

Australian type material in the Economic Botany Collection, Royal Botanic Gardens, Kew

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Introduction

The purpose of this paper is to draw attention to some type collections housed in the Economic Botany Collection at the Royal Botanic Gardens, Kew. They were lodged in the Collection well over a century ago and, perhaps because the Collection is physically separate from the Herbarium, appear to have been overlooked by taxonomists in recent decades. Kew's Museum was opened to the public on 20 September 1847 (as recorded on the title page of the first Museum Entry Book), soon after the establishment of the Gardens themselves as a public institution in 1841. By 1855 the museum was known as the Museum of Economic Botany; it was to grow to occupy four buildings at Kew, including the Orangery. In the late 1980s the Museum was renamed the Economic Botany Collection, and its specimens were rehoused in a purpose-built research store in the Sir Joseph Banks Building, just west of the Herbarium. It holds plant and fungal specimens and materials of economic importance, or potentially so, from all parts of the world, as well as many artifacts made from natural materials. Among these are some 2800 specimens sent from Australia, in particular during the second half of the 19th century. Colonists and explorers were investigating the natural resources of the country for any products that might be of some economic or material benefit. Samples of those known or thought to be of some benefit (e.g. timbers, resins, fibres) were sent to Europe, some for promotional display at international exhibitions held in cities such as London and Paris (Desmond 1995) but also directly to Kew. An especially intriguing item is a travelling desk made by a convict from Australian timbers taken back to England by Ferdinand Bauer in 1805 (George 2006).

The receipt of items was recorded in Museum Entry Books which survive intact from the opening of the Museum to the present day. Figure 1 shows page 219 from the Entry Book for the years 1855 to 1861, listing items from the North Australian Expedition (amusingly, giving Mueller's first name as 'Fred'). It includes the entries for receipt of *Adansonia* and *Casuarina*, discussed below. Sadly, some of the items sent no longer survive, e.g. samples of coal and other items sent by Surveyor-General J.S. Roe, Western Australia, received 9 November

Abstract

Fourteen collections representing type or possible type material of Australian plants, housed in the Economic Botany Collection at the Royal Botanic Gardens, Kew, are documented and illustrated. They appear to have been overlooked by taxonomists. One, *Hicksbeachia pinnatifolia* F.Muell., may be all that remains of the type material. The others are: *Adansonia gregorii* F.Muell., *Casuarina decaisneana* F.Muell., *Eucalyptus dichromophloia* F.Muell., *Eucalyptus megacarpa* F.Muell., *Eucalyptus ptychocarpa* F.Muell., *Helicia sayeriana* F.Muell., *Kentia belmoreana* C.Moore & F.Muell., *Kentia canterburyana* C.Moore & F.Muell., *Kentia mooreana* F.Muell., *Livistona alfredii* F.Muell., *Musa banksii* F.Muell., *Paederota densifolia* F.Muell., *Pandanus forsteri* C.Moore & F.Muell.

Keywords: Museum of Economic Botany, Kew; Australia; type specimens; Ferdinand Mueller

