



A revised infrageneric classification for *Brickellia* (Asteraceae, Eupatorieae)

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Abstract

A recent molecular phylogenetic study of the predominantly Mexican *Brickellia* resolved issues regarding its generic circumscription, but a new infrageneric classification remains to be formalized. We propose to recognize as sections nine clades identified as monophyletic based on molecular data. Three of these clades have been previously recognized as distinct genera, *Barroetia*, *Kuhnia*, and *Phanerostylis*, and require names at the sectional level. The remaining six sections have names available from previous taxonomic work, but two of them require validation at the sectional level, and all have a different species composition compared to previous studies.

Key words: Alomiinae, Mexican Flora, North American Flora

Introduction

The massive restructuring of the classification of Eupatorieae by King & Robinson (1987) leading to the establishment of dozens of new genera has subsequently been mostly validated by molecular phylogenetic studies for *Eupatorium* L. (e.g. Robinson *et al.* 2009; Tippery *et al.* 2014), but the record for genera segregated from *Brickellia* Elliott has been mixed. Schilling *et al.* (2013) were able to show as distinct *Asanthus* R.M. King & H. Rob., *Brickelliastrum* R.M. King & H. Rob., *Carminatia* Moc. ex DC., and *Steviopsis* R.M. King & H. Rob., each of which have been at one time or another included in *Brickellia*. In contrast, the segregation of *Barroetia* A. Gray and *Phanerostylis* (A. Gray) R.M. King & H. Rob. from *Brickellia* was not supported in a recent molecular phylogenetic analysis (Schilling *et al.* 2015), and further evidence was provided for the inclusion of *Kuhnia* L. as part of the genus.

An infrageneric classification of *Brickellia* had been proposed previously in the monograph of the genus by Robinson (1917). This work is long outmoded, with a third (31/91) of the species treated in it having subsequently been synonymized or transferred to other genera. The Robinson (1917) monograph, together with the three genera formerly considered to be distinct, provide names for all of the clades supported by the molecular phylogenetic analysis of Schilling *et al.* (2015), although the generic names and some that were used for subsections require validation at the sectional level. The decision on the rank at which to recognize infrageneric taxa in *Brickellia* is somewhat arbitrary, and the use of sections follows the precedent established by Robinson (1917).

Molecular phylogenetic studies revealed not only a structure for diversification within *Brickellia* but also uncovered a surprising amount of variability among the species of the genus (Schilling *et al.* 2015). This suggests the possibility that additional species remain to be discovered through further exploration. Indeed, new species continue to be proposed (Hinojosa & Cruz-Durán 2010; Turner 2010, 2011, 2013; Rzedowski & Calderón 2013), and those that were examined by Schilling *et al.* (2015) all proved to be distinctive at the molecular level. A complete taxonomic revision of the genus is badly needed, but the large size (almost 100 species) has been a barrier. The infrageneric classification presented here may encourage progress toward revising the genus by delimiting putatively monophyletic units of reasonable size for detailed study in thesis or dissertation projects.

The morphological distinctiveness of the sections varies, making it difficult to construct a simple but completely accurate key. Sections that have been named previously as genera are easily recognized. Others, however, notably sections *Microphyllae*, *Xerobrickellia*, and *Coleosanthus*, have broad overlap in morphological features as reflected