BLUMEA 51: 131–142
Published on 10 May 2006 http://dx.doi.org/10.3767/000651906X622382

ACMENA, ACMENOSPERMA, CLEISTOCALYX, PILIOCALYX AND WATERHOUSEA FORMALLY TRANSFERRED TO SYZYGIUM (MYRTACEAE)

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SUMMARY

Based on morphological and molecular data, we have concluded that *Acmena*, *Acmenosperma*, *Cleistocalyx*, *Piliocalyx* and *Waterhousea* should be combined with *Syzygium*. The five genera are formally transferred to *Syzygium* and new names provided for those of their accepted representatives for which names are as yet not available in *Syzygium*, with the exception of the New Caledonian members of *Piliocalyx* as these currently are being revised.

Key words: Myrtaceae, *Acmena*, *Acmenosperma*, *Cleistocalyx*, *Piliocalyx*, *Syzygium*, *Waterhousea*, taxonomy.

INTRODUCTION

The myrtle flora of the Old World rain forests is dominated by *Syzygium* Gaertn. and its generic allies. Current estimates are that these genera, *Acmena* DC., *Acmenosperma* Kausel, *Cleistocalyx* Blume, *Piliocalyx* Brongn. & Gris, *Syzygium* Gaertn. and *Waterhousea* B. Hyland, together contain in the order of 1200 species. In habit, they range from canopy-emergent trees to canopy trees, understorey trees, treelets and shrubs, and occur from littoral communities at sea level through swamp forests, lowland and montane forests to subalpine shrubberies. They have high ecosystem significance as their (often massed) nectariferous flowers and (usually) fleshy fruit are food sources for a wide range of animals, from small insects through to cassowaries and primates. Several species, e.g. *S. aqueum* (Burm.f.) Alston, *S. cumini* (L.) Skeels and *S. malaccense* (L.) Merr. & L.M. Perry are widely cultivated, especially in the Malesian region, for their edible fruit, and one species, *S. aromaticum* (L.) Merr. & L.M. Perry, is extensively cultivated for its flower buds that are dried and used as the spice, clove. In some areas, especially New Guinea, species of the group can form a significant proportion of the logs extracted during forestry operations although the timber is not highly valued for cabinet or veneer work and is utilised for general purpose construction and as a filler in laminated boards.

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The basis for floristic work on the *Syzygium* generic group within the Indo-Pacific region during the past 50 years has been the taxonomic studies by E.D. Merrill and/or L.M. Perry (references given in Schmid, 1972a, and in Craven, 2001). The generic concepts of Merrill & Perry were adopted by the majority of taxonomists with the notable exceptions of Henderson (1949), Kochummen (1978) and some others who continued to treat all species within *Eugenia* L. as that genus had been circumscribed by Bentham & Hooker (1865). Merrill & Perry's concepts largely are congruent with those of Niedenzu (1893) and Diels (1922) in that the Old World species of the *Syzygium* alliance generically were separate from the *Eugenia* generic alliance. Schmid's research into generic delimitation of the *Eugenia–Syzygium* complex indicated that, while *Eugenia* and the *Syzygium* group were well distinct, there was little support for maintenance of the several generic segregates from *Syzygium* (Schmid, 1972a, b). The diagnostic features of *Acmena*, *Acmenosperma*, *Cleistocalyx*, *Piliocalyx*, *Syzygium* and *Waterhousea* are given in tabular form in Craven (2001: Table 1).

