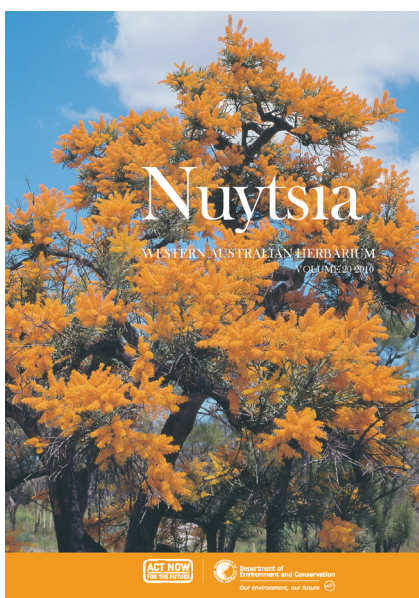


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Calothamnus (Myrtaceae): precursor
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Calothamnus* (Myrtaceae): precursor paper to *Flora of Australia

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Abstract

George, A.S. *Calothamnus* (Myrtaceae): precursor paper to *Flora of Australia*. *Nuytsia* 20: 183–200 (2010). The following new taxa are described: *Calothamnus arcuatus* A.S.George, *C. borealis* subsp. *cinereus* A.S.George, *C. cupularis* A.S.George, *C. montanus* A.S.George, *C. phellosus* A.S.George (the species previously known as *C. oldfieldii*), *C. roseus* A.S.George and *C. scabridus* A.S.George. *Calothamnus blepharospermus* var. *glaber* Benth. is raised to specific rank. The name *Calothamnus lateralis* f. *crassus* Benth. (*C. crassus* (Benth.) Hawkeswood) is shown to have been misapplied by Hawkeswood and is given varietal rank under *C. lateralis*. *Calothamnus blepharatherus* (a synonym of *C. sanguineus* Labill.), *C. blepharospermus* F.Muell. and *C. chrysanthereus* F.Muell. are lectotypified. *Calothamnus oldfieldii* F.Muell. is also lectotypified and the name correctly applied, with *C. kalbarriensis* Hawkeswood reduced to synonymy.

Introduction

An account of *Calothamnus* Labill. is being prepared for the *Flora of Australia* (George, in preparation) but, as its publication is some time off, new taxa, combinations and typifications are published here and in an associated paper on *Calothamnus quadrifidus* R.Br. (George & Gibson, 2010). Since Hawkeswood published several papers (1984, 1985, 1987), much new material has been collected, including the new taxa here described and collections that have allowed re-interpretation of some previously-named taxa. Study of type collections has also led to some new interpretations.

Methods

The work is based on a morphological study of herbarium material as well as field work. The concepts for species and subspecies follow those outlined in George (1996). Taxa are arranged alphabetically.

Taxonomy

Calothamnus arcuatus* A.S.George, *sp. nov.

Ad *Calothamnium hirsutum* Hawkeswood affinis, a qua habitu lignotubero, foliis patentibus arcuatis pungentibus glabris differt.

Typus: Nebroo Reserve, Western Australia [precise locality withheld for conservation reasons], 18 November 2009, A.S. George 17801 (*holo*: PERTH 08178445; *iso*: CANB, K, MEL, NSW).

Erect or spreading *shrub* to 1.5 m tall and 2 m wide, with lignotuber. *Bark* somewhat flaky or fibrous. *Stems* glabrous. *Leaves* widely spreading but gently curved upwards, terete, pungent, 2–5 cm long, 0.7–1.1 mm wide, glabrous. *Flowers* 5-merous (rarely 6-merous), in small groups among or below oldest leaves. *Hypanthium* 4–4.5 mm long, silky with reflexed hairs. *Sepals* ovate, 2–3 mm long, reflexed-silky, the inner ones and overlapped edges of outer ones with dense crimped hairs. *Petals* ovate, 2.5–3 mm long, finely erose on outer margin. *Staminal bundles* 22–25 mm long, bright red. *Pistil* 21–28 mm long. *Fruit* globose or depressed-globose, 5–6 mm long, smooth or slightly corky when mature; sepals persistent for a year or so but not woody, then falling. *Seeds* 1–1.2 mm long, smooth, brown. (Figure 1)

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons], J. Borger CH 244-1 (PERTH); J. Borger BR 086–2 (PERTH); L.A. Craven & C. Chapman 6891 (CANB, PERTH); M. Hislop 3901 (PERTH); S. Patrick 4503 (PERTH).