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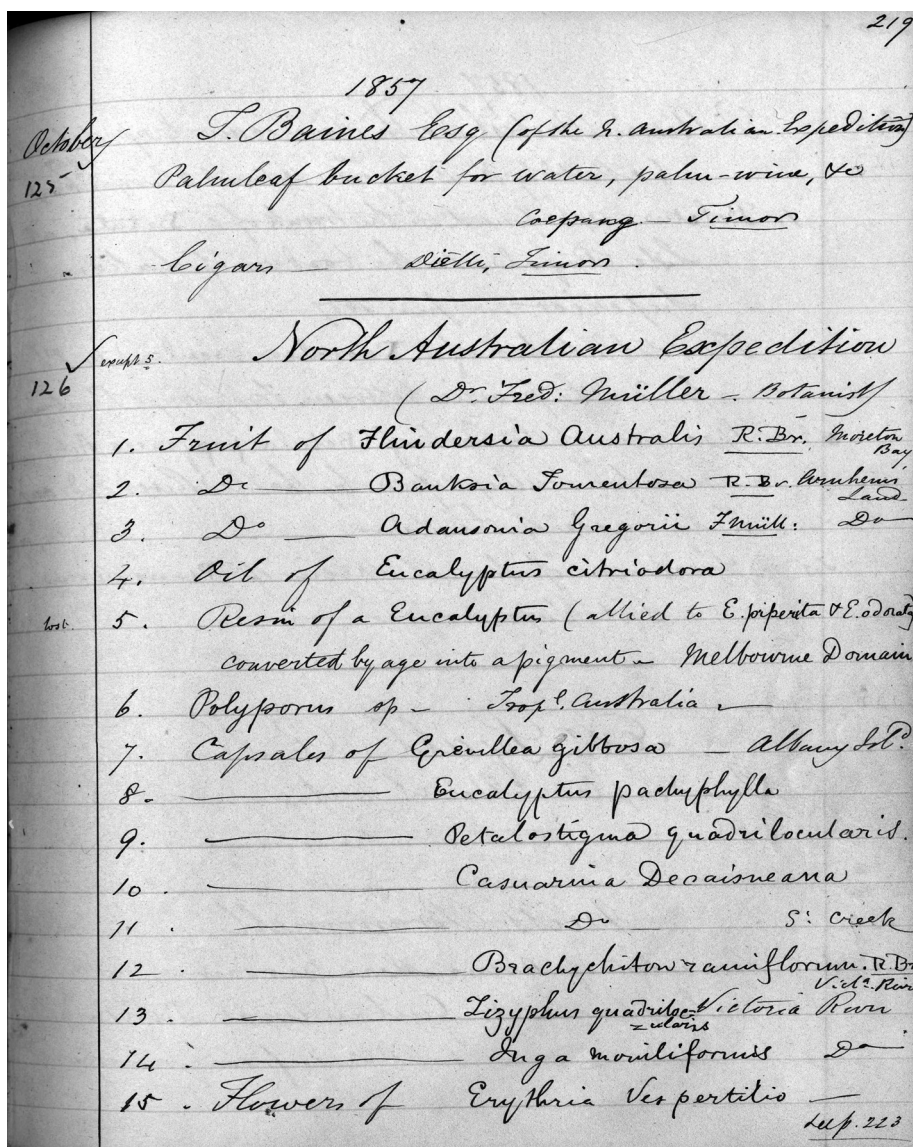


Figure 1: Page 219 of the Museum Entry Book 1855–1861. © Board of Trustees of the Royal Botanic Gardens, Kew.

1853, and 3 cones of *Araucaria bidwillii*, received from John Carne Bidwill himself on 11 January 1851.

A large number of items were sent to Kew by the Government Botanist of Victoria, Ferdinand Mueller, including specimens that he collected during the North Australian Exploring Expedition of 1855–56 led by Augustus Gregory. Mueller also received specimens from many collectors spread widely across Australia. There are references to various consignments in his correspondence, e.g. Home *et al.* (1998 p. 301).

Some items are now of mainly historical interest, e.g. samples of cotton grown presumably as a trial at Mt Narryer Station, WA., in the 1890s. During my term as Australian Botanical Liaison Officer in 2004–05, I was particularly interested to find some Australian type material housed in the Museum and recorded the collections below, all donated or associated in some way with Ferdinand Mueller and his collectors. These were items that stood out as possible types from a scan of an electronic catalogue for the Collection

which is accessible only within Kew. I did not have time to examine all the Australian material – it would take many weeks to do this. It is likely that there is more material from type collections, but some may be in the form of products such as resin, fibre etc.

My conclusion that these are or may be type material is based on the data accompanying them, i.e. botanical name, locality, date (or date of receipt at Kew), collector (or Mueller as donor), and comparison with equivalent data in the protologue.

The species are listed in alphabetical order under their originally published names. The place of publication is cited, with the type citation (from the protologue), the location of herbarium sheets of type material, and comments on the collectors. References are cited for other information on types and collectors. Data documented for each sample are the Economic Botany Collection (EBC) catalogue number, the Museum Entry Book number, name of donor, date of receipt, transcript of any extant labels, and brief description of material. A photograph of each sample is included.

1. *Adansonia gregorii* F. Muell., *Hooker's J. Bot. Kew Gard. Misc.* 9: 14 (1857) (Bombacaceae)

Type citation: 'In planitiebus orariis et ripariis ad flumina Victoria et Fitzmaurice, ad promontorium Point Pearce alibique.'

A collection in MEL (MEL 229658), made by Mueller from the Victoria River was selected as lectotype by D. Baum (1995), with possible isotypes at BM and GH.