The very large number of species of the *Syzygium* generic complex, coupled with a geographic range from Africa eastwards to the Hawaiian Islands and from India-southern China southwards to southern Australia-New Zealand, makes monography decidedly difficult. It is not surprising that species level systematic work has been restricted to floristic/revisionary accounts or checklists for local regions, e.g. Merrill & Perry (1939) for Borneo, Merrill (1951) for the Philippines, Henderson (1949) for Malaya, Hartley & Craven (1977) and Hartley & Perry (1973) for Papuasia, Ashton (1981) and Kostermans (1981) for Sri Lanka, Hyland (1983) and Craven & Matarczyk (in press) for Australia, Smith (1985) for Fiji, Chantaranothai & Parnell (1993, 1994) for Thailand, Turner (1997a, b) for Malaya, and Dawson (1999) for New Caledonia. Unfortunately, the generic circumscriptions adopted by these authors often lack consistency. For example, Merrill & Perry (1937, 1938, 1939) and Merrill (1951) recognised *Acmena*, *Cleistocalyx* and *Syzygium*, whereas Henderson (1949) combined all under *Eugenia*; Hyland (1983) recognised *Acmena*, *Acmenosperma*, *Syzygium* (incl. *Cleistocalyx*) and the Australian endemic *Waterhousea*, whereas Chantaranothai & Parnell (1993, 1994) recognised *Acmena*, *Cleistocalyx* and *Syzygium* (incl. *Acmenosperma*). Turner (1997a) preferred to recognise *Syzygium* only (incl. *Acmena*, *Acmenosperma*, *Cleistocalyx*) although, in a checklist for Malaya (Turner, 1997b), he recognised the genera then accepted by the Kew Herbarium for the syzygioid species of Malaya, i.e., *Acmena*, *Cleistocalyx*, *Stereocaryum* Burret, *Syzygium*. Smith (1985) treated the Fijian species of the group under *Cleistocalyx*, *Piliocalyx* and *Syzygium*. The situation is unsatisfactory as there would seem to be as much justification for recognition of *Cleistocalyx* as there is for *Acmenosperma*; yet Hyland (1983) did not accept the former while accepting the latter and Chantaranothai & Parnell (1993, 1994) did the opposite. After studying the morphological variation evident in syzygioid species in the Papuasian–Australian–New Caledonian region, Craven (1998, 2001, 2003) considered that only a single large genus, i.e. *Syzygium*, should be recognised.

The species of the various syzygioid genera, especially within a local region, are generally clear and easy to distinguish. It is higher in the classification that problems arise as attempts are made to inter-relate the species groups and/or to classify them on the basis of features such as presence/absence of a calyptra, stamen number, anther sac orientation, and the presence of intercotyledonary tissue in the seed. Systematists

have increasingly been taking advantage of the opportunities provided by analysis of molecular sequence data to gain fresh perspectives on the phylogenetic relationships between the groups of species of their particular interest and the evolution and distribution of morphological traits. Phylogenies inferred from molecular sequence data have now been obtained for comprehensive samplings of the *Syzygium* group of genera (Harrington & Gadek, 2004, ITS and ETS regions of nuclear ribosomal DNA; Biffin et al., in press a, in press b, *matK*, *ndhF* and *rpl16* regions of chloroplast DNA). These provide support for the view that the conventionally accepted genera of the *Syzygium* group are not robust and that homoplasy exists in conventional characters. In particular, the occurrence of calyptra, the sole defining character for *Cleistocalyx*, is widely distributed across the *Syzygium* group (Fig. 1). That *Cleistocalyx* is not a monophyletic group is supported also by numerical and phylogenetic analysis of morphological data. Parnell (1999) analysed morphological data obtained from Thai species of *Acmena*, *Cleistocalyx* and *Syzygium*. Even with such a geographically restricted sampling of species, *Cleistocalyx* was not demonstrated by phylogenetic analysis to be monophyletic and in the numerical analysis its species did not form a cohesive grouping separate from the *Syzygium* species.

The distribution of other characters used in the definition of genera similarly are not reflective of monophyly in higher level species groupings (Biffin et al., in press b). Developmental studies indicate that the intercotyledonary tissues, that are such a distinctive feature in the seeds of *Acmena*, *Piliocalyx* and *Waterhousea*, may be homologous with tissues that surround the cotyledons in many *Syzygium* species and the situation with respect to the condition in *Acmenosperma* is also being investigated (Biffin, unpublished data). The distribution of intercotyledonary tissues is indicated in Fig. 1.

