



## Nomenclatural notes on the *Alphitonia* Group in Australia (Rhamnaceae)

Jürgen Kellermann<sup>a,b</sup>

<sup>a</sup> State Herbarium of South Australia, Botanic Gardens and State Herbarium, Hackney Road, Adelaide, South Australia 5000

Email: juergen.kellermann@sa.gov.au

<sup>b</sup> The University of Adelaide, School of Biological Sciences, Adelaide, South Australia 5005

**Abstract:** The nomenclature and typification of seven species of *Alphitonia* Reissek ex Endl. and *Emmenosperma* F.Muell. is discussed. These two genera form the “*Alphitonia* Group” together with *Granitites* Rye and *Jaffrea* H.C.Hopkins & Pillon from New Caledonia. Lectotypes are chosen for *E. cunninghamii* Benth. and for the synonyms *A. excelsa* var. *acutifolia* Braid, *A. obtusifolia* R.Br. ex Braid and *A. obtusifolia* var. *tenuis* Braid. The lectotypes of *A. petriei* Braid & C.T.White and *A. philippinensis* Braid are clarified. Three species are illustrated: *A. petriei*, *A. whitei* Braid and *E. cunninghamii*.

**Keywords:** Nomenclature, typification, second-step lectotype, Rhamnaceae, *incertae sedis*, Australia

### Introduction

Rhamnaceae Juss. is a medium-sized plant family with over 1000 species in 64 genera. The current intra-familial classification was devised by Richardson *et al.* (2000b), following the first molecular analysis of the whole family (Richardson *et al.* 2000a). The family is divided into 11 tribes, but several genera have not been placed into a tribe, because the molecular analysis did not provide enough evidence as to their position within the family. Subsequent molecular analyses of Onstein *et al.* (2015) and Hauenschild *et al.* (2016, 2018a), included more taxa and provided further information on relationships within the family; they did not, however, resolve the position of all genera *incertae sedis*.

Four of these genera, *Alphitonia* Reissek ex Endl., *Granitites* Rye, *Emmenosperma* F.Muell., and *Jaffrea* H.C.Hopkins & Pillon, are very closely related (Fay *et al.* 2001; Hopkins *et al.* 2015; Hauenschild *et al.* 2018b) and are here referred to as the “*Alphitonia* Group” (Kellermann 2020). Of the above mentioned large-scale molecular analyses, only that of Hauenschild *et al.* (2018a) included accessions of all four genera and retrieved them as a well-supported monophyletic clade, but the relationships to other tribes and unplaced genera were unresolved due to poor support for the backbone of the phylogeny.

Hopkins *et al.* (2015) and Hauenschild *et al.* (2018b) discuss the morphology and taxonomic history of the *Alphitonia* Group. Species of *Alphitonia* and related genera are evergreen trees and shrubs, growing in tropical to subtropical regions (Fig. 1). Almost all species have a characteristic type of fruit dehiscence:

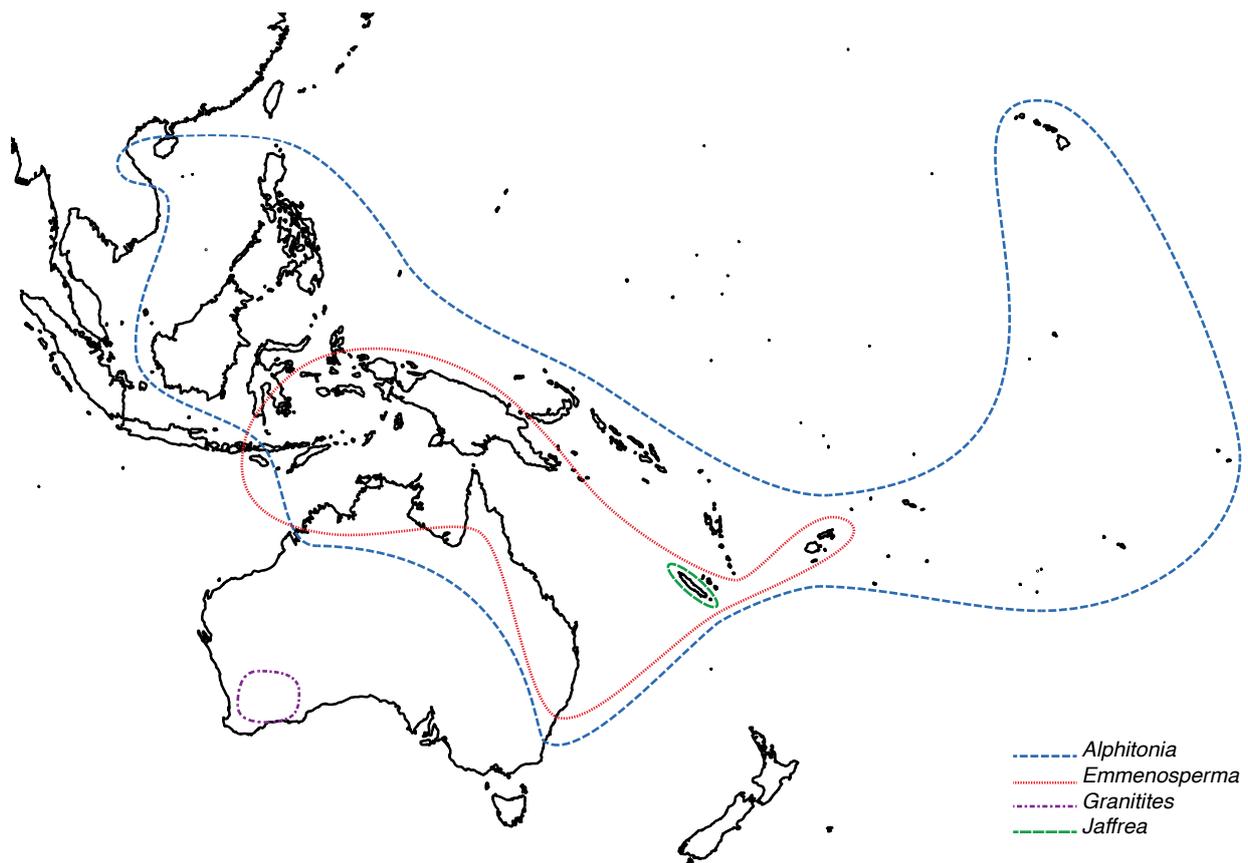
when fruits are ripe, they split open and the pericarp falls off, leaving the seeds (usually 3) remaining attached to the base of the fruit (Fig. 3F, P).