EBC Catalogue no. 65247; Entry Book no. 126.1857. From the North Australian Exploring Expedition which, led by Augustus Gregory with Ferdinand Mueller as botanical collector, explored northern Australia in 1855–56 (Gregory & Gregory 1884). Received at Kew 1857. Two fruit, one cut transversely, the other lengthwise, both with the seed mass extant (Fig. 2). The Collection also has a wood sample from the same expedition, EBC Catalogue no. 2445.

2. *Casuarina decaisneana* F. Muell., *Fragm.* 1: 61 (1858)

basionym for *Allocasuarina decaisneana* (F.Muell.) L.Johnson, *J. Adelaide Bot. Gard.* 6: 74 (1982) (Casuarinaceae)

Type citation: 'Rara in eremo arenoso Australiae centralis; e.c. juxta Mount Mueller.'

The type was collected by Mueller on the North Australian Exploring Expedition. Mount Mueller (19°52'S, 127°46'E) was named after him by Gregory on 2 March 1856 (Gregory & Gregory 1884). Nine days later, as the party was returning up Sturt Creek, Gregory mentioned the hill again and noted that 'we passed through a patch of casuarina forest, which was remarkable, as they are the only trees of this genus we had seen on the coast since landing at the Victoria'. This implies that they had not seen them on the outward trip, and it was probably on this day when Mueller made his collection. Wilson and Johnson (1989) stated that they had not found any type material at MEL, and that an isotype at K was vegetative only.

EBC Catalogue no. 42524; Entry Book no. 126.1857. Donated by F. Mueller. Received at Kew in 1857. Three fruit, one cut lengthways. Fig. 3.

3. *Eucalyptus dichromophloia* F. Muell., *J. Proc. Linn. Soc., Bot.* 3: 89 (1859)

basionym for *Corymbia dichromophloia* (F.Muell.) K.D.Hill & L.A.S.Johnson, *Telopea* 6: 295 (1995) (Myrtaceae)

Type citation: 'In locis minus fertilibus sterilibusve Australiae intratropicae passim, Anth. Apr., Mai.'

Mueller collected this species three times while on the North Australian Exploring Expedition. Blake (1953) chose the MEL collection of October 1855 from the Fitzmaurice Ranges as lectotype; there are duplicates in K and NSW.

EBC Catalogue no. 55185; no record in Entry Book. Received at Kew in 1857. Donated by F. Mueller. A single fruit, a twig and a leaf, but the box also contains four fruits of the south-western Australian *Eucalyptus pleurocarpa* Schauer, clearly an admixture. A typed label gives 'North Australia' and a comparison with the three Mueller collections of *E. dichromophloia* is required to determine if this material can be matched with one of them. Fig. 4.

4. *Eucalyptus megacarpa* F. Muell., *Fragm.* 2: 70 (1860) (Myrtaceae)

Type citation: 'ad sinum Wilson's Inlet ... juxta flumina Franklin River et Deep River.'



Figure 2: *Adansonia gregorii* EBC65247 © Board of Trustees of the Royal Botanic Gardens, Kew.

Figure 3: *Casuarina decaisneana* EBC42524 © Board of Trustees of the Royal Botanic Gardens, Kew.

Figure 4: *Eucalyptus dichromophloia* EBC55185 © Board of Trustees of the Royal Botanic Gardens, Kew.

Figure 5: *Eucalyptus megacarpa* EBC55250 © Board of Trustees of the Royal Botanic Gardens, Kew.

Chippendale (1988) cited a collection by George Maxwell at Wilson Inlet in 1858 as the type (two syntype sheets at MEL, one at PERTH). Maxwell was a collector for Mueller (George 2009). Since there is no other collection of the species this early, the material at EBC is probably part of the same gathering. There is no matching herbarium sheet at K.

EBC Catalogue no. 55250; Entry Book no. 141.1861. Received at Kew in 1861. Donated by F. Mueller. A twig, three leaves and nine fruits. This has a label in Mueller's hand: 'for Sir Will Hooker Blue Gum Eucalyptus megacarpa ferd Mueller S.W. Australia'. This is one of several eucalypts called Blue Gum by early settlers in Western Australia. Fig. 5.

5. *Eucalyptus ptychocarpa* F. Muell., *J. Proc. Linn. Soc., Bot.* 3: 90 (1859)

basionym for *Corymbia ptychocarpa* (F. Muell.) K.D. Hill & L.A.S. Johnson, *Telopea* 6: 250 (1995) (Myrtaceae)

Type citation: 'Ad rivulos rupestres necnon secus amnes exsiccantes versus originem fluviorum Wentworth, Wickham et Limmen Bight River. Anth. Mart., April.'