Distribution and habitat. Occurs north-east of Eneabba and, disjunctly, north-east of Arrino, south-western Western Australia. Grows in shallow sandy loam over sandstone or siltstone on slopes near creeks, in kwongan, and in yellow sand over gravel.

Phenology. Flowers recorded in April, June and August. Autumn and early winter appear to be the normal flowering period (A. Tinker, pers. comm.).

Conservation status. Department of Environment and Conservation (DEC) Conservation Codes for Western Australian Flora: Priority Two (Smith 2010). Known from four populations over a range of 40 km. One is in a nature reserve.

Etymology. The Latin *arcuatus* (curved like a bow) refers to the leaves.

Affinities. This is apparently related to *Calothamnus hirsutus* Hawkeswood but is a stouter plant with a lignotuber, the leaves typically widely spreading and pungent. *C. hirsutus* usually occupies low-lying sites in deep sandy loam but is present with *C. arcuatus* at the type locality. The collection by M. Hislop from north-east of Arrino (growing in yellow sand over gravel at the edge of a thicket) is described in the collection notes as ‘glaucous’, whereas the foliage is typically bright to deep green.

Note. A collection by A. Tinker (PERTH) has 6-merous flowers, the only specimen seen in the genus with this attribute.

Calothamnus blepharatherus F.Muell., *Fragm.* 3: 111 (1862) as *blepharathera*. *Type citation*: ‘In plagis aridis ad flumen Murchison. Oldfield’ [i.e. On arid plains towards the Murchison River, Western Australia, A. Oldfield] (*lecto*, here chosen: MEL 105166).

At MEL there are two collections by Oldfield annotated with this name by Mueller. Besides the above there is one with the locality ‘Okagee’ [= Oakagee?] but this is near Champion Bay, well south of the Murchison River., and is here discounted as type material, although it was labelled holotype by Hawkeswood (1987). The sheet selected as lectotype has flowers and fruit and agrees with the protologue. The name is a synonym of *Calothamnus sanguineus* Labill.



Figure 1. *Calothamnus arcuatus*. Holotype, north-east of Encabba, A.S. George 17801 (PERTH 0817445). Scale bar = 5 cm.

Calothamnus blepharospermus F.Muell., *Fragm.* 3: 112 (1862) as *blepharosperma*. *Type citation*: ‘In deserto ad flumen Murchison. Oldfield’ [i.e. In the desert towards the Murchison River, Western Australia, A. Oldfield] (*lecto*, here chosen: MEL 105173 [left-hand specimen]; *isolecto*: MEL 105174 [upper left and right-hand specimens]).

The collections annotated by Mueller represent the same species but are probably from different localities and evidently from different plants. MEL 105173 and MEL 105174 have the locality ‘Murchison R.’ while MEL 105175 is labelled ‘near Minaru’ and MEL 105176 appears to have the same locality (Oldfield’s writing is unclear). The left-hand specimen (of two) on MEL 105173 has spirally-twisted lower leaves, as do the upper left and right-hand specimens on MEL 105174. The largest specimen on MEL 105174 has leaves of similar length but they are not twisted. The right-hand specimen on MEL 105173, the lower central specimen on MEL 105174 and the single specimens on MEL 105175 and MEL 105176 have shorter leaves than the others. Mueller described flowers and fruit, but no specimen has both, nor have any seeds survived on any sheet. Hawkeswood annotated MEL 105175 as holotype on 11 June 1984 but this is one of the short-leaved specimens that are less typical of the species as now known, and has just one damaged flower. I suggest that the left-hand specimen on MEL 105173, in fruit, best represents the species and here select it as lectotype.

Calothamnus borealis Hawkeswood subsp. **cinereus** A.S.George, *subsp. nov.*

Ab *C. boreali* Hawkeswood subsp. *boreali* ut sequente differt: folia anguste linearia, crassa, plerumque 1.5–2 mm lata, indumento persistente; fructus 8–10 mm longus, sepalis persistentibus ut pote lobis lignosis.

Typus: Kennedy Range, Western Australia [precise locality withheld for conservation reasons], 20 September 1991, *Peter G. Wilson* 1191 & *R. Rowe* (*holo*: PERTH 02116510; *iso*: L, MO, NSW).