*Alphitonia* (10–15 species) was published in Endlicher (1840), using Reissek’s manuscript name and description. He indicated that *Colubrina excelsa* A.Cunn. ex Fenzl was the only member of the genus, but did not validly publish a combination in *Alphitonia*. The name of the type of the genus, *A. excelsa* (A.Cunn. ex Fenzl) Benth., was published by Bentham (1863).

The only revision of the genus over its whole range of distribution was published by Braid (1925a), who divided it into two sections: these were *Alphitonia* sect. *Alphitonia* (published as *A. sect. Tomentosae* Braid, but this name is invalid, as the proposed section contains the type) and *A. sect. Glabratae* Braid. Suessenguth (1953) followed Braid in his treatment for *Die Natürlichen Pflanzenfamilien*. Since then, only regional treatments and descriptions of new species have been published. Bean (2010) revised the five species of *Alphitonia* in Australia. Hopkins *et al.* (2015) restricted the genus to species classified by Braid (1925a) in *A. sect. Alphitonia*.

*Granitites* (monotypic) was described by Rye (1996) for an unusual species, *G. intangendus* (F.Muell.) Rye, which occurs on granite outcrops of south-western Western Australia and was previously included in *Pomaderris* Labill. and *Cryptandra* Sm. It is most closely related to *Alphitonia* (Rye 1996; Nikulinsky & Hopper 1999) and is recovered as its sister genus in molecular analyses (Fay *et al.* 2001; Hauenschild *et al.* 2018a).

*Emmenosperma* (5 species) was erected by Mueller (1862) to accommodate *E. alphitonioides* F.Muell.



**Fig. 1.** Distribution of the four genera of the *Alphitonia* Group. Map reproduced from Hopkins *et al.* (2015).

Since then, four other species have been described, but apart from regional treatments, the genus has not been revised; Suessenguth (1953) only provided a short overview of *Emmenosperma*. Two species were known from Australia, until Bean (2013) reported a single population of the New Caledonian taxon *E. pancherianum* Baill. near Townsville in Queensland.

*Jaffrea* (2 species) was segregated from *Alphitonia* by Hopkins *et al.* (2015) and contains the two species listed by Braid (1925a) in *A.* sect. *Glabratae*, both endemic to New Caledonia. It is the sister genus to *Emmenosperma* (Hopkins *et al.* 2015; Hauenschield *et al.* 2018b). The type species is *J. xerocarpa* (Baill.) H.C.Hopkins & Pillon.

During the preparation of the *Flora of Australia* treatment of Rhamnaceae, it became apparent that the nomenclature of several species of the *Alphitonia* Group in Australia needs to be clarified, especially in the genera *Alphitonia* and *Emmenosperma*. While Bean (2006, 2010, 2013) and Kellermann & Thiele (2008) published some lectotypifications, not all names and their synonyms have so far been typified correctly.

McNeill (2014) clarified some misconceptions about holotypes and procedures for lectotypification and his advice is followed in this paper. All types have been examined; those that were seen online via JSTOR Global Plants and other websites are indicated by “photo seen”. In the 1990s, specimens of *Alphitonia*

were sent from K on loan to CANB and before they were returned, the sheets were photographed. These images were also available for this study, but as they do not have K barcodes, the specimens are identified by their loan number.

Only species occurring in Australia and taxon names that have been used in an Australian context are reviewed here (APC 2020). Hauenschield *et al.* (2018b) listed type specimens for all names published in the *Alphitonia* Group, but did not suggest taxonomic changes or lectotypifications. Five names are not discussed as they have been typified in the following cited references: *A. oblata* A.R.Bean and the misapplied name *A. incana* (Roxb.) Kurz (typified by Bean 2010), *Emmenosperma alphitonioides* (Kellermann & Thiele 2008), *E. pancherianum* (Bean 2013) and *Granitites intangendus* (Rye 1996).

Three species occurring in Australia are illustrated in Fig. 3: *Alphitonia petriei* Braid & C.T.White, *A. whitei* Braid and *Emmenosperma cunninghamii* Benth.

