New combinations in *Callistemon* (Myrtaceae)

Frank Udovicic and Roger D. Spencer

National Herbarium of Victoria, Royal Botanic Gardens Melbourne, Birdwood Avenue, South Yarra, Victoria 3141, Australia; e-mail: frank.udovicic@rbg.vic.gov.au

Introduction

Morphological and molecular studies of genera in the tribe Melaleuceae *sensu* Wilson *et al*. (2005) have extended our knowledge of the phylogeny of the group, but failed to resolve their classification (see Briggs & Johnson 1979; Johnson & Briggs 1983; Johnson & Briggs 1984; Gravolin 1997; Ladiges *et al.* 1999; Orlovich *et al.* 1999; O'Brien *et al.* 2000; Brown *et al.* 2001). Craven (2006) sank *Callistemon* into *Melaleuca*, and provided combinations in *Melaleuca* for Australian species of *Callistemon*. Subsequently, Craven (2009) described several new species of *Melaleuca* that would previously have been placed in *Callistemon*. No combinations exist for these taxa in *Callistemon*. Australian herbaria are divided in their recognition of *Callistemon*, with state herbaria in New South Wales, Victoria, South Australia and Western Australia following the Australian Plant Census (APC 2011) in recognising *Callistemon*, whilst the other state herbaria in Queensland, Northern Territory, Australian Capital Territory, and Tasmania, treat the relevant taxa in *Melaleuca*.

Studies of nuclear 5S and ITS-1 DNA (Ladiges *et al.* 1999; Brown *et al.* 2001), and a combined study of morphology and chloroplast *ndh*F DNA (Edwards *et al.* 2010) have shown that *Melaleuca* is polyphyletic, genera of the monophyletic tribe Melaleuceae being nested within it. Edwards *et al.* (2010) pointed out that this presented a classic 'split-or-sink' dilemma. They noted that although molecular studies had indicated three major clades within the tribe 'no morphological support or diagnostic synapomorphies are identified for any of these clades' and therefore because 'the circumscription of *Melaleuca* and the generic status of other genera within Melaleuceae, is poorly supported' they proposed 'that all genera within the Melaleuceae are synonymised with *Melaleuca*' (Edwards *et al.* 2010). The difficulty of finding morphological characters to uniquely define what could potentially be many new segregate genera with few representatives gave further support for this decision.

The genera of tribe Melaleuceae *sensu* Wilson *et al.* (2005) are: *Callistemon* (c. 35 spp.), *Conothamnus* (3 spp.), *Lamarchea* (2 spp.), *Melaleuca* (c. 220 spp.), *Beaufortia* (15 spp.), *Calothamnus* (38 spp.), *Eremaea* (15 spp.), *Phymatocarpus* (3 spp.) and *Regelia* (6 spp.). Edwards *et al.* (2010) note that Melaleuceae have never been formally defined

Abstract

Recent phylogenetic studies have investiga ted the tribe Melaleuceae and, in particular, the degree of 'inclusiveness' of the genus *Melaleuca,* but the results remain open to interpretation. State herbaria in Australia are, for example, divided over the proposal to subsume *Callistemon* into *Melaleuca*. A proposal to sink all genera of tribe Melaleuceae into a broadly defined *Melaleuca* appears premature without corroboration from further research and discussion of possible alternatives. New combinations in *Callistemon* are therefore provided for nine species and three subspecies of *Melaleuca*.

Keywords: *Callistemon*, *Melaleuca*, Melaleuceae, Myrtaceae

Muelleria 30(1): 23–25 (2012)

morphologically and, given the homoplasious nature of the morphological characters surveyed in their study, the situation appears no closer to resolution.