The holotype collection by Mueller from the Gulf of Carpentaria was made on 22 July 1856 and is at K (Blake 1953; Chippendale 1988).

EBC Catalogue no. 55280; no record in Entry Book. Received at Kew in 1859. Donated by F. Mueller. Two large and four small fruit, one of the larger cut lengthways. This has a label in Mueller's hand: 'Eucalyptus ptychocarpa ferd Mueller Box-Stringybark tree of Gulf of Carpentaria, ferd. Mueller'. Fig. 6.



Figure 6. *Eucalyptus ptychocarpa* EBC55280

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6. *Helicia sayeriana* F. Muell., *Vict. Naturalist* 3: 93 (1886)

basionym for *Hollandaea sayeriana* (F.Muell.) L.S.Sm., *Proc. Roy. Soc. Queensland* 67: 39 (1956) (Proteaceae)

Type citation: 'On the Russell-River, W. Sayer'.

Hyland (1995) gave the locality as [Mt] Bellenden Ker and cited the holotype at MEL. The Russell River rises on the southern side of Bellenden Ker. There is an isotype at K consisting of a specimen in leaf and flower. William Sayer collected plants for Mueller in north Queensland in 1886–88 (George 2009).

EBC Catalogue no. 45009; Entry Book no. 87.1887. Donated by F. Mueller. Received at Kew in 1887. Two dehiscent fruit. A label states: '*Hollandaea Sayeri* Near entrance of the Russell River 1887'. Fig. 7.

7. *Hicksbeachia pinnatifolia* F. Muell., *S. Sci. Rec.* 3: 33 (1883) (Proteaceae)

Type citation: 'Near the Tweed; C. Fawcett, Esq.'

Weston (1995) stated that he had not found the type. H. Charles Fawcett collected for Mueller in N.S.W.

from 1875 to 1885. He was at the Tweed R. in 1883 (George 2009).

EBC Catalogue no. 45001; Entry Book no. 67.1884. Donated by F. Mueller. Received at Kew in 1884. Fourteen fruits, one cut in half. Three slips in Mueller's hand accompany this collection: 1, 'A large and two small fruit of *Hicksbeachia*, the former fit for germination Fresh April 1883' 'Nut tree Tweed March 1883 C. Fawcett'; 2, apparently only part of a note: 'as the autochthons eat this fruit *Hicksbeachia pinnatifolia* F v M 1884 Tweed'; 3, 'too dry for sowing; fit for museum'. These indicate that Mueller included fruits from more than one collection. Further, the part of the *Southern Science Record* in which the species was described was published in February 1883. It may be impossible to determine if any of the fruits are type material. Fig. 8.

8. *Kentia belmoreana* C. Moore & F. Muell., *Fragm.* 7: 99 (1870)

basionym for *Grisebachia belmoreana* (C.Moore & F.Muell.) Drude & H.Wendl., *Nachr. Königl. Ges. Wiss. Georg-Augusts-Univ.* 1875: 58 (1875); *Howea belmoreana* (C.Moore & F.Muell.) Becc., *Malesia* 1: 66 (1877) (Arecaceae)

Type citation: 'In insula Lord Howe's Island frequens, sed vix ultra altitudinem 1000' reperienda; Moore & Carron'.

The holotype is in MEL (Green 1994) and there is an isotype at BO (John Dowe, pers. comm.). Charles Moore and William Carron (with Robert D. Fitzgerald) visited Lord Howe Island in May–June 1869 (George 2009).

EBC Catalogue nos 35692, 35693; Entry Book no. 95.1876 (received as a single sample). Donated by F. Mueller. Received at Kew in 1876. No. 35693 (Fig. 9) has 10 fruit, and no. 35692 (Fig. 10) eight, as well as one cut open. No. 35692 has a label with the annotation '*Kentia Belmoreana*' in a hand that I don't recognise and, in another hand, 'Perhaps *K. Forsterianum* Lord Howe's Island'.

9. *Kentia canterburyana* C. Moore & F. Muell., *Fragm.* 7: 101 (1870)

basionym for *Veitchia canterburyana* (C.Moore & F.Muell.) H.Wendl. ex Anon., *Gard. Chron.* 32: 327 (1872); *Hedyscepe canterburyana* (C.Moore & F.Muell.) H.Wendl. & Drude, *Linnaea* 39: 204 (1875) (Arecaceae)

Type citation: 'In regionibus altioribus insulae Lord



Figure 7. *Helicia sayeriana* EBC45009 © Board of Trustees of the Royal Botanic Gardens, Kew.