### The *Alphitonia* types of Braid

Kenneth W. Braid was an early adopter of the type-method and indicated and discussed “types” in his taxonomic papers (Braid & Ridley 1924, Braid 1925a, b, c). Although he was working at K at this time, in all but one case (see below), Braid does not state in which

herbarium the type specimen is located, and as such, lectotypification of these names is advisable (McNeill 2014; Mosyakin *et al.* 2019).

In his revision of *Alphitonia*, Braid (1925a: 177) stated that “an asterisk denotes the type specimen, or where material is incomplete the type specimens”. For three species, *A. petriei* Braid & C.T.White, *A. whitei* Braid and *A. philippinensis* Braid, he indicated more than one type specimen, i.e. two gatherings are highlighted with an asterisk in the list of collections that were examined. When Bean (2010) lectotypified the first two of these names, he chose specimens of one of the two gatherings that was indicated by Braid.

However, Bean (2010) and other authors overlooked an *addendum* to Braid (1925a), which was published two months after the revision of *Alphitonia* (Fig. 2; Braid 1925b). While no authorship is specified for this *addendum*, it is here assumed that the information was provided by Braid to the journal and he is thus credited with the resulting lectotypifications. Braid explicitly stated that one of the asterisks needs to be deleted in these three species and that the sentence quoted above should be shortened to: “In the following enumeration an asterisk denotes the type specimen”, i.e. the reference to multiple types was to be removed.

As such, Braid chose single gatherings as types of these three species of *Alphitonia* in the *addendum*, i.e. he effected the lectotypification of these names. However, since he only designated the gathering, but did not indicate the herbarium in which each gathering is located, this constitutes a first-step lectotypification (Art. 9.17; Turland *et al.* 2018). The selection of a single specimen conserved in one herbarium needs to be published as a second-step lectotypification. For *A. whitei* this second-step typification was undertaken by Bean (2010), for *A. petriei* and *A. philippinensis* it is published below.

Braid (1925a: 129) acknowledged Queensland Government Botanist C.T. White, who sent to Kew over “40 specimens of *Alphitonia* from Australia and New Guinea” collected by a variety of people. White seems to have numbered these specimens consecutively. The number listed for these specimens by Braid in the protologues is therefore not a collection number, but was added by White later (see also Bean 2010). These numbers are here indicated in square brackets and can be found on the K specimens and also on the duplicates retained by White in BRI.

**Revision of the genus *Alphitonia*.**—In *K.B.* 1925, p. 177, l. 8, delete the words from “or where” to “type specimens.” Delete the asterisks on p. 178, l. 34 after *Ladbrook* 46; p. 181, l. 28 after *Bailey* 24; p. 184, l. 11 after *Elmer* 10335.

**Fig. 2.** The *addendum* to K.W. Braid’s *Revision of the genus *Alphitonia** (Braid 1925b).

## Nomenclature

### *Alphitonia excelsa* (A.Cunn ex Fenzl) Reissek ex Benth.

*Fl. Austral.* 1: 414 (1863). — *Colubrina excelsa* A.Cunn. ex Fenzl in Endl. *et al.*, *Enum. Pl.* 20 (1837). — *Ceanothus excelsus* (A.Cunn. ex Fenzl) A.Cunn ex Steud., *Nomencl. Bot. ed. 2*, 2: 313 (1841). — *Ceanothus excelsus* A.Cunn. ex Fenzl in Endl. *et al.*, *Enum. Pl.* 20 (1837), *nom. inval. pro syn.* — **Lectotype:** Moreton Bay, N.S. Wales [now Qld], 1824, *A. Cunningham s.n.* (W0059884, photo seen), *vide* A.R.Bean, *Muelleria* 28: 5 (2010). **Possible isolectotype:** BRI-AQ0317604.

*Alphitonia excelsa* var. *acutifolia* Braid, *Bull. Misc. Inform. Kew* 1925: 177–178 (1925). — **Type citation:** “Ipswich, *Hall* 9\*”. **Lectotype (here designated):** Ipswich, *T.F. Hall s.n.* [9] (K000074522, photo seen; determined by K.W. Braid). **Isolectotype:** BRI-AQ0317588 (photo seen).

*Alphitonia* sp. (=RfK/25763) B.P.M.Hyland & T.P.Whiffin, *Austral. Trop. Rain Forest Trees: Interactive Ident. Syst.* 1: 109, 129, 140, Code 901 (1993)

*Alphitonia* sp. (Forty Mile Scrub BH 25763RfK) B.P.M.Hyland, B.Gray & R.W.Elick in W.E.Cooper & W.T.Cooper, *Fr. Rainforest* 310 (1994) [Appendix I: Provisional Species List].

*Alphitonia* sp. (Selwyn Ranges *L.P. Conroy* 3) E.M.Ross in R.J.F.Hend. (ed.), *Queensl. Vasc. Pl. Names Distrib.* 291 (1994).

*Alphitonia* sp. (Little Crystal Creek *A.R. Bean* 5237) E.M.Ross in R.J.F.Hend. (ed.), *Queensl. Vasc. Pl. Names Distrib.* 291 (1994).

*Alphitonia* sp. (Broad-leaved Form) W.E.Cooper & W.T.Cooper, *Fr. Austral. Trop. Rainforest* 423 (2004).