Edwards *et al.* (2010) justify the sinking of *Callistemon* on the basis of non-monophyly demonstrated by cpDNA alone. A decision based on this evidence seems premature, especially as their combined analysis, with morphology included, and studies based on nuclear DNA (Ladiges *et al.* 1999; Brown *et al.* 2001), recovered a monophyletic Australian *Callistemon*. The analysis of Edwards *et al.* (2010) contained relatively few samples of *Callistemon* and GenBank accession numbers were given for only a small proportion of taxa in that study precluding the independent verification of *ndh*F sequences and their resulting phylogenies. We therefore concur with Brown *et al.* (2001) that, Australian species should be retained in *Callistemon*, and that monophyletic groups may need to be formally recognised within *Melaleuca,* preferably with morphological characters to diagnose the main clades.

If all genera of the Melaleuceae are subsumed within *Melaleuca* then this aggregate genus would itself have no morphological characters to uniquely define it, thereby failing a major criterion used to justify the proposed synonymy. Further, the conclusion that, '… current species-poor genera may retain recognition at the subgeneric level' (Edwards *et al.* 2010), simply transfers this difficulty to a lower rank, raising the possibility of a polyphyletic subgenus *Melaleuca* that cannot be morphologically defined.

We consider that, in spite of clear difficulties in resolving these issues, current evidence is insufficient to justify the proposal to synonymise all genera of Melaleuceae, and more molecular and morphological evidence is required. Accordingly, the following new combinations are provided for Australian species of *Callistemon* currently placed in *Melaleuca*. For readers' reference we have listed phrase names recognised in the Australian Plant Name Index (APNI 2011) as synonyms. Full synonymy is available in Craven (2009).

Taxonomy

Callistemon hemistictus **(S.T.Blake ex Craven) Udovicic & R.D.Spencer, *comb. nov.***

Basionym: *Melaleuca hemisticta* S.T.Blake ex Craven, *Novon* 19: 444–445 (2009).

Callistemon lazaridis **(Craven) Udovicic & R.D.Spencer, *comb. nov.***

Basionym: *Melaleuca lazaridis* Craven, *Novon* 19: 445–446 (2009).

Callistemon megalongensis **(Craven & S.M.Douglas) Udovicic & R.D.Spencer, *comb. nov.***

Basionym: *Melaleuca megalongensis* Craven & S.M.Douglas, *Novon* 19: 446–447 (2009).

Synonym: *Callistemon* sp. Megalong Valley (Craven, Mallison & Douglas 10442) NSW Herbarium

Callistemon montis-zamiae **(Craven) Udovicic & R.D.Spencer, *comb. nov.***

Basionym: *Melaleuca montis-zamiae* Craven, *Novon* 19: 447 (2009).

Callistemon phratra **(Craven) Udovicic & R.D.Spencer, *comb. nov.***

Basionym: *Melaleuca phratra* Craven, *Novon* 19: 447–448 (2009).

Callistemon pungens **Lumley & R.D.Spencer**

Synonym: *Melaleuca williamsii* Craven

Callistemon pungens **subsp. *pungens***

Callistemon pungens **subsp. *fletcheri*** **(Craven) Udovicic & R.D.Spencer, *comb. nov.***

Basionym: *Melaleuca williamsii* subsp. *fletcheri* Craven, *Novon* 19: 451–452 (2009).

Synonym: *Callistemon pungens* subsp. Fletcheri (P.F.Lumley 1120) Australian National Herbarium

Callistemon pungens **subsp. *synoriensis*** **(Craven) Udovicic & R.D.Spencer, *comb. nov.***

Basionym: *Melaleuca williamsii* subsp. *synoriensis* Craven, *Novon* 19: 452–453 (2009).

Synonym: *Callistemon* sp. Gibraltar Range (R.Johnstone 1738) NSW Herbarium

Callistemon pyramidalis* (Craven) Udovicic & R.D.Spencer, *comb. nov.

Basionym: *Melaleuca pyramidalis* Craven, *Novon* 19: 448–449 (2009).

Callistemon quercinus* (Craven) Udovicic & R.D.Spencer, *comb. nov.

Basionym: *Melaleuca quercina* Craven, *Novon* 19: 449 (2009).

Callistemon sabrina* (Craven) Udovicic & R.D.Spencer, *comb. nov.

Basionym: *Melaleuca sabrina* Craven, *Novon* 19: 449–450 (2009).