Leaves narrowly linear but thick, usually 1.5–2 mm wide, the indumentum persistent. *Fruit* 8–10 mm long, the sepals persistent as woody lobes. (Figure 2)

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons], *J.S. Beard* 4375 (PERTH); *R. Cranfield* 1899 (PERTH).

Distribution and habitat. Occurs in the Kennedy Range, Western Australia. Grows in red sand on flats and dunes.

Phenology. Flowers July–September.

Conservation status. DEC Conservation Codes for Western Australian Flora: Priority Three (Smith 2010). Known from a small area in the Kennedy Range National Park.

Etymology. The Latin *cinereus* (ash grey) refers to the leaves.

Notes. This has quite the appearance and morphology of typical *C. borealis* but the wider leaves give it a coarser aspect and the indumentum persists longer.

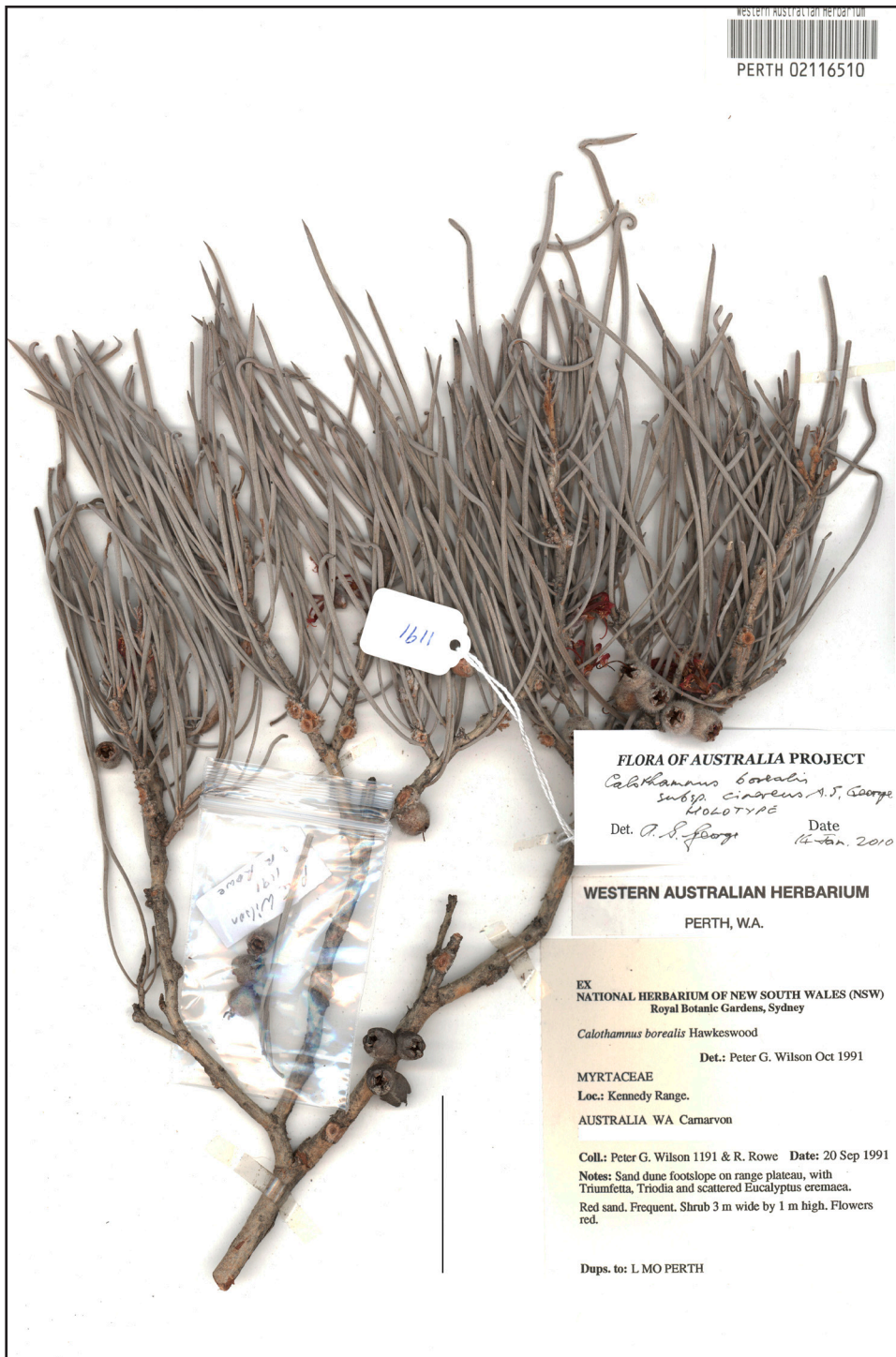


Figure 2. *Calothamnus borealis* subsp. *cinereus*. Holotype, Kennedy Range, Peter G. Wilson 1191 & R. Rowe (PERTH 02116510). Scale bar = 5 cm.