Our conclusions are that *Acmena*, *Acmenosperma*, *Piliocalyx* and *Waterhousea* are better included in *Syzygium* than being maintained as distinct genera. Even if *Acmena* and *Piliocalyx* were to be merged, the resultant grouping is still nested within *Syzygium*. That monophyletic groupings equating to the generic concepts of *Piliocalyx* and *Waterhousea* occur at a low topological level in a cladogram is not in itself an argument for the continued taxonomic recognition of these groups at the rank of genus. There are other equally strongly supported monophyletic groupings that similarly could be argued as warranting generic recognition, e.g. the three Fijian *Cleistocalyx* species (*C. decussatus* A.C. Sm., *C. longiflorus* (A.C. Sm.) Merr. & L.M. Perry and *C. ellipticus* (A.C. Sm.) Merr. & L.M. Perry) and the tri-merous New Caledonian *Syzygium* species (*S. auriculatum* Brongn. & Gris, *S. lateriflorum* Brongn. & Gris and *S. tenuiflorum* Brongn. & Gris). The morphological markers available to characterise these monophyletic groups are few in number and may not hold up across the whole complex, in which case unambiguous taxonomic circumscription would not be possible. Should classification proceed in this direction, the end result would be the establishment of a very large number of finely delimited genera and a residue of species that would be difficult to fit into any of the microgenera. Two botanical dicta are worth mentioning in this context: 1) genera are evolutionary units and consequently exhibit variation, i.e. the concept of *patio ludens* applies; and 2) the ability to distinguish associations of species does not lead to an automatic conclusion that they should be given taxonomic recognition.

