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## Review of nomenclature for Actinidiaceae in Australia

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### Abstract

A lectotype is chosen for Australia's only native species of Actinidiaceae, *Dillenia andreana* F.Muell. A case is made for *Saurauia andreana* (F.Muell.) Oliv. ex F.Muell. to be treated as a new combination based on *Dillenia andreana* rather than as the name of a new taxon. Notes are provided on the classification of Yang-tao (Chinese Gooseberry or Kiwifruit), *Actinidia chinensis* var. *deliciosa* (A.Chev.) A.Chev., a taxon occasionally naturalised in Australia, for use on the online *Flora of Australia*.

### Introduction

A single species of native Actinidiaceae is recognised in Australia, in the genus *Saurauia* Willd. There are around 300 species of *Saurauia*, and about 50 of these are found in New Guinea, a centre of diversity for the genus (Briggs 2011) which extends to Asia and South and Central America. The Australian species, *Saurauia andreana* (F.Muell.) Oliv. ex F.Muell., is described and illustrated by Mueller (1865: 175); Bailey (1886: 7); Bailey (1899: 106, pl. V); Bailey (1913: 46, fig. 42); Cooper and Cooper (1994, pl.; 2004, pl.); Zich *et al.* (2020; figs) and Barrett (2021). There is confusion around the correct attribution of authorship of the current name for this species (see summary of early publications below) which continues today. Two names are most commonly cited in published literature and treated as if they are based on separate types, as *Dillenia andreana* F.Muell. and *Saurauia andreana* Oliv. ex F.Muell.

Ferdinand Mueller (1865: 175) first described the taxon as *Dillenia andreana* F.Muell. (Dilleniaceae) based on a collection by John Dallachy in 1860 from the Mackay River in north Queensland, with specimens sent to MEL and some of these subsequently distributed from there. Mueller indicated in the protologue that he was naming the species in honour of Édouard-François André (1840–1911), a French horticulturist and landscape architect, and sent at least one specimen to André (now held in P).

In 1884 a request was sent to Mueller for specimens of taxa he had described that were not yet present in the herbarium collections at K. William T. Thiselton-Dyer, the then-Assistant Director, indicated that a species list (now missing) had been sent to Mueller on 5 April 1884 (Kew Correspondence, Mueller 1882–1890, folio 76). The K sheet of *Dillenia andreana* was received there in July 1884 as part of a batch of specimens sent by Mueller in response. This specimen, K 000761751 (<http://specimens.kew.org/herbarium/K000761751>),

appears to be the basis for Daniel Oliver (K) recognising that the taxon belonged in *Saurauia*, with the form of the handwriting in pencil ‘Saurauja aff. *S. altissima*’ matching other annotations (presumably by Oliver, but possibly by another member of staff) on specimens at K from around this time. Someone else has added an annotation ‘Saurauja *andreana* (F. v. Muell.) Oliv.’ In October 1884 Oliver, in a memorandum ‘For F. v. Mueller’, wrote: “Amongst the specimens recd. [latterly] is *Dillenia Andreana*, F.v.M. (Fragm. Fl Austr. V. 175). This is no doubt a *Saurauja* & the first representative of Ternstroemiaceae noted in Australia — so far as I know.” (Kew Correspondence, Mueller 1882–1890, folio 113). Oliver’s re-determination was presumably communicated to Mueller, who used the new genus name in a letter to J.D.Hooker (which from internal evidence was probably written on 15 December 1884) and indicated that the taxon was only known to him from one collection: “Since I had the Sauravia first, I never got any more of it, so it never came before me again...” (Kew Correspondence, Mueller 1882–1890, folio 126).

Mueller included the designation ‘*Sarauia Andreana* Oliver (inedited)’ in the second supplement to his *Systematic Census of Australian Plants* (1885: 3). While this is the first published reference in which the designation appears, it is not a validly published name, lacking a description or diagnosis or any reference to an earlier description or diagnosis.

*Saurauia andreana* ‘Oliv. ex F.Muell.’ was validly published the following year in Bailey (1886: 7; placed in Ternstroemiaceae). The name is attributed to ‘Oliver (inedited)’ The description in Bailey (1886) is essentially an English translation of Mueller’s original Latin protologue for *Dillenia andreana* (Mueller 1865: 175), and there is a note immediately following that states that it was ‘Kindly furnished by Baron Mueller for this work.’ However, there is no explicit reference to any previous publications.