*Alphitonia* sp. (Little Crystal Creek) W.E.Cooper & W.T.Cooper, *Fr. Austral. Trop. Rainforest* 423 (2004).

*Alphitonia philippinensis* *auct. non* Braid: C.T.White, *Proc. Roy. Soc. Queensland* 50: 66–87 (1939).

Braid (1925a) published *A. excelsa* var. *acutifolia* from specimens of the taxon provided by C.T. White. The specimen seen and annotated by Braid in preparing his description of var. *acutifolia* is designated as the lectotype, above.

As Bean (2010) mentioned, a number of phrase names have been used for local variations of the polymorphic species *A. excelsa*. Several more names that were added to the *Australian Plant Census* (APC 2020) recently, are listed here, as well.

### *Alphitonia franguloides* A.Gray

*U.S. Expl. Exped., Phan.* 15: 280, pl. 22B (1854). — *Alphitonia excelsa* var. *franguloides* (A.Gray) F.M.Bailey, *Compr. Cat. Queensland Pl.* 837 (1913). — **Type citation:** “Sandalwood Bay, &c., Vanua-levu, Feejee Islands”. **Lectotype:** [Mbua Bay, Vanua Levu, Fiji.] U.S. Exploring Expedition, [1840,] *C. Wilkes* (US00094511, old accession number 17196, photo seen), *vide* A.C.Sm., *Fl. Vit. Nova* 3: 695 (1985), as “holotype”. **Isolectotypes:**



• A. BARLEY • 2007 •

**Fig. 3.** Three Australian members of the *Alphitonia* Group. **A–F** *Alphitonia petriei*: **A** branch  $\times 0.3$ ; **B** flower (side view)  $\times 7.5$ ; **C** flower from above  $\times 7.5$ ; **D** stamen  $\times 15$ , with characteristic appendage at the base of the anther; **E** fruit  $\times 1.25$ ; **F** receptacle with seeds attached  $\times 2.5$ . **G–J** *A. whitei*: **G** branch  $\times 0.3$ ; **H** flower (side view)  $\times 7.5$ ; **I** flower from above  $\times 7.5$ ; **J** fruit  $\times 2.5$ . **K–P** *Emmenosperma cunninghamii*: **K** branch  $\times 0.3$ ; **L** flower (side view)  $\times 7.5$ ; **M** flower from above  $\times 7.5$ ; **N** closed fruit  $\times 2$ ; **O** open fruit  $\times 2$ ; **P** seed remaining on receptacle  $\times 2$ . — A A.R. Bean 5043 (MEL721022), B–D K.R. Thiele 2501 (CANB467468), E F. Mueller s.n. (MEL712882), F I.R. Telford 11194 (CBG9102405), K–M J. Russel-Smith 8403 (MEL1601336), N B. Gray 1480 (MEL1605347), O, P C.R. Dunlop 7242 (MEL1583577), G–I A.R. Bean 5078 (MEL721328), J V.K. Moriarty 2039 (CANB296521).

Feejee Islands, U.S. Exploring Expedition, *C. Wilkes* (K000729218, ex Herb. Benth.; NY00406510; photos seen). Feejee Islands, U.S. South Pacific Exploring Expedition 1838–42, *C. Wilkes* (GH00051228, ex US, right hand specimen; P00641644, ex US, right hand specimen; photos seen).

Smith (1985: 695) stated that the “type is U. S. Expl. Exped. (US 17196 HOLOTYPE; ISOTYPE at K)”. This can be interpreted as an inadvertent lectotypification (Art. 9.10; Turland *et al.* 2018) with the term “holotype” to be corrected to “lectotype”. The type specimen contains a flowering and a fruiting branch of the species. Duplicates of the expedition’s specimens can be found in several herbaria.

*Alphitonia franguloides* is known from higher elevations and drier habitats in Fiji (Thomson & Thaman 2008). The name was applied in error to *A. whitei* by Bailey (1913), who also reduced the taxon to a variety of *A. excelsa*.

Gray (1854) also published *A. franguloides* var. *obtusa*<sup>1</sup> from specimens collected in Tonga during the same expedition, and this name most likely refers to *A. zizyphoides* (Sol. ex Spreng.) A.Gray, the only species of the genus recorded for Tonga (Yuncker 1959; Ellison 1990). However, other authors have synonymised this variety also with either *A. franguloides* (Hauenschild *et al.* 2018b) or *A. vieillardii* Lenorm. ex Braid (Braid 1925a).

#### *Alphitonia petriei* Braid & C.T.White

in Braid, *Bull. Misc. Inform. Kew* 1925: 178 (1925). — **Type citation:** “Johnston River, *Ladbrook* 46\*; Kuranda, *White* (1525) 43\*”. **First-step lectotype:** Kuranda, 1 Mar. 1922, *C.T. White* (1525) [43], *fide* Braid, *Bull. Misc. Inform. Kew* 1925: 320 (1925). **Second-step lectotype (here designated):** K, specimen with loan stamp “H/1641/93 8”. **Residual syntype:** Johnstone River, Oct. 1917, *H.G. Ladbrook s.n.* [46] (K, with loan stamp “H/1641/93 9”; BRI-AQ317594, photo seen).