Calothamnus chrysanthereus F.Muell., *Fragm.* 3: 112 (1862) as *chrysantherea*. *Type citation*: ‘In vallibus collium calcariorum juxta fluminis Murchison. Oldfield’ [i.e. In valleys of calcareous hills next to the Murchison River, Western Australia, 18--., A. Oldfield] (*lecto*, here chosen: MEL105183; *isolecto*: BM, K (2 sheets), MEL (5 sheets, see below), P).

At the National Herbarium of Victoria there are six sheets collected at the Murchison River by Oldfield and annotated as *Calothamnus chrysanthereus* (or *chrysantherea*) by Mueller—MEL 105178, 105179, 105180, 105181, 105182, 105183. From Oldfield’s field labels it is clear that these are more than one gathering (probably three); all are the same species but it seems preferable to select a lectotype. The best sheet is MEL 105183, annotated as holotype by Hawkeswood on 11 June 1984. This is here selected as lectotype.

The epithet has long been spelt *chrysanthera* or *chrysantherus* but Mueller (1862–63) used the form *chrysantherea* in both the protologue and the index of volume 3 of the *Fragmenta*, as well as in volume 10 (Mueller 1876–77: 31). His annotations on sheets at MEL also give *chrysantherea* and *chrysanthereus*. The latter spelling is here restored.

Calothamnus cupularis A.S.George, *sp. nov.*

Ad *Calothamnium formosum* Hawkeswood affinis, sed floribus majoribus (hypanthio 5.5–6.5 mm longo, staminibus 35–38 mm longis) et fructibus majoribus (12–14 mm longis), praecipue differt.

Typus: north-west of Highway 1 along road to Kalbarri [Kalbarri NationalPark], Western Australia [precise locality withheld for conservation reasons], 30 September 1979, M.D. Crisp 6266, J. Taylor & R. Jackson (*holo*: PERTH 02324997; *iso*: CANB).

Calothamnus sp. Junga (S.D. Hopper 1293), Western Australian Herbarium, in *FloraBase*, <http://florabase.dec.wa.gov.au> [accessed 11 December 2009].

Shrub to 1.2 m tall with? lignotuber. *Stems* hirsute, glabrescent. *Leaves* terete, pungent, 4–10 cm long, 1–1.3 mm wide. *Flowers* 5-merous. *Hypanthium* 5.5–6.5 mm long, glabrous or hirsute. *Sepals* with prominent, thickened, tapering ‘midrib’ and wide, scarious margins, 3.5–4 mm long, variably hirsute, pubescent or partly glabrous. *Petals* glabrous, 7–8 mm long. *Staminal bundles* equal, 35–38 mm long, bright red. *Pistil* 38–40 mm long. *Fruit* almost cylindrical, smooth, 12–14 mm long; sepals persistent for a year or so, then falling leaving low lobes. *Seeds* 3.5–4 mm long, papillose on angles. (Figure 3)

Selected specimens examined. WESTERNAUSTRALIA: [localities withheld for conservation reasons], S.D. Hopper 1293 (PERTH); A. Strid 20810 (PERTH, S).

Distribution and habitat. Known from a small area in Kalbarri National Park, south-western Western Australia. Grows in yellow sand in kwongan.

Phenology. Flowers September–October.



Figure 3. *Calothamnus cupularis*. Holotype, Kalbarri National Park, M.D. Crisp 6266, J. Taylor & R. Jackson (PERTH 02324997). Scale bar = 5 cm.

Conservation status. Listed by Smith (2010) as Priority Two under DEC Conservation Codes for Western Australian Flora under the name *Calothamnus* sp. Junga (S.D. Hopper 1293). Known from several populations in a small area in Kalbarri National Park.

Etymology. The Latin *cupularis* (cup-like) refers to the fruit.