Figure 8. *Hicksbeachia pinnatifolia* EBC45001 © Board of Trustees of the Royal Botanic Gardens, Kew.

Howe's Island, nempe altitudine 1000–2000'. Moore et Fitzgerald'.

The holotype is in MEL (Green 1994) and there is an isotype at BO (John Dowe, pers. comm.). Charles Moore and Robert D. Fitzgerald (with William Carron) visited Lord Howe Island in May–June 1869 (George 2009).

EBC Catalogue no. 35690; Entry Book no. 95.1876. Donated by F. Mueller. Received at Kew in 1876. Eight fruits, one cut transversely to reveal seed. A label states: 'Kentia Canterburyana Howe's Island'. Fig. 11.

10. *Kentia mooreana* F.Muell., *Fragm.* 7: 101 (1870)

basionym for *Clinostigma mooreana* (F.Muell.) F.Muell., *Fragm.* 8: 235 (1874); *Clinostigma mooreanum* (F.Muell.) H.Wendl. & Drude, *Linnaea* 39: 218 (1875); *Lepidiorrhachis mooreana* (F.Muell.) O.F.Cook, *J. Heredity* 18: 408 (1927) (Arecaceae)

Type citation: 'In cacumine montis Gower insulae Lord Howe's Island, altitudine 2500 pedum'.

The holotype is at MEL, collected by C. Moore (Green 1994). The collector was Charles Moore, who (with William Carron and Robert D. Fitzgerald) visited Lord

Howe Island in May–June 1869 and climbed Mt Gower (George 2009).

EBC Catalogue no. 35702; Entry Book no. 95.1876. Donated by F. Mueller. Received at Kew in 1876. 26 fruits, one cut open. A label states: 'Kentia Moorei Lord Howe's Island'. Fig. 12.

11. *Livistona alfredii* F.Muell., *Victorian Nat.* 9: 112 (1892) (Arecaceae)

EBC Catalogue no. 35756; Entry Book no. 121.1888. Donated by F. Mueller. Received at Kew in 1888. Three fruit and one seed. This has a blue 'Phytologic Museum of Melbourne' label but not in Mueller's hand: 'Livistona Mariae F. v. M. West Australia'. Fig. 13.

This collection is labelled as *Livistona mariae* but it appears to be *Livistona alfredii*. The fruits are 22–24 mm diam., approaching the size given by Rodd for *L. alfredii*, 25–35(–c. 40) mm, whereas those of *L. mariae* are 13–17 mm diam. (Rodd 1998). *Livistona mariae*, described by F. Mueller, *Fragm.* 8: 283 (1874), is endemic in a single gorge in the Northern Territory, where it was discovered by Ernest Giles in 1872. The year of receipt of this collection at Kew, the location 'West Australia' and the



Figure 9: *Kentia belmoreana* EBC335693 © Board of Trustees of the Royal Botanic Gardens, Kew.

Figure 10: *Kentia belmoreana* EBC35692 © Board of Trustees of the Royal Botanic Gardens, Kew.

present determination indicate that it is not from central Australia. *Livistona alfredii* is endemic in north-western Australia on the upper Ashburton and Fortescue Rivers, with a disjunct outlier in the Cape Range.

Although the holotype collection of *L. alfredii* at MEL has been attributed to John Forrest, collected in 1878 (Mueller 1878; Rodd 1998), it seems more likely that it was collected by his brother Alexander Forrest. John never explored the Hamersley Range area, whereas Alexander did extensive survey work there in 1878. At MEL there are two other collections from this period, one attributed to Forrest, collected in 1879, the other collected by McRae (probably Alexander Joseph) in 1879 and labelled Nickol Bay, where McRae lived at the time (George 2009). Until Mueller named *L. alfredii*, the species from the Hamersley Range was known as *L. mariae*. In the protologue, Mueller (1892) cited no specific type collection, mentioning its discovery 'fully

thirty years ago ... on the Millstream ... Mr Beresford records this palm now also from the Fortescue-River and its tributaries, from the sources of the Robe-River, and from Cave's Creek.' No collection by Beresford is known. The 'thirty years ago' given by Mueller probably refers to a sighting by Francis Gregory on the Fortescue R. on 6 June 1861 (Gregory & Gregory 1884). For the present it is not possible to decide which of the early collections the material at Kew represents or if it is part of the type.

