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Australian spinifex grasses: new names in *Triodia* for *Monodia* and *Symplectrodia*

MICHAEL D. CRISP[1]*, JIM MANT[2], ALICIA TOON[3] & LYN G. COOK[4]

[1]*Research School of Biology, The Australian National University, Acton, Canberra ACT 2601, Australia; e-mail: mike.crisp@anu.edu.au.*

[2]*The Australian National University, Acton, Canberra ACT 2601, Australia; and School of Biological Sciences, The University of Queensland, Brisbane, Qld 4072, Australia; email: jim.mant@yahoo.com.au.*

[3]*School of Biological Sciences, The University of Queensland, Brisbane, Qld 4072, Australia; e-mail: a.toon@uq.edu.au.*

[4]*School of Biological Sciences, The University of Queensland, Brisbane, Qld 4072, Australia; e-mail: l.cook@uq.edu.au.*

**author for correspondence*

The Australian spinifex grasses comprise an endemic radiation (69+ species) of morphologically and ecologically distinctive plants. Many species are long-lived hummock-forming perennials that bristle with needle-like leaves. Ecologically, they resemble sclerophyll shrubs rather than grasses (Rice & Westoby 1999). They are widespread in dry communities, especially the eremaean and monsoonal (savannah) biomes, where they often dominate the landscape, particularly on oligotrophic (sandy and skeletal) substrates. Across nearly one-third of the continent, spinifex plays a dominant role in structuring communities and their fire regimes, directly influencing the habitat dynamics of many animals, including endangered species (Allan & Southgate 2002, Brown *et al.* 2009, Dickman *et al.* 2011).

Taxonomically, spinifex grasses have always been recognised as a natural group and molecular phylogenies strongly support their monophyly (Mant *et al.* 2000, Toon *et al.* 2015). The sister group relationship is uncertain (Peterson *et al.* 2010, Toon *et al.* 2015) but is most likely a pair of African and Asian genera (*Aeluropus* and *Odyssea*, Soreng *et al.* 2015) that occur in similar environments to spinifex. Currently, spinifex grasses are classified as subtribe Triodiinae in Poaceae subfam. Chloridoideae, tribe Cynodonteae, together with the above two genera of subtribe Aeluropodinae (Soreng *et al.* 2015).

As many as four genera have been recognised in Triodiinae—*Triodia* (1810), *Plectrachne* (1929), *Monodia* (1985) and *Symplectrodia* (1985)—and diagnosed using characters of the glumes, lemmas and spikelet structure (Jacobs 2004, Lazarides 1997). *Plectrachne* was distinguished from *Triodia* by having a lemma with three deep lobes, each with an awn, and glumes much longer than the florets excluding awns (Lazarides 1997: table 1). However, as the number of species included in *Plectrachne* grew (ultimately to 18), the two genera were found to be very heterogeneous in these features. As the morphological diagnosis proved to be unworkable, Lazarides (1997) formally sank *Plectrachne* into *Triodia*. Subsequent molecular phylogenetic analysis (Mant *et al.* 2000) supported this decision by finding both *Triodia sens. str.* and *Plectrachne sens. str.* to be paraphyletic and the phylogeny also showed that the characters used to distinguish the genera were homoplastic. Meanwhile, three new species had been discovered in the monsoonal tropics and were found to have spikelets that differed in number and arrangement of florets, and their fertility, from those in *Triodia sensu* Lazarides (1997). *Monodia*, known only from the Kimberley region of north-western Australia including the environs of the Mitchell Plateau, was diagnosed and named for its single-flowered spikelet and sterile prolongation of the rachilla (Jacobs 1985). In the same year, Lazarides (1985) described *Symplectrodia* with two species, both occurring in restricted areas of the Arnhem Land plateau. Subsequently, a comprehensive treatment of the whole spinifex group (as tribe Triodieae) in the *Flora of Australia* recognised three genera: *Triodia s.l.* (including *Plectrachne*), *Monodia* and *Symplectrodia*, totalling 68 species (Anonymous 2005, Lazarides *et al.* 2005, Nightingale *et al.* 2005, Nightingale & Weiller 2005).

Recently, we carried out a new molecular phylogenetic analysis of the spinifex group to test a hypothesis that historical shifts in leaf anatomical traits related to C_4 photosynthesis, and water relations might have been a key innovation leading to the radiation of the group into the monsoonal tropics (Toon *et al.* 2015). Sampling was more comprehensive than in the previous study by Mant *et al.*, including 66 of 69 described species and adding sequences of the *matK* gene (chloroplast DNA) to the nuclear ITS sequences that had been used by Mant *et al.* (2000). This presented an opportunity to test the generic classification more rigorously. *Plectrachne* was confirmed as non-monophyletic, being scattered throughout the spinifex clade. Both *Symplectrodia* and *Monodia* were nested deeply within the spinifex clade, with their inclusion supported by multiple nodes with high statistical support. Moreover, the

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