Affinities. Similar to *C. formosus* Hawkeswood but with much larger flowers and fruit.

Notes. Collections by S.D. Hopper 1293 (PERTH) and M.D. Crisp 6268 (CANB, PERTH) have the hypanthium almost glabrous except the sepals. *Strid* 20810 is hirsute throughout.

Calothamnus glaber (Benth.) Hawkeswood ex A.S.George, *stat. nov.*

C. blepharospermus var. *glaber*, Benth., *Fl. Austral.* 3: 176 (1867). *Type:* near the Murchison River, Western Australia, 18--, *A. Oldfield* (*holo:* K; *iso:* MEL 105168, MEL 105170, MEL 105171).

Trevor Hawkeswood annotated sheets at PERTH in 1979 but never published the combination, although it was listed as an invalid combination in Paczkowska and Chapman (2000). The taxon differs consistently from *C. blepharospermus* in being glabrous. Mueller referred to it in his protologue of *C. blepharospermus* thus: ‘Vidi ex eodem loco plantam non nisi glabrities, ut apparet, diversam’, i.e. I have seen from the same place a plant different, as it seems, in its glabrous state. The sheet MEL 105170, with Oldfield’s detailed notes, was annotated ‘var.’ by Mueller.

Calothamnus lateralis Lindl. var. ***crassus*** (Benth.) A.S.George, *stat. nov.*

C. lateralis f. *crassus* Benth., *Fl. Austral.* 3: 177 (1867); *Calothamnus crassus* (Benth.) Hawkeswood, *Nuytsia* 6: 86 (1987). *Type:* south-western Western Australia, 184-, *J. Drummond* 2: 73 (*lecto:* K *fide* T.J. Hawkeswood, *Nuytsia* 6: 86 (1987); *isolecto:* BM, K, NSW, OXF, P; south-western Western Australia, *J. Drummond* 37; *syn:* K).

Calothamnus sp. Scott River (R.D. Royce 84), Western Australian Herbarium, in *FloraBase*, <http://florabase.dec.wa.gov.au> [accessed 11 December 2009].

The name *Calothamnus lateralis* f. *crassus* Benth. was raised to specific rank by Hawkeswood (1987) and misapplied to a taxon endemic in the Stirling Range, described below as *Calothamnus montanus*. In fact, it is a taxon from far south-western Western Australia known as ‘*Calothamnus* sp. Scott River (R.D. Royce 84)’ and not sufficiently distinct from *C. lateralis* Lindl. to maintain at specific rank. Typical plants are much more robust and have shorter leaves than that species but there is much variation and the two cannot be separated by any reliable character. Bentham’s form is here given varietal rank.

Confirmation of the application of the name *C. crassus* came from a loose inflorescence of a *Grevillea* that was caught up in the syntype at Kew. These turned out to be *G. papillosa* (McGill.) P.M. Olde & N.R. Marriott, a species confined to the Scott River and Nannup area. Drummond visited this region in 1842 and sent his specimens to England as his First Collection in 1843 and 1844. He visited the Stirling Range twice later in the 1840s and sent this material in his Fourth and Fifth Collections. It is highly unlikely that flowers from the Scott River could have been mixed with a specimen from the Stirling Range.

Calothamnus montanus A.S.George, *sp. nov.*

Frutex erectus ad 2 m altus, sine lignotubero? Caules breviter villosi, glabrescentes, spissescentes. Folia teretia, 3.5–11 mm longa, 0.8–1 mm lata, hirsuta, glabrescentia. Flores 4-meri, conferti. Hypanthium immersum, 2–2.5 mm longum, glabrum; sepala 0.7–1 mm longa. Petala 2.5–3 mm longa. Fasciculi staminales 25–28 mm longi, rubri et virides. Pistillum 20–25 mm longum. Fructus depresso-globosus, 3–5 mm longus, glaber; sepala persistentia, 2 incurva et quam alia majora. Semina 0.7–1.2 mm longa, laevia.

Typus: Bluff Knoll [Stirling Range], Western Australia [precise locality withheld for conservation reasons], 12 November 1961, *A.S. George* 3140 (*holo*: PERTH 01074792).

Calothamnus crassus auct. non (Benth.) Hawkeswood: Hawkeswood, *Nuytsia* 6: 86 (1987)

Calothamnus sp. Montane (A.S.George 3140), Western Australian Herbarium, in *FloraBase*, <http://florabase.dec.wa.gov.au> [accessed 11 December 2009].