There appear to be two erroneous statements in Bailey’s (1886) work. Firstly, it states ‘Hab. : Near the border of New South Wales.’ but the species is restricted in distribution to north Queensland, between Cardwell and Cape Tribulation. Historically New South Wales included Queensland, but Queensland was established as a separate colony in 1859 and as Colonial Botanist from 1881 Bailey would presumably have been well aware of its boundaries. Secondly, an etymology is given (as in all of Bailey’s own species descriptions in this supplement) as “After H. Andrae.” [i.e. Hans Andrae, who collected for Mueller in New South Wales near the Lachlan River and Cobar during the 1870s and 1880s]. If the species were named for him the correct orthography for the epithet would presumably be *andraeana*, but that form is not used in any known works. It is unclear exactly how much of the text was supplied by Mueller and it is possible that Bailey assumed the epithet referred to H. Andrae, given his collections in Australia and association with Mueller.

Interestingly, Mueller (1889: 14) attributes the name to ‘Dyer & Oliver in Bailey’, with direct reference to his original description of *Dillenia andreana* as ‘M.fr.V,175’, but there is no mention of [Thiselton-]Dyer in Bailey (1886), nor has any other mention been found in other publications.

Bailey (1899: 106) provides some more details, stating that the name was attributed to Oliver ‘(inedited)’ by Mueller ‘in letter’, and specifically cites *Dillenia andreana* as a synonym. The distribution is given as “Hab.: Freshwater Creek near Cairns and creeks about Bellenden Ker...” [i.e. north Queensland] and the etymology is also corrected to “After E. André”. Correspondence between Mueller and Bailey for this period has not been found so the source of these corrections is unknown. Bailey (1913: 46) later simply attributes the name to Oliver, but includes a full reference to the basionym *Dillenia andreana* F.Muell.

Domin (1928) lists ‘*Saurauja Andreana* Oliv ex F. M. Bail.’ and lists an additional name in synonymy. Domin attributes the latter name, *Synarrhena andreana*, to “F. v. MUELL. Fragn. V. 175 (1866) in syn.” [i.e. F.J.H. von Mueller, *Fragn.* 5(39): 175 (1866)]. While Mueller (1866) provisionally suggests that *Dillenia andreana* F.Muell. may represent the type of a new genus, *Synarrhena*, he does not validly publish the names at genus or species ranks.

If we accept that there is no basionym cited by Bailey (1886: 7), the conditions for publication of *Saurauia andreana* as the name of a new taxon are fulfilled, and ICN Art. 41.4 (Turland *et al.* 2018) is then relevant. In this case, one can interpret the fact that Mueller adopted the genus name supplied by Oliver and re-used his previous epithet (the only known case where he named a taxon in honour of André) as indicating a ‘presumed intention’ to provide a new combination based on *D. andreana*.

There is no specific mention of Mueller’s publication or earlier name in Bailey (1886: 7), but the similarities of the description, and its attribution to Mueller, could alternatively be considered to constitute an indirect reference to the basionym *Dillenia andreana* F.Muell. (ICN Art. 38.14 and Art. 41.3; Turland *et al.* 2018). This presents a second option that leads to the same conclusion.

If *Saurauia andreana* were treated as the name of a new taxon, the authorship would be ‘Oliv. ex F.Muell.’ and any selection of a lectotype would have to be made in the context of Bailey’s (1886) publication. It is likely

however that suitable original material does not exist, given Mueller's statement that he had received specimens of the taxon only once prior to 1885 and the cited habitat "Near the border of New South Wales". However, if either a presumed intent to make a new combination (Art 41.4), or an indirect reference is accepted here (Art. 41.3), then a lectotype is only needed for *Dillenia andreana* F.Muell., and the correct citation in *Saurauia* is *S. andreana* (F.Muell.) Oliv. ex F.Muell.

We consider there to be sufficient reasons to accept *Saurauia andreana* as a new combination, and below select a lectotype for the basionym, *Dillenia andreana*.

*Saurauia* Willd., *Der gesellschaft naturforschenden freunde zu Berlin, Neue schriften* 3: 407, t. 4 (1801), orth. cons. Type: *Saurauia excelsa* Willd.

*Saurauia andreana* (F.Muell.) Oliv. ex F.Muell. in F.M. Bailey, *A synopsis of the Queensland flora. Supplement* 1: 7 (1886), (as *Saurauja Andreana*).

Basionym: *Dillenia andreana* F.Muell., *Fragmenta phytographiae Australiae* 5(39): 175 (1865).

