supported phylogeny. Morphological data was mapped on to the cladogram to explore the variation of characters and to find key synapomorphies for the clades.

The results of the different analyses were generally congruent, but the arrangement of the clades to one another was not resolved satisfactorily and the position of some species changed between analyses. The ITS phylogeny was well-resolved, in contrast to the trnL-F analysis, which contained only few clades and many polytomies. Long homoplasious indels hampered the trnL-F analysis and resulted in seemingly unrelated species being grouped together.

Pomaderreae is monophyletic, which corroborates findings by Richardson et al. (2000a, 2000b) and Fay et al. (2001). Five main genera of Pomaderreae, Pomaderris, Siegfriedia C.A. Gardner, Spyridium Fenzl, Stenantemum Reissek and Trymalium Fenzl, are confirmed, but some name changes are needed to achieve a classification with monophyletic genera: the Victorian species of Trymalium and Cryptandra waterhousei F. Muell. should be transferred to Spyridium; Blackallia connata C.A. Gardner needs to be subsumed in Cryptandra and the genus Blackallia C.A. Gardner has to be restricted to B. biloba C.A. Gardner. Three new genera are suggested. The first should include the four species of the ‘Bilocular Clade’, a group of species previously thought to be unrelated. The second genus would be monotypic containing Stenantemum gracilipes Diels. The last new genus would consist of two other species so far included in Stenantemum.

The current results do not support a split of Cryptandra, although a number of morphologically distinct species or groups of species have been suggested by others to warrant generic rank. Most of these unusual species are part of a ‘basal’ grade that is separated from a clade containing mostly ‘typical’ species of Cryptandra sensu Thiele & West (2004), however, resolution within the Cryptandra clade is limited and only few nodes receive statistical support.

The indumentum on leaves of selected species of Pomaderreae was examined with Scanning Electron Microscopy to assess the variation of hair types and their distribution. Trichomes are quite variable and range from simple hairs to fasciculate or dendroid multi-radiate hairs. The indumentum in some taxa, such as Stenantemum, the three new genera, or Cryptandra, seems to be more constant and might provide synapomorphies for certain clades or groups of species in the future.
https://doi.org/10.5962/p.361585.

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