As stated above, Braid (1925b) selected the lectotype gathering from the two specimens he had initially indicated as syntypes with an asterisk (Braid 1925a). There is no duplicate of *C.T. White* [43] specimen in BRI (Bean 2010), however, in case there are duplicates elsewhere the K specimen is here selected as lectotype. Bean (2010) designated a specimen of *Ladbrook s.n.* as lectotype in error, as he was unaware of the *addendum* by Braid (1925b), whose selection has priority.

#### *Alphitonia philippinensis* Braid

*Bull. Misc. Inform. Kew* 1925: 183 (1925). — **Type citation:** “Malay Archipelago. Philippines: [...] Dumaquate, *Elmer* 9432\* and 10335\*”. **First-step**

**lectotype:** Philippines, Island of Negros: Province of Negros Oriental, Dumaguete, Cuernos Mts., Mar. 1908, *A.D.E. Elmer* 9432, *fide* Braid, *Bull. Misc. Inform. Kew* 1925: 320 (1925). **Second-step lectotype (here designated):** K, specimen with loan stamp “H/1641/93 2”. **Isolectotype:** L0383140, photo seen; NSW281006. **Residual syntype:** Philippines, Island of Negros: Province of Negros Oriental, Dumaguete, Cuernos Mts., June 1908, *A.D.E. Elmer* 10335 (K, with loan stamp “H/1641/93 3”; L0383139, photo seen; NSW503021).

Bean (2010) stated that Australian material determined by C.T. White as *A. philippinensis* was in fact *A. excelsa* (White 1939) and that the name *A. philippinensis* had been later misapplied to specimens of *A. oblata* by Hyland *et al.* (2002) and Kellermann & Thiele (2008). The species is native to Malaysia, Indonesia, the Philippines, and possibly adjacent regions of Indo-China and Papua New Guinea, but more research is needed to determine the exact area of distribution.

#### *Alphitonia pomaderroides* (Fenzl) A.R.Bean

*Austrobaileya* 7: 377 (2006). — *Zizyphus pomaderroides* Fenzl in Endl. *et al.*, *Enum. Pl.* 20 (1837), as “*Zizyphus*”. — **Type citation:** “*Cap van Diemen*. (Ferd. Bauer.)”. **Holotype:** Cape Van Diemen [Mornington Is.], Dec. 1802, *F. Bauer* (W0002221, photo seen).

*Alphitonia obtusifolia* R.Br. ex Braid, *Bull. Misc. Inform. Kew* 1925: 182 (1925). — **Type citation:** “Queensland and Region of Gulf of Carpentaria. Carpentaria, *Brown* 5364,\*”. **Lectotype (here designated):** Carpentaria Island C, [i.e. Allen Island, Gulf of Carpentaria, Qld, 20 Nov.] 1802, *R. Brown Iter Austral.* 5364 (BM000839293). **Isolectotype:** Carpentaria, *R. Brown Iter Austral.* 5364 (K, with loan stamp “H/1641/93 6”, determined by K.W. Braid, labelled as “Holotype” by K.R. Thiele & J.G. West). **Possible isolectotypes:** North Coast (BRI-AQ0317590, photo seen; CANB278602; E00769942, photo seen; NSW281104).

*Alphitonia obtusifolia* var. *tenuis* Braid, *Bull. Misc. Inform. Kew* 1925: 183 (1925). — **Type citation:** “North Coast,” *R. Brown*\*”. **Lectotype (here designated):** North Coast, [Qld, Nov. 1802,] *R. Brown s.n.* (K; with loan stamp “H/1641/93 5”, determined by K.W. Braid). **Possible isolectotype:** North Coast (P06791109, photo seen).

[“*Ceanothoides obtusifolia*” R.Br. *in sched.*, *fide* Braid, *Bull. Misc. Inform. Kew* 1925: 182 (1925), *et* A.R.Bean, *Muelleria* 28: 8 (2010) (both as “*Ceanothoides*”), *nom. inval. pro syn.*]

Only one specimen of Ferdinand Bauer’s collection of *Zizyphus pomaderroides* is known from the Herbarium in Vienna, where Fenzl worked at the time (Fenzl

<sup>1</sup> *Alphitonia franguloides* var. ?  $\beta$  *obtusa* A.Gray, *U.S. Expl. Exped., Phan.* 15: 278 (1854). — **Type citation:** “Tongatabu : in fruit only”. **Syntypes:** Tongatabu, U.S. Exploring Expedition, *C. Wilkes* (US00094512, old accession number 17197, photo seen); Tonga or Friendly Islands, U.S. South Pacific Exploring Expedition 1838–42, *C. Wilkes* (GH00051228, ex US, left hand specimen, photo seen); [wrongly labelled as “Feejee Islands”] U.S. South Pacific Exploring Expedition 1838–42, *C. Wilkes* (P00641644, ex US, left hand specimen, photo seen).

1837); this is accepted here as holotype of the species, as indicated by Bean (2006).

The synonym *A. obtusifolia* was described by Braid from a Robert Brown “specimen [...] in the British Museum, and a duplicate specimen [...] in the Kew Herbarium” (Braid 1925a: 182), indicating that he considers the main type specimen to be at BM. This is in contrast to Bean (2010), who stated in his revision of the genus for Australia that the holotype could be found in K (the same information is repeated by Hauenschild *et al.* 2018b).