Erect *shrub* to 2 m, without? lignotuber. *Stems* shortly villous, glabrescent, becoming thick. *Leaves* terete, 3.5–11 mm long, 0.8–1 mm wide, openly hirsute, glabrescent. *Flowers* 4-merous, crowded, arranged on one side or quite surrounding stem. *Hypanthium* immersed, 2–2.5 mm long, glabrous. *Sepals* 0.7–1 mm long. *Petals* 2.5–3 mm long. *Staminal bundles* 25–28 mm long, red and green. *Pistil* 20–25 mm long. *Fruit* depressed-globose, 3–5 mm long, glabrous; sepals persistent, 2 incurved and larger. *Seeds* 0.7–1.2 mm long, smooth. (Figure 4)

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons], *S. Barrett* 97 (PERTH); *S. Barrett* 1041 (PERTH); *J.A. Cochrane* 5580 & *R. Hartley* (PERTH).

Distribution and habitat. Occurs in the Stirling Range, south-western Western Australia, generally above 800 m. Grows in quartzitic schist meta-sandstone soil in shrubland or woodland.

Phenology. Flowers October–January.

Conservation status. Recently listed as Priority Four under DEC Conservation Codes for Western Australian Flora. Known from several populations in the Stirling Range National Park.

Etymology. From the Latin *montanus* (montane), in reference to the occurrence.

Affinities. This is distinguished from *C. lateralis* by the villous young stems, generally shorter leaves and paler stamens that may be partly green; it has longer stamens than *C. lateralis* var. *crassus* which also has the thickened stems characteristic of *C. montanus*. In specimens from the eastern part of the Range the leaves are glabrous from the start.

Calothamnus oldfieldii F.Muell., *Fragm.* 3: 113 (1862). *Type citation*: ‘In collibus arenosis apud ostium fluminis Murchison. Oldfield’ [i.e. On sandy hills near mouth of Murchison River, Western Australia, 18--., *A. Oldfield*] (*lecto*, here chosen: MEL 105193; *isolecto*: K (2 sheets), MEL 105192).



Western Australian Herbarium
PERTH 01074792

3140

3140

Calothamnus crassus (Benth.)
T.J.Hawkeswood
DETERMINAVIT T.J.Hawkeswood 6 June 1980

Calothamnus lateralis Lindl.
subsp. *crassus* (Benth.) T.J.Hawkeswood.
DETERMINAVIT T.J.Hawkeswood. 6 March 1980.
Western Australian Herbarium (PERTH)

STATE HERBARIUM
WESTERN AUSTRALIA
Shrub to 1m. Fls. red & green.
Loc. Bluff Knoll.
Coll. A. S. GEORGE 3140. 12. II. 1961.

FLORA OF AUSTRALIA PROJECT
Calothamnus montanus A.S. George
HOLOTYPE
Det. A. S. George Date 15 Dec. 2009
REPRESENTED IN REFERENCE HERBARIUM

Figure 4. *Calothamnus montanus*. Holotype, Stirling Range, A.S. George 3140 (PERTH 01074792). Scale bar = 5 cm.

Calothamnus kalbarriensis Hawkeswood, *Nuytsia* 5: 147 (1984). *Type*: c. 5 km inland from Zuytdorp Cliffs, 40 km WSW of Cooloomia Homestead, Western Australia, 15 September 1979, S.D. Hopper 1327 (*holo*: PERTH; *iso*: CANB).