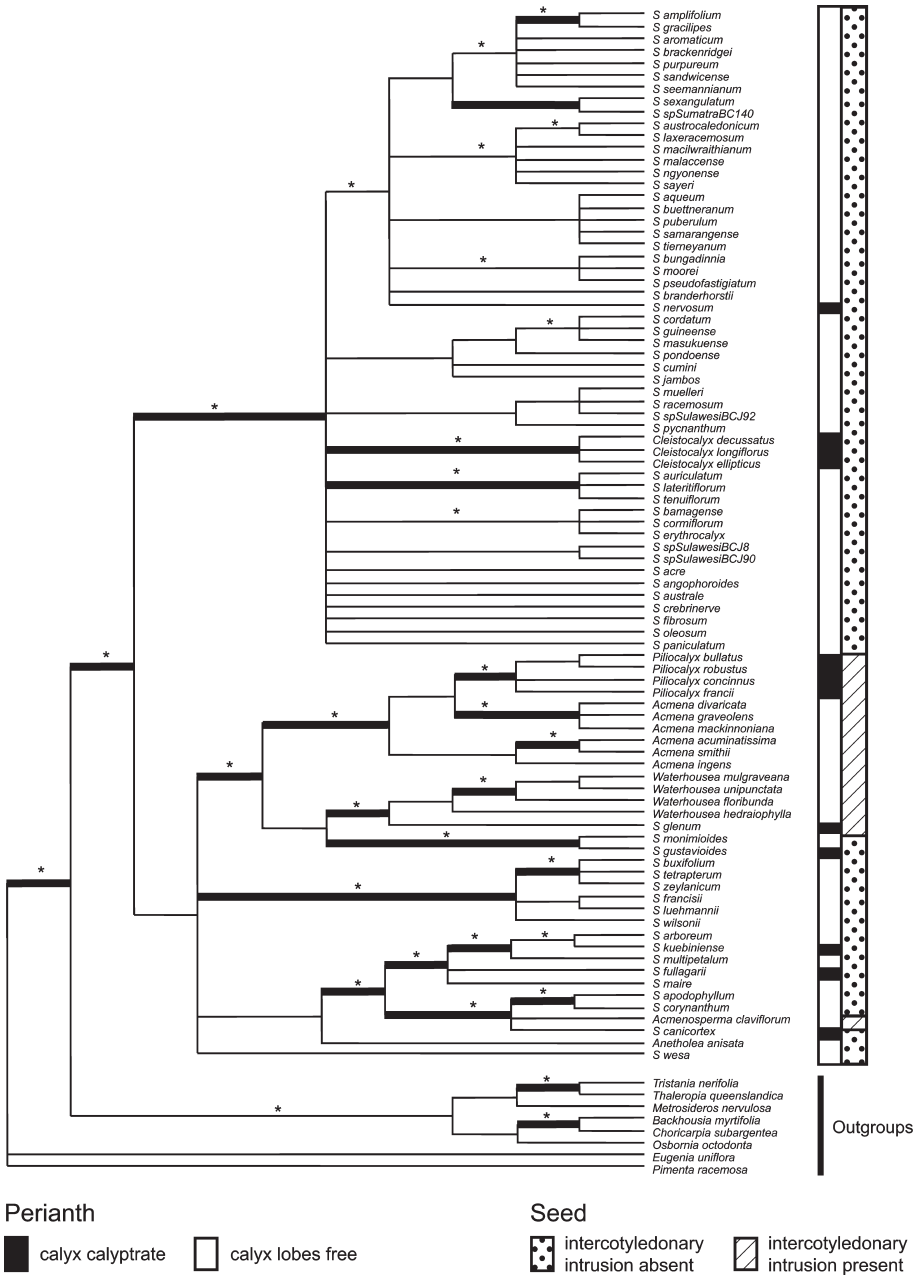

Fig. 1. Distribution of morphological features in the *Syzygium* group. The cladogram is a strict consensus tree of 1000 most parsimonious trees found in analysis of a combined chloroplast data set (*matK*, *ndhF* and *rpl16*). Bold branches represent those receiving 90% or greater bootstrap support, and asterisks indicate branches with Bayesian posterior probability of 95% or greater. Based on Biffin et al. (in press b).

Valid names already exist in *Syzygium* for several species of the genera concerned, i.e. in some species of *Acmena*, *Acmenosperma*, *Cleistocalyx* and *Waterhousea*, and names are provided below for most of those species not yet transferred. The exceptions are the New Caledonian species of *Piliocalyx*. J.W. Dawson, Wellington, presently is revising the New Caledonian representatives of *Piliocalyx* for 'Flore de la Nouvelle-Calédonie' (Dawson, pers. comm.) and it would be premature to make new combinations before the species level taxonomy is settled. *Syzygium*, even without the addition of the relatively small number of species involved in the present recircumscription, is extremely speciose and devising an infrageneric classification will be a priority once current studies into embryology and fruit development are concluded.

Unless indicated by '!', the specimens cited below have not been seen.

SYZYGIUM

Syzygium Gaertn. (1788) 166, nom. cons. — Type: *Syzygium caryophyllaeum* Gaertn. (typ. cons.).

Acmena DC. (1828) 262. — Type: *Acmena smithii* (Poir.) Merr. & L.M. Perry (*Eugenia elliptica* Sm., nom. illeg., non Lam. (1789) 206).

Acmenosperma Kausel (1957) 609. — Type: *Acmenosperma claviflorum* (Roxb.) Kausel (*Eugenia claviflora* Roxb.).

Cleistocalyx Blume (1850) 84. — Type (fide Merrill & Perry (1937) 333): *Cleistocalyx nitidus* Blume (*Syzygium cleistocalyx* (Merr.) P.S. Ashton).

Piliocalyx Brongn. & Gris (1865) 185, nom. cons. — Type (fide Mansfeld (1935) 449): *Piliocalyx robustus* Brongn. & Gris.

Waterhousea B. Hyland (1983) 138. — Type: *Waterhousea floribunda* (F. Muell.) B. Hyland (*Syzygium floribundum* F. Muell.).

1. Syzygium arcuatinervium (Merr.) Craven & Biffin, *comb. nov.*

Basionym: *Eugenia arcuatinervia* Merr. (1906) 104. — *Cleistocalyx arcuatinervius* (Merr.) Merr. & L.M. Perry (1937) 333. — Type: *Meyer 2598* (holo PNH†), Philippines, Luzon, Manila Bay area, Lamao Forest Reserve, forests at c. 600 m.