While today only one sheet of *R. Brown Iter Austral.* 5364 is at BM, in Braid’s time, however, more material of the species was available in London and most likely seen by him during the preparation of his revision. Duplicates of Brown’s specimens have been distributed by BM to many institutions since the 1970s, including a large number sent to Australian herbaria<sup>2</sup>. Hence it cannot be assumed that the single specimen currently in BM is the holotype of the name (see McNeill 2014). To clarify the situation, the specimen at BM is here designated as the lectotype. The K isoelectotype carries the same Bennett Number as the lectotype and was also determined by Braid.

The location details of Brown duplicates are very sparse. Two duplicates from CANB and NSW bear Brown’s original label “North Coast”, but were distributed by BM with an additional label stating the location as “Allen Island”. The BRI duplicate has a label “North Coast”, possibly written by J.J. Bennett, who catalogued Brown’s collections, and a second label by S.T. Blake, stating that he had determined the location as Allen Island from Brown’s manuscripts. A specimen at E is similarly labelled. None of these specimens bear the Bennett Number 5364 and are accepted here as possible isoelectotypes of *A. obtusifolia* and not original material of var. *tenuis*.

Only one Brown specimen at K bears Braid’s determination *A. obtusifolia* var. *tenuis*. However, as there are multiple other specimens with the location “North Coast” (see above), this is here designated as the lectotype of that name. A specimen at P is possibly an isoelectotype, it has been determined as var. *tenuis* by Jacques Florence.

Braid (1925a) and Bean (2010) mention Robert Brown’s manuscript name, and both misspelt it as “*Caenothoides obtusifolia*”. However, the lectotype is labelled by Brown as “*Ceanothoides obtusifolia*”, i.e. he compared it with the well-known Californian genus *Ceanothus* L. Burbidge (1955) stated that a “large number of names employed by Brown are what he called himself [...] “nicknames””, with the suffix *-oides* indicating an affinity to an existing genus. Almost all

Brown collections mentioned above were labelled by him with this name.

Brown generally used “*Ceanothoides*” as a nickname on specimens of Rhamnaceae that he regarded to belong to new genera. It can be found on the original labels of many specimens that are now in *Alphitonia* Endl., *Colubrina* Rich. ex Brongn., *Discaria* Hook., *Pomaderris* Labill., *Trymalium* Fenzl and *Spyridium* Fenzl. (unpubl. data).

#### *Alphitonia whitei* Braid

*Bull. Misc. Inform. Kew* 1925: 181 (1925). — **Type citation:** “Near Barron River, *Bailey* (24)\* [...] Jordan Creek, *Mocatta* 23\*”. **First-step lectotype:** Jordan Creek, Innisfail district, Nov. 1912, *H.W. Mocatta s.n.* [23], *vide* Braid, *Bull. Misc. Inform. Kew* 1925: 320 (1925). **Second-step lectotype:** K000074521, *vide* A.R.Bean, *Muelleria* 28: 10 (2010). **Isoelectotype:** BRI-AQ0317596. **Residual syntype:** Boar Pocket nr. Barron River, 25 June 1899, *J.F. Bailey* [24] (K000729496; BRI-AQ0317598).

*Alphitonia franguloides* auct. non A.Gray: F.M.Bailey, *Compr. Cat. Queensland Pl.* 837 (1913).

*Alphitonia excelsa* var. *franguloides* auct. non (A.Gray) F.M.Bailey: F.M.Bailey, *Compr. Cat. Queensland Pl.* 837 (1913).

Following the method described above, the lectotype of this name was chosen in a two-step process: Braid (1925b) selected the gathering, *Mocatta s.n.* [23], by deleting the asterisk from the Bailey specimen mentioned in the protologue, and Bean (2010) chose the specimen at K as the second-step lectotype.

#### *Emmenosperma cunninghamii* Benth.

*Fl. Austral.* 1: 415 (1863), as “*Emmenospermum* (?)”. — **Type citation:** “Port Warrender, N.W. coast, A. Cunningham. The specimens are very imperfect; they were referred to *Croton* by Cunningham”. **Lectotype (here designated):** “*Croton miltospermum* A.Cunn. / Port Warrender / N.W. Australia”, Oct. 1819, *A. Cunningham* 476 (K0007299222, presented by R. Heward, 1862, photo seen). **Isoelectotypes:** “Port Warrender N.W. Coast / 2<sup>nd</sup> Voyage of Mermaid” 1819, *A. Cunningham* 476 (BM000838394, photo seen). “*Croton miltospermum* / C / Port Warrender”, *A. Cunningham s.n.* (K000729221, photo seen).

There are three Cunningham specimens of the taxon present at K and BM, all in the fruiting stage. Two of the three specimens (BM000838394, K0007299222) have fruits and seeds present; in the third specimen (K000729221), all seeds have been shed, i.e. it is now sterile. The specimen with seeds that is annotated with Cunningham’s manuscript name “*Croton miltospermum*”, mentioned in the protologue by

<sup>2</sup> For example, 123 specimens collected by Robert Brown and Allan Cunningham were sent by BM to the Forest Research Institute, Canberra (FRI), in 1974 (Chippendale 1976) and are now incorporated into CANB; in 1978 CANB received 1069 specimens (Eichler 1978) and NSW “a large number of duplicates” (Briggs 1979); around the year 2000 some duplicates were sent to HO (Tasmanian Herbarium 2003).