The type citation for *L. mariae* is 'Celeber Australiae centralis geographus Ernestus Giles palmam fortasse conspecificam in valle "Glen of Palms" montium Gillii detexit'. Rodd (1998) selected as lectotype a sheet at MEL labelled 'Gills Range, Giles' and discussed a second sheet labelled 'Gills (Macdonells) Range, E. Giles' (which is probably an isolectotype though not specified as such by Rodd). The locality on these sheets may not be correct, since the species grows only in Palm Valley where the Finke River cuts through the Krichauff Range. Giles discovered the palms there in September 1872. He was in the George Gill Range, which lies to the west, late in 1873. There is no locality named Mount Gill.

12. *Musa banksii* F. Muell., *Fragm.* 4: 132 (1864) (Musaceae)

Type citation: 'In vallibus silvarum ad montem Elliot. Fitzalan'.

The holotype is at MEL and an isotype BM (Ross 1987). Eugene Fitzalan collected widely for Mueller in Queensland between 1860 and 1882 (George 2009). No date is recorded for this collection but, in a letter to August Petermann dated 26 August 1864, Mueller mentioned having recently received *Musa* from north-eastern Australia (Home *et al.* 2002).

EBC Catalogue no. 29543; Entry Book no. 61.1873. Donated by F. Mueller. Received at Kew in 1873. A hand of five fruit. There are no collection details with the specimen but there are no other collections this early. Fig. 14.

13. *Paederota densifolia* F. Muell., *Trans Philosoph. Soc. Victoria* 1: 107 (1855)

basionym for *Veronica densifolia* (F. Muell.) F. Muell., *Fragm.* 2: 137 (1861); *Chionohebe densifolia* (F. Muell.) Briggs & Ehrendorfer, *Contr. Herb. Australiense* 25: 2 (1976)



Figure 11: *Kentia canterburyana* EBC35690 © Board of Trustees of the Royal Botanic Gardens, Kew.

Figure 12: *Kentia mooreana* EBC35702 © Board of Trustees of the Royal Botanic Gardens, Kew.

Figure 13: *Livistonia alfredii* EBC35756 © Board of Trustees of the Royal Botanic Gardens, Kew.

Figure 14: *Musa banksii* EBC29543 © Board of Trustees of the Royal Botanic Gardens, Kew.

Figure 15: *Paederota densifolia* EBC47910 © Board of Trustees of the Royal Botanic Gardens, Kew.

Figure 16: *Pandanus forsteri* EBC34726 © Board of Trustees of the Royal Botanic Gardens, Kew.

Type citation: 'On the highest rocky summits of the Munyang Mtns (6–6,500 feet).'

Briggs and Ehrendorfer (2006) selected as lectotype a collection from Munyang Mountains by Mueller in January 1855. They cited a further sheet at MEL and three at K as residual syntypes, with a further sheet at MEL a possible syntype. Munyang Mountains was an early name for Mt Kosciuszko, which Mueller climbed in the summer of 1854–55.

EBC Catalogue no. 47910; no record in Entry Book. Date of receipt at Kew not given. There are several dried pieces, one probably with a few fruit. A label in a hand that I don't recognise states: 'Paederota densifolia Mueller Australian Alps Alt. 6000 feet Dr. Mueller'. Fig. 15.

14. *Pandanus forsteri* C. Moore & F. Muell., Fragm. 8: 220 (1874) (Pandanaeae)

Type citation: 'In insula Howei a litore marino ad altitudinem 2000' montes adscendens, ubi omnibus ob res scientiae proficiscentibus observatus'.

No collector was cited directly in the protologue, but habit notes from both Charles Moore and James Fullagar were given. Green (1994) cited a collection by both Moore and Fullagar as syntype, represented at K and MEL, but it is more likely that there were two collections. Moore (with William Carron and Robert D. Fitzgerald) visited Lord Howe Island in May–June 1869, and Fullagar (with Lind, whose initials I have never seen) collected there in 1872–73 (George 2009). The sheet at MEL gives only Fullagar.

EBC Catalogue no. 34726; Entry Book no. 95.1876. Donated by F. Mueller. Received at Kew in 1876. One fruit. A label states: 'Pandanus Forsteri F.Muell Lord Howe's Island Fullagar F.Mueller 1876' and annotated 'Rec^d. Aug. 1876.' Fig. 16.

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