Note — A leaf rubbing made by Merrill of *Meyer 2598*, presumably from the holotype, is at A (Emily Wood, pers. comm.; xerox seen). The rubbing is accompanied by a leaf of *Cuming 1275* which, along with *Cuming 1325* and *Cuming 1710*, represents the same species (fide Merrill, in herb. sched. at A). An isotype of *Meyer 2598* is not at K and a search needs to be made in other herbaria in the effort to locate duplicate material. Failing the existence of such material, it would be possible to lectotypify the name *Eugenia arcuatinervia* Merr. with the leaf rubbing at A (on the basis that this constitutes part of the original materials used by the author), and designate another gathering as the iconotype. For the latter purpose, *Cuming 1275*, *1325* and *1710* may be worthy of consideration given that Merrill identified them as representing the species in question.

2. Syzygium baeuerlenii (F. Muell.) Craven & Biffin, *comb. nov.*

Basionym: *Eugenia baeuerlenii* F. Muell. (1886) 199. — *Cleistocalyx baeuerlenii* (F. Muell.) Merr. & L.M. Perry (1937) 331. — Type (fide Merrill & Perry (1937) 332): *Baeuerlen s.n.* (holo MEL), New Guinea, Papua New Guinea, Western Division, Strickland River.

3. Syzygium calyptrocalyx P.S. Ashton, *nom. nov.*

Replaced synonym: *Cleistocalyx leucocladus* Merr. & L.M. Perry (1937) 336, t. 215, f. 39, 40. — Type: *Haviland & Hose 3382 A, E, L, M* (holo GH; iso BO, K, L), Borneo, Sarawak, near Kuching.

Note — A new epithet is required as *leucocladum* is pre-empted in *Syzygium* by *S. leucocladum* Merr. & L.M. Perry. The replacement epithet is derived from the Greek *kalyptos*, covered and *kalyx*, calyx in reference to the floral calyptra.

4. Syzygium circumscissum (Gagnep.) Craven & Biffin, *comb. nov.*

Basionym: *Eugenia circumscissa* Gagnep. (1918) 321. — *Cleistocalyx circumcissa* (Gagnep.) P.H. Hô (1992) 63. — Type: *Pierre 6279* (holo P), Cochinchina, Bien-hoa Province, Chiao-xhan Mountains.

Note — The combination *Cleistocalyx circumcissa* apparently is invalid as Hô (1992) cites the reference Gagnepain, Flore Générale de l'Indochine 2 (1920–1921) 841 but not the protologue. In Article 33.3 of the ICBN (Greuter et al., 2000), for a new combination to be validly published it is stated that to the basionym or replaced synonym there must be a "full and direct reference given to its author and place of valid publication".

5. Syzygium cleistocalyx (Merr.) P.S. Ashton, *comb. nov.*

Basionym: *Jambosa nitida* Korth. (1847) 202. — *Cleistocalyx nitidus* Blume (1850) 84, f. 56. — *Eugenia cleistocalyx* Merr. (1918) 98. — Type: *Korthals s.n.* (holo L), Borneo, Kalimantan, Banjarmasin, Mount Bahay.

Note — The epithet *cleistocalyx* must be used as *nitidum* is pre-empted in *Syzygium* by *S. nitidum* Brongn. & Gris.

6. Syzygium concinnum (A.C. Sm.) Craven & Biffin, *comb. nov.*

Basionym: *Piliocalyx concinnus* A.C. Sm. (1971) 496. — Type: *Smith 6155* (holo A; iso BISH, K!, US), Fiji, Viti Levu, Mba Province, hills between Nandala and Nukunuku Creeks, along trail from Nandarivatau towards Lewa.

Note — The name *Syzygium concinnum* Wall. (Wallich & Bentham, 1831) is a *nomen nudum* and the entity concerned, based on 'Wallich's Catalogue 3582', may be referable to *S. syzygioides* (Miq.) Merr. & L.M. Perry rather than to *S. cymosum* (Lam.) DC. as was done by De Candolle (1828).

7. Syzygium conspersipunctatum (Merr. & L.M. Perry) Craven & Biffin, *comb. nov.*

Basionym: *Cleistocalyx conspersipunctatus* Merr. & L.M. Perry (1937) 335, t. 215, f. 34–36. — Type: *How 73332* (holo A), China, Hainan, Po-ting.