Callistemon serpentinus* (Craven) Udovicic & R.D.Spencer, *comb. nov.

Basionym: *Melaleuca serpentina* Craven, *Novon* 19: 450–451 (2009).

***Callistemon viminalis* (Solander ex Gaertner) G.Don**

Callistemon viminalis* subsp. *viminalis

Callistemon viminalis* subsp. *rhododendron* (Craven) Udovicic & R.D.Spencer, *comb. nov.

Basionym: *Melaleuca viminalis* subsp. *rhododendron* Craven, *Novon* 19: 451 (2009).

Synonym: *Callistemon viminalis* subsp. Rhododendron (W.Stanford *s.n.* CANB 780382) Australian National Herbarium

Acknowledgements

Wayne Gebert, Neville Walsh and reviewers are thanked for constructive comments on the manuscript.

References

APC (2011). *Australian Plant Census*, IBIS database. Centre for Plant Biodiversity Research, Council of Heads of Australasian Herbaria. Accessed 23 June, 2011. [http://www.anbg.gov.au/chah/apc].

APNI (2011). *Australian Plant Name Index*, IBIS database. Centre for Plant Biodiversity Research, Canberra. Accessed 23 June, 2011. [http://www.anbg.gov.au/cgi-bin/apni].

Briggs, B.G. and Johnson, L.A.S. (1979). Evolution in the Myrtaceae-evidence from inflorescence structure. *Proceedings of the Linnean Society of New South Wales Series 2* **102**, 157–256.

Brown, G.K., Udovicic, F. and Ladiges, P.Y. (2001). Molecular phylogeny and biogeography of *Melaleuca*, *Callistemon* and related genera (Myrtaceae). *Australian Systematic Botany* **14**, 565–585.

Craven, L.A. (2006). New combinations in *Melaleuca* for Australian species of *Callistemon* (Myrtaceae). *Novon: A Journal for Botanical Nomenclature* **16**, 468–475.

Craven, L.A. (2009). *Melaleuca* (Myrtaceae) from Australia. *Novon: A Journal for Botanical Nomenclature* **19**, 444–453.

Edwards, R.D., Craven, L.A., Crisp, M.D. and Cook, L.G. (2010). *Melaleuca* revisited: cpDNA and morphological data confirm that *Melaleuca* L. (Myrtaceae) is not monophyletic. *Taxon* **59**, 744–754.

Gravolin, M. (1997). Stigmas, stamens and systematics: floral morphology of the *Beaufortia* suballiance (Myrtaceae). BSc (Hons) Thesis, School of Botany, The University of Melbourne.

Johnson, L.A.S. and Briggs, B.G. (1983). 'Myrtaceae'. In B.D. Morley and H.R. Toelken (eds), Flowering Plants in Australia, pp. 175–185. Rigby: Adelaide.

Johnson, L.A.S. and Briggs, B.G. (1984). Myrtales and Myrtaceae – A phylogenetic analysis. *Annals of the Missouri Botanical Garden* **71**, 700–756.

Ladiges, P.Y., McFadden, G.I., Middleton, N., Orlovich, D.A., Treloar, N. and Udovicic, F. (1999). Phylogeny of *Melaleuca*, *Callistemon*, and related genera of the *Beaufortia* suballiance (Myrtaceae) based on 5S and ITS-1 spacer regions of nrDNA. *Cladistics* **15**, 151–172.

O'Brien, M.M., Quinn, C.J. and Wilson, P.G. (2000). Molecular systematics of the *Leptospermum* suballiance (Myrtaceae). *Australian Journal of Botany* **48**, 621–628.

Orlovich, D.A., Drinnan, A.N. and Ladiges, P.Y. (1999). Floral development in *Melaleuca* and *Callistemon* (Myrtaceae). *Australian Systematic Botany* **11**, 689–710.

Wilson, P.G., O'Brien, M.M., Heslewood, M.M. and Quinn, C.J. (2005). Relationships within Myrtaceae *sensu lato* based on a *mat*K phylogeny. *Plant Systematics and Evolution* **251**, 3–19.