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Molecular phylogenetic data and seed coat morphology resolve the generic position of some critical Chenopodioideae (Chenopodiaceae–Amaranthaceae) with reduced perianth segments

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The former *Chenopodium* subgen. *blitum* and the genus *Monolepis* (Chenopodioideae) are characterized in part by a reduced (0–4) number of perianth segments. According to recent molecular phylogenetic studies these groups belong to the reinstated genera *Blitum* incl. *Monolepis* (tribe Anserineae) and *Oxybasis* (tribe Chenopodieae). However, key species such as *Chenopodium antarcticum*, *C. exsuccum*, *C. litwinowii*, *C. foliosum* subsp. *montanum*, and *Monolepis spathulata* were not included, and so their phylogenetic position within Chenopodioideae remained equivocal. These species were incorporated into an expanded phylogenetic study based on nrDNA (ITS region) and cpDNA (trnL-trnF and atpB-rbcL intergenic spacers and rbcL gene). Analyses confirm the placement of *Chenopodium antarcticum*, currently known as *Oxybasis antarctica*, *C. exsuccum*, *C. litwinowii* and *C. foliosum* subsp. *montanum* within *Blitum*. Two of the three accepted species of *Monolepis*, the type species *M. trifida* (= *M. nuttalliana*) and *M. asiatica*, were included in *Blitum* congruent with previous studies. The North American *M. spathulata* nested within (ITS and atpB-rbcL analyses) or sister (trnL-trnF intergenic spacer) to the tribe Dysphanieae. To date, few reliable morphological characters have been proposed that consistently distinguish *Blitum* (incl. two *Monolepis* species) from *Oxybasis*; however, two key differences are evident: (1) the presence of the long-petiolate rosulate leaves in *Blitum* vs their absence in *Oxybasis*, and (2) a seed coat structure with the outer wall of the testa cells lacking stalactites ('non-stalactite seed coat'), and an obvious protoplast in *Blitum* vs seed coat with the outer walls of the testa cells having stalactites ('stalactite seed coat') and reduced protoplast in *Oxybasis*. *Monolepis spathulata* also has stalactites in the outer cell walls of the testa and lack of rosulate leaves. These unique features in combination with the phylogenetic results, confirm that this species is unlike all other *Blitum*, and therefore the recent combination *Blitum spathulatum* is erroneous. Indeed, the morphological and molecular distinctiveness of *Monolepis spathulata* from all *Dysphanieae* suggest that it should be recognized as a new monotypic genus.

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Notes