8. Syzygium dispansum (Ridl.) Craven & Biffin, *comb. nov.*

Basionym: *Eugenia dispansa* Ridl. (1916) 47. — *Acmena dispansa* (Ridl.) Merr. & L.M. Perry (1938) 18. — Type: *Kloss (Wollaston Expedition) s.n.* (holo BM!), New Guinea, Irian Jaya (Papua), southern slopes of Nassau Range, near Tsingarong River, Camp VIa and Camp VIc, 1912–1913.

9. Syzygium divaricatum (Merr. & L.M. Perry) Craven & Biffin, *comb. nov.*

Basionym: *Acmena divaricata* Merr. & L.M. Perry (1938) 17. — Type: *Kajewski 1479* (holo A; iso BRI, MEL!, NSW!, NY), Australia, Queensland, Daintree River.

10. Syzygium fluvicola (Hartley & Craven) Craven & Biffin, *comb. nov.*

Basionym: *Acmena fluvicola* Hartley & Craven (1977) 336, f. 2. — Type: *Brass 28857* (holo CANB!), New Guinea, Papua New Guinea, Milne Bay Province, Dawa Dawa River, along floodbank, 10 m.

11. Syzygium graveolens (F.M. Bailey) Craven & Biffin, *comb. nov.*

Basionym: *Cryptocarya graveolens* F.M. Bailey (1891) 16. — *Acmena graveolens* (F.M. Bailey) L.S. Sm. (1956) 34. — Type (fide Hyland (1983) 11): *Bailey s.n.* (lecto BRI; isolecto MEL!), Queensland, Tringilburra Creek.

12. Syzygium hedraiophyllum (F. Muell.) Craven & Biffin, *comb. nov.*

Basionym: *Eugenia hedraiophylla* F. Muell. (1892) 198. — *Waterhousea hedraiophylla* (F. Muell.) B. Hyland (1983) 141. — Type (fide Hyland (1983) 141): *Sayer s.n.* (lecto MEL!; isolecto MEL!), Queensland, Mossman River.

13. Syzygium hemilamprum (F. Muell. ex F.M. Bailey) Craven & Biffin, *comb. nov.*

Basionym: *Eugenia hemilampra* F. Muell. ex F.M. Bailey (1886) 23. — *Acmena hemilampra* (F. Muell. ex F.M. Bailey) Merr. & L.M. Perry (1938) 15. — Type (fide Hyland (1983) 12): *Dallachy s.n.* (lecto MEL!), Queensland, Saltwater Creek.

14. Syzygium hemilamprum (F. Muell. ex F.M. Bailey) Craven & Biffin subsp. **orophilum** (B. Hyland) Craven & Biffin, *comb. nov.*

Basionym: *Acmena hemilampra* (F. Muell. ex F.M. Bailey) Merr. & L.M. Perry subsp. *orophila* B. Hyland (1983) 13, f. 5. — Type: *Hyland 3146* (holo QRS; iso CANB!, MEL!, NSW!), Queensland, State Forest Reserve, 143 North Mary Logging Area.

15. Syzygium ingens (F. Muell. ex C. Moore) Craven & Biffin, *comb. nov.*

Basionym: *Nelitris ingens* F. Muell. ex C. Moore (1861) 48. — *Acmena ingens* (F. Muell. ex C. Moore) Guymer & B. Hyland (1988) 437. — Type: *C. Moore 19* (holo MEL!; iso K), New South Wales, Richmond River.

16. Syzygium khaoyaiense (Chantar. & J. Parn.) Craven & Biffin, *comb. nov.*

Basionym: *Cleistocalyx khaoyaiensis* Chantar. & J. Parn. (1993) 590. — Type: *Larsen 10316* (holo C), Thailand, Prachinburi, Khao Yai, Hao Sai Falls.

17. Syzygium lenbrassii Craven & Biffin, *nom. nov.*

Replaced synonym: *Acmena brassii* Craven (1990) 727, f. 1. — Type: *Brass 30452* (CANB!), New Guinea, Papua New Guinea, Eastern Highlands region, Mt Wilhelm, east slopes, 2770 m.