Bentham (1863), is chosen as the lectotype. While Bentham published the species with a question mark, this is possibly related to its generic placement, but the taxon was nonetheless accepted by him (Art. 36.1; Turland *et al.* 2018).

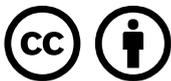
### Acknowledgments

Anna Monro (CANB) is thanked for nomenclatural advice and Helen Fortune Hopkins (K) for feedback on the manuscript. Tony Bean (BRI) and an anonymous reviewer commented on an earlier draft of this paper. Teresa Lebel (AD) edited the manuscript. The project “A new phylogeny of the Australian Rhamnaceae, revision of *Cryptandra* and *Spyridium*, and completion of the *Flora of Australia* treatment of the family” is supported through funding from the Australian Government’s Australian Biological Resources Study (ABRS) National Taxonomy Research Grant Programme. The line drawings were prepared by Anita Barley, also funded by ABRS. The map was provided by Yohan Pillon (MPU) and is reproduced by permission of the Trustees of the Royal Botanic Gardens, Kew.

### References

- Australian Plant Census* [APC] (continuously updated). IBIS database. (Centre for Australian National Biodiversity Research & Council of Heads of Australasian Herbaria: Canberra). <https://biodiversity.org.au/nsi/services/APC> [accessed: 14 Feb. 2020].
- Bailey, F.M. (1913). *Comprehensive catalogue of Queensland plants*. (Government Printer: Brisbane).
- Bean, A.R. (2006). A new combination in *Alphitonia* Endl. (Rhamnaceae). *Austrobaileya* 7: 377–378.
- Bean, A.R. (2010). A revision of *Alphitonia* (Rhamnaceae) for Australia. *Muelleria* 28: 3–17.
- Bean, A.R. (2013). *Emmenosperma pancherianum* Baill. (Rhamnaceae) newly recorded for Australia. *Austrobaileya* 9: 150–152.
- Bentham, G. (1863). Rhamnaceae. In: *Flora Australiensis, a Description of Plants of the Australian Territory* 1: 409–445. (L. Reeve & Co.: London).
- Braid, K.W. (1925a). Revision of the genus *Alphitonia*. *Bulletin of Miscellaneous Information Kew* 1925: 168–186.
- [Braid, K.W.] (1925b). Revision of the genus *Alphitonia* [addendum]. *Bulletin of Miscellaneous Information Kew* 1925: 320.
- Braid, K.W. (1925c). The genus *Brachycorythis*. *Bulletin of Miscellaneous Information Kew* 1925: 353–361.
- Braid, K.W. & Ridley, H.N. (1924). New orchids: Decas L. *Bulletin of Miscellaneous Information Kew* 1924: 199–206.
- Briggs, B.G. (1979). Committee of Heads of Australian Herbaria, 6<sup>th</sup> meeting, Sydney, 29–30. 11. 1978. *Australian Systematic Botany Society Newsletter* 18: 11–12.
- Burbidge, N.T. (1955). *An index to the microfilm of Robert Brown’s botanical descriptions (manuscript) of Australian plants held by the British Museum (Natural History)*. (CSIRO, Division of Plant Industry: Canberra).
- Chippendale, G. (1976). Brief history of botanical collections of the Forest Research Institute, Canberra. *Australian Botany Society Newsletter* 7: 4–5.
- Eichler, H. (1978). Herbarium Australiense. In: Division of Plant Industry, *Annual Report 1978*, pp. 32–35. (CSIRO: Canberra).
- Ellison, J.C. (1990). The vegetation and floristics of the Tongatapu outliers. *Atoll Research Bulletin* 332: 1–36.
- Endlicher, S. (1840). Rhamnaceae. In: *Genera plantarum secundum ordines naturales disposita*, pp. 1094–1104. (Fr. Beck: Vienna).
- Fay, M.F., Lledó, M.D., Richardson, J.E., Rye, B.L. & Hopper, S.D. (2001). Molecular data confirm the affinities of the south-west Australian endemic *Granitites* with *Alphitonia* (Rhamnaceae). *Kew Bulletin* 56: 669–675.
- Fenzl, E. (1837). Rhamnaceae. In: Endlicher, S.F.L., Fenzl, E., Bentham, G. & Schott, H.W. (eds), *Enumeratio plantarum quas in Novae Hollandiae ora austro-occidentali ad fluvium Cygnorum et in Sinu Regis Georgii collegit Carolus liber baro de Hügel*. (Fr. Beck: Vienna).
- Gray, A. (1854). Ord. Rhamnaceae. In: *United States Exploring Expedition during the year 1838, 1839, 1840, 1841, 1842: Under the command of Charles Wilkes, U.S.N.* 15: 274–285 & Atlas, pl. 22. (C. Sherman: Philadelphia).
- Hauenschild, F., Favre, A., Michalak, I. & Muellner-Riehl, A.N. (2018a). The influence of the Gondwanan breakup on the biogeographic history of the ziziphoids (Rhamnaceae). *Journal of Biogeography* 45: 2669–2677.
- Hauenschild, F., Favre, A., Schulz, M. & Muellner-Riehl, A.N. (2018b). Biogeographic analyses support an Australian origin for the Indomalaysian-Australasian wet forest-adapted tropical tree and shrub genus *Alphitonia* and its close allies (Rhamnaceae). *Botanical Journal of the Linnean Society* 188: 1–20.
- Hauenschild, F., Matuszak, S., Muellner-Riehl, A.N. & Favre, A. (2016). Phylogenetic relationships within the cosmopolitan buckthorn family (Rhamnaceae) support the resurrection of *Sarcomphalus* and the description of *Pseudoziziphus* gen. nov. *Taxon* 65: 47–64.
- Hopkins, H.C.F., Pillon, Y., Stacy, E.A. & Kellermann, J. (2015). *Jaffrea*, a new genus of Rhamnaceae endemic to New Caledonia, with notes on *Alphitonia* and *Emmenosperma*. *Kew Bulletin* 70: 42 (19pp.).
- Hyland, B.P.M., Whiffen, T., Christophel, D.C., Gray, B. & Elick, R.W. (2002). *Australian tropical rain forest plants: Trees, shrubs and vines*. CD-ROM. (Centre for Plant Biodiversity Research: Canberra).
- Kellermann, J. (2020). A preliminary survey of the leaf-indumentum in the Australian Pomaderreae (Rhamnaceae) using Scanning Electron Microscopy. *Swainsona* 33: 75–102.
- Kellermann, J. & Thiele, K.R. (2008). Lectotypifications and nomenclatural notes on Rhamnaceae from northern Australia. *Journal of the Adelaide Botanic Gardens* 22: 33–35.
- McNeill, J. (2014). Holotype specimens and type citations: General issues. *Taxon* 63: 1112–1113.
- Mosyakin, S.L., McNeill, J. & Boiko, G.V. (2019). Comments on proper type designation for names of taxa validated by Turczaninow in his *Animadversiones*, with case studies. *Ukrainian Botanical Journal [Український ботанічний журнал]* 76: 379–389.
- Mueller, F. (1862). Rhamnaceae. *Fragmenta Phytographiae Australiae* 3: 62–86.
- Nikulinsky, P. & Hopper, S.D. (1999). *Life on the rocks: The art of survival*. (Fremantle Arts Centre Press: Fremantle).