Type citation: 'Ad ripas fluminis Mackay-River, Dallachy.'

Type: Queensland: Banks of the Mackay River [Tully River, Rockingham Bay], 11 Aug. 1860, *J. Dallachy s.n.* (lecto (here designated): MEL 2283107; isolecto: MEL 2283108; K 000761751; P 00682291 [ex Herb. E.André], images seen for all).

*Synarrhena andreana* Domin, *Bibliotheca Botanica* 22(89): 979 (1928), *nom. inval., pro syn.*

**Typification:** Four sheets have been located that all appear to be duplicates of the original collection, though each has slightly differing label information. Two sheets in MEL represent the best material on which to base the name, and MEL 2283107 is selected as the lectotype as it has a slip with the original collection notes and a separate label with the name *Dillenia andreana* in Mueller's hand. The second sheet (MEL 2283108) has the same information duplicated in a different hand on a single label. Two other sheets (at K and P) are simply labelled 'Rockingham Bay', with no collector or date, but both have labels from Mueller's herbarium with the name *Dillenia andreana*. It is considered reasonable to assume both are duplicates and therefore isolectotypes.

## A kiwifruit by any other name

Kiwifruit is cultivated in a number of locations in Australia and is occasionally naturalised in Queensland, New South Wales and Victoria (Messina 2015). Deciding on the most appropriate taxonomic rank for the commercially popular Kiwifruit (Yang-tao or Chinese Gooseberry) has been much debated (Li *et al.* 2007a, 2007b, 2010; Huang 2014). The options are inclusion under a broad concept of *Actinidia chinensis* Planch., or recognition either as a distinct variety, *A. chinensis* var. *deliciosa* (A.Chev.) A.Chev., or as a distinct species, *A. deliciosa* (A.Chev.) C.F.Liang & A.R.Ferguson.

Reticulation as a result of hybridisation is common in the genus *Actinidia* Lindl., and it has been suggested that kiwifruit (a polyploid taxon, 6x) may be a hybrid between *A. chinensis* var. *chinensis* (2x or 4x) and another taxon whose identity was uncertain (Chat *et al.* 2004). A very detailed study by Liu *et al.* (2017) utilising whole-genome data for 40 *Actinidia* samples has shown complex patterns of reticulation in the genus, reflecting both old and recent hybridisation events. An interesting pattern emerged showing significant and widespread reticulation between *A. chinensis* var. *chinensis* and numerous related species and varieties, but relatively little reticulation involving *A. chinensis* var. *deliciosa*. Analysis of nuclear genomic data showed that these two varieties are very closely related, but the total evidence analyses suggest that *A. chinensis* var. *deliciosa* has remained relatively isolated from the remainder of the *A. chinensis* complex, and the change to 6x may be a relatively effective barrier against hybridisation relative to 4x and 2x relatives (Liu *et al.* 2017). Some reticulation in *A. chinensis* var. *deliciosa* was identified (cytonuclear conflicts), linking the genome of var. *deliciosa* to the chloroplast genomes of *A. callosa* var. *strigillosa* C.F.Liang and *A. zhejiangensis* C.F.Liang and to the mitochondrial genome of *A. arguta* var. *giraldii* (Diels) Vorosch. (Liu *et al.* 2017: see figs 1 and S13).

Given that the genetic history of *Actinidia chinensis* var. *deliciosa* is supported as distinct from var. *chinensis*, the recognition of the variety for taxonomic purposes in Australia is recommended. Currently only the species, *A. chinensis*, is listed as an accepted name by the Australian Plant Census (<https://biodiversity.org.au/nsl/services/search/taxonomy>; accessed May 2021).

*Actinidia chinensis* var. *deliciosa* (A.Chev.) A.Chev., *Revue de Botanique Appliquee et d'Agriculture Tropicale* 21: 241, t. 1 (1941). *Actinidia latifolia* var. *deliciosa* A.Chev., *Revue de Botanique Appliquee et d'Agriculture Tropicale* 20(221): 12, t. 1, 2 (1940). *Actinidia deliciosa* (A.Chev.) C.F.Liang & A.R.Ferguson, *Guihaia* 4(3): 181 (1984).

Type: published illustration: “Fructification du meme,” Planche II in Chevalier, (1940), (lectotype); China: Hubei: Wufeng, 2 Aug. 1959, R.H. Huang 1991 (epitype: HIB), both lectotype and epitype designated by Li *et al.*, *Novon* 20(1): 58 (2010).

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