Note — The replacement epithet has been arbitrarily formed from the familiar and family names of the collector, Len Brass (Leonard J. Brass, 1900–1971), as the epithet *brassii* is pre-empted in *Syzygium* by *S. brassii* Merr. & L.M. Perry.

18. Syzygium mackinnonianum (B. Hyland) Craven & Biffin, *comb. nov.*

Basionym: *Acmena mackinnoniana* B. Hyland (1983) 14, f. 5. — Type: *Hyland 3307 RFK* (holo QRS; iso CANB!, NSW!), Queensland, Timber Reserve 14.

19. Syzygium melanostictum (Miq.) Craven & Biffin, *comb. nov.*

Basionym: *Jambosa melanosticta* Miq. (1855) 432. — *Eugenia melanosticta* (Miq.) Koord. & Valeton (1900) 159. — *Acmena melanosticta* (Miq.) Merr. & L.M. Perry (1938) 12. — Type: *Junghuhn s.n.* (syn. A fragm., U), Java, Pengalengan Plateau.

20. Syzygium mulgraveanum (B. Hyland) Craven & Biffin, *comb. nov.*

Basionym: *Waterhousea mulgraveana* B. Hyland (1983) 143, f. 47. — Type: *Dockrill 1295* (holo QRS; iso CANB!, MEL!, NSW!), Queensland, State Forest Reserve 675, East Mulgrave Logging Area.

21. Syzygium nervosum DC. var. **paniala** (Roxb.) Craven & Biffin, *comb. nov.*

Basionym: *Eugenia paniala* Roxb. (1832) 489. — *Eugenia operculata* Roxb. var. *paniala* (Roxb.) Duthie (1879) 498. — *Cleistocalyx operculatus* (Roxb.) Merr. & L.M. Perry var. *paniala* (Roxb.) Chantar. & J. Parn. (1993) 591. — *Cleistocalyx nervosum* (DC.) Kosterm. var. *paniala* (Roxb.) J. Parn. & Chantar. (1996) 201. — *Cleistocalyx cerasoides* (Roxb.) I.M. Turner var. *paniala* (Roxb.) I.M. Turner, in Turner & Gandhi (2005) 26. — Type: *Ic. Roxburgh no. 2255* (K).

22. Syzygium nigrans (Gagnep.) Craven & Biffin, *comb. nov.*

Basionym: *Eugenia nigrans* Gagnep. (1918) 329. — *Cleistocalyx nigrans* (Gagnep.) Merr. & L.M. Perry (1937) 336. — Type (fide Merrill & Perry (1937) 337): *Pierre 1934* (holo P; iso A fragm.), Indo-China, Caï-cong, Ongien.

23. Syzygium phengklaii (Chantar. & J. Parn.) Craven & Biffin, *comb. nov.*

Basionym: *Cleistocalyx phengklaii* Chantar. & J. Parn. (1993) 591. — Type: *Phengklai 4020* (holo PSU; iso A), Thailand, Ratchaburi, Suan Phueng District.

24. Syzygium piluliferum Craven & Biffin, *nom. nov.*

Replaced synonym: *Acmena caudata* Merr. & L.M. Perry (1938) 11. — Type: *Endert 3922* (holo BO), Borneo, Kalimantan, Western Koetai, near Kemoel.

Note — A new epithet is required as *caudatum* is pre-empted in *Syzygium* by *S. caudatum* (Merr.) Airy Shaw. The replacement epithet is derived from the diminutive of the Latin *pilus*, hair, in reference to the puberulous branchlets and inflorescence that were noted by Merrill & Perry (1938) to be diagnostic.

25. Syzygium pringlei (B. Hyland) Craven & Biffin, *comb. nov.*

Basionym: *Acmenosperma pringlei* B. Hyland (1983) 26, f. 9. — Type: *Hyland 3245 RFK* (holo QRS; iso CANB!, MEL!, NSW!), Queensland, Melville Range, Bathurst Bay.