- Onstein, R.E., Carter, R.J., Xing, Y., Richardson, J.E. & Linder, H.P. (2015). Do Mediterranean-type ecosystems have a common history?—Insights from the Buckthorn family (Rhamnaceae). *Evolution* 69: 756–771.
- Richardson, J.E., Fay, M.F., Cronk, Q.C.B., Bowman, D. & Chase, M.W. (2000a). A phylogenetic analysis of Rhamnaceae using *rbcL* and *trnL-F* plastid sequences. *American Journal of Botany* 87: 1309–1324.
- Richardson, J.E., Fay, M.F., Cronk, Q.C.B. & Chase, M.W. (2000b). A revision of the tribal classification of Rhamnaceae. *Kew Bulletin* 55: 311–340.
- Rye, B.L. (1996). *Granitites*, a new genus of Rhamnaceae from the south-west of Western Australia. *Nuytsia* 10: 451–457.
- Smith, A.C. (1985). Rhamnaceae. In: *Flora Vitiensis nova* 3: 687–705. (Pacific Tropical Botanical Garden: Lawai, Hawaii).
- Suessenguth, K. (1953). Rhamnaceae. In: Engler, H.G.A. & Prantl, K.A.E. (eds), *Die Natürlichen Pflanzenfamilien* (ed. 2), 20d: 7–173. (Duncker & Humblot: Berlin).
- Tasmanian Herbarium (2003). *Tasmanian Herbarium: Annual review of activities 2001/2002*. (Tasmanian Museum and Art Gallery: Hobart).
- Thomson, L.A.J. & Thaman, R.R. (2008). *Alphitonia zizyphoides* (toi), ver. 2.1. In: Elevitch, C.R. (ed.), *Species profiles for Pacific island agroforestry*. (Permanent Agricultural Resources: Holualoa, Hawaii). <http://www.traditionaltree.org> [accessed: 20 Nov. 2020].
- Turland, N.J., Wiersema, J.H., Barrie, F.R., Greuter, W., Hawksworth, D.L., Herendeen, P.S., Knapp, S., Kusber, W.-H., Li, D.-Z., Marhold, K., May, T.W., McNeill, J., Monro, A.M., Prado, J., Price, M.J. & Smith, G.F. (eds.) (2018). *International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code) adopted by the Nineteenth International Botanical Congress Shenzhen, China, July 2017*. (Koeltz Botanical Books: Glashütten). [*Regnum Vegetabile* 159].
- White, C.T. (1939). Contributions to the Queensland flora, No. 5. *Proceedings of the Royal Society of Queensland* 50: 51–84.
- Yunker, T.G. (1959). Plants of Tonga. *Bernice P. Bishop Museum Bulletin* 220: 1–283.



With the exception of images and other material protected by a trademark and subject to review by the Government of South Australia at all times, the content of this publications is licensed under the *Creative Commons Attribution 4.0 Licence* (<https://creativecommons.org/licenses/by/4.0/>). All other rights are reserved.  
© 2020 Board of the Botanic Gardens and State Herbarium (Adelaide, South Australia)