26. Syzygium pseudocalcicola Craven & Biffin, *nom. nov.*

Replaced synonym: *Eugenia paucipunctata* Merr. (1915) 215, nom. illeg., non Koord. & Valeton (1899) 8. — *Cleistocalyx paucipunctatus* Merr. & L.M. Perry (1937) 336, t. 215, f. 22, 23. — Type (neotype designated here): *Merrill (Philip. Pl. 1709)* (neo GH; iso L), Philippines, Luzon, Benguet Subprovince, near Baguio.

Notes — 1. A new epithet is required as *paucipunctatum* is pre-empted in *Syzygium* by *S. paucipunctatum* (Koord. & Valeton) Merr. & L.M. Perry. The replacement epithet is derived from the Greek *pseudes*, false, and the epithet *calcicola*. Merrill & Perry (1937) considered this species resembled *S. calcicola* (Merr.) Merr. in habit.

2. The holotype in PNH was lost with the destruction of the Philippines National Herbarium during World War II. An image of the isotype specimen deposited in GH has been seen and, as the material is adequate and quite ample, the GH specimen is designated above as the neotype.

27. Syzygium resa (B. Hyland) Craven & Biffin, *comb. nov.*

Basionym: *Acmena resa* B. Hyland (1983) 16, f. 6. — Type: *Hyland 5760* (holo QRS; iso CANB!, MEL!, NSW!), Queensland, near National Park Reserve 353, Mt Hypipamee.

28. Syzygium retinervium (Merr. & L.M. Perry) Craven & Biffin, *comb. nov.*

Basionym: *Cleistocalyx retinervius* Merr. & L.M. Perry (1937) 334, t. 215, f. 12–15. — Type: *Clemens 3777* (holo A; iso NY, US), Indo-China, Annam, Tourane and vicinity.

29. Syzygium sorongense (Hartley & Craven) Craven & Biffin, *comb. nov.*

Basionym: *Acmena sorongensis* Hartley & Craven (1977) 339. — Type: *Van Royen 3195* (CANB!), New Guinea, Irian Jaya (Papua), Vogelkop Peninsula, Klabala River, SE of Sorong.

30. Syzygium unipunctatum (B. Hyland) Craven & Biffin, *comb. nov.*

Basionym: *Waterhousea unipunctata* B. Hyland (1983) 145, f. 48. — Type: *Moriarty 1945* (holo QRS; iso CANB!, MEL!, NSW!), Queensland, State Forest Reserve 143, Little Mossman Logging Area.

31. Syzygium zhenghei Craven & Biffin, *nom. nov.*

Replaced synonym: *Acmena montana* Hartley & Craven (1977) 338. — Type: *Streimann & Stevens LAE 53863* (holo CANB!), New Guinea, Papua New Guinea, Morobe Province, vicinity of Aseki.

Note — A new epithet is required as *montanum* is pre-empted in *Syzygium* by *S. montanum* Thwaites. The arbitrarily formed replacement epithet commemorates

Zheng He (Cheng Ho, 1371–1435), the senior admiral of the Chinese emperor Zhu Di (1360–1424). Zheng He directed the major fleets of exploration and trade that investigated the world between 1421 and c. 1423. These inspirational voyages have been documented by Menzies (2003) as far as evidence permits.

ACKNOWLEDGEMENTS

The environment agencies of Provinces Nord and Sud, New Caledonia, are thanked by LAC and EB for the opportunity to observe and collect Myrtaceae for our research, as are Drs Tanguy Jaffré and Jérôme Munzinger, IRD, for facilitating our use of facilities at the Nouméa Herbarium. John Dawson, Wellington, and John Parnell, Dublin, are thanked by LAC for their discussions on the morphology and taxonomy of the group; John Dawson additionally has assisted with the provision of materials. Emily Wood and Henry Kesner, Harvard University Herbaria, provided information on, and images of, some specimens deposited at A and GH. Marlien van der Merwe gave useful comments on the paper. Ed Biffin holds an ABRS Postgraduate Scholarship from the Australian Biological Resources Study, and a Scholarship from the Australian National University; this support is gratefully acknowledged.

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