The five sheets of material at MEL collected at the Murchison River by Oldfield and annotated as *Calothamnus oldfieldii* by Mueller bear two entities. MEL 105192 and MEL 105193 are the species described by Hawkeswood (1984) as *C. kalbarriensis*; both have the Oldfield number 1134, and 105193 has his field label with the locality 'Pillyandie-Nat the mouth of Murchison R'. MEL 105194 and MEL 105197 are the species described below as *C. phellosus*; neither has an Oldfield label but both are annotated 'Murchison R.' in Mueller's hand. MEL 105196 is the same species; Oldfield's field label on this sheet has the locality 'Limestone Hills W of Yarrhos' and his number 794; the sheet was annotated by Hawkeswood as lectotype on 11 June 1984 but he never published this. Unfortunately, the specimens that best fit Mueller's protologue are those on MEL 105192 and MEL 105193: Mueller italicised '*Foliis breviusculis muticis teretiusculis*' (the italic indicating a significant attribute) and gave their length as ' $\frac{3}{4}$ – $\frac{1}{2}$ "' (c. 2–3 cm) long, and the fruit as almost ' $\frac{1}{2}$ "' (c. 12 mm) long. These attributes are those of *Calothamnus kalbarriensis* (leaves 1.5–2.5 cm long, fruit 10–12 mm long), whereas *C. oldfieldii* as recently known has leaves typically 3–8 cm long and fruit 7–10 mm long; this species has fruit with a corky bark, as represented on MEL 105194 and MEL 105197. Further, Mueller cited an Oldfield collection gathered on sand hills near the mouth of the Murchison River, and these details are given for sheet 105192 and its duplicate 10593. The sheet MEL 105193 has the best specimens and is here selected as lectotype, MEL 105192 being an isolectotype. While it is unfortunate that the well-known name *C. oldfieldii* is shown to have been misapplied, and *C. kalbarriensis* is a well-established name, the evidence from the type material and the protologue leaves no choice but to apply the name *oldfieldii* correctly and publish a new name for the entity that has been known as *C. oldfieldii* (*C. phellosus*, see below).

Calothamnus phellosus A.S. George, *sp. nov.*

Ad *Calothamnium formosum* Hawkeswood affinis, a qua habitu majore (ad 4 m alto, 6 m lato), lignotubero, hypanthio pubescente vel tomentoso, et fructu minore (7–11 mm longo) cortice suberoso, differt.

Typus: North-West Coastal Highway, 9.8 km north of Eurardy Station entrance, Western Australia, 27° 29' S, 114° 43' E, 13 September 2004, A.S. George 17627, R.K. Brummitt & E.G.H. Oliver (*holo*: PERTH 07002009; *iso*: K).

Calothamnus oldfieldii auct. non F. Muell.

Erect *shrub* to 4 m tall and 6 m wide, with lignotuber. *Stems* pubescent or tomentose, glabrescent. *Leaves* terete, acute, pungent, 2.5–8 cm long, 0.7–1.1 mm wide, glabrous, or sparsely hirsute and glabrescent. *Flowers* 5-merous, commonly in small groups among or below leaves. *Hypanthium* 3–4.5 mm long, sparsely to densely pubescent, or tomentose. *Sepals* ± equal, 1.3–2 mm long, pubescent to tomentose. *Petals* 4–4.5 mm long. *Staminal bundles* 22–30 mm long, bright red. *Pistil* 18–30 mm long. *Fruit* depressed-globose but irregular when closely packed, 7–11 mm long, soon developing corky bark; sepals not enlarged, initially persistent. *Seeds* 2.8–3 mm long, papillose on angles. (Figure 5)

Selected specimens examined. WESTERNAUSTRALIA: 20 km SE of Z-bend turnoff on Kalbarri–Ajana road, D.E. Albrecht 4193A & B. Fuhrer (MEL, PERTH); 12 km W of Mullewa, L.A. Craven & F.A.



Figure 5. *Calothamnus phellosus*. Holotype, north of Eurardy Station turnoff, North West Coastal Highway, A.S. George 17627, R.K. Brummitt & E.G.H. Oliver (PERTH 07002009). Scale bar = 5 cm.

Zich 8719 (CANB, PERTH); NNE of Northampton, *J. D'alonzo* 563 (PERTH); north of Whelarra, *A.S. George* 17634, *R.K. Brummitt & E.G.H. Oliver* (K, PERTH); 6.6 km N of Binnu, North West Coastal Highway, *R.W. Purdie* 3828 (CANB, PERTH).

Distribution and habitat. Occurs between Eurardy Station, Northampton and Yuna, south-western Western Australia. Grows in deep yellow sand or sand over laterite, in kwongan or shrubland.

Phenology. Flowers September–November.

Conservation status. Not threatened.

Etymology. The Greek *phellosus* (corky) refers to the bark of the fruit.

Affinities. This species resembles *C. formosus* which is non-lignotuberous, has a hypanthium that is glabrous or pubescent only towards base, and a fruit that is usually larger and warted. It is also related to *C. oldfieldii* but is a much larger shrub and has longer leaves that taper more gradually to the apex, and fruit that quickly develop a corky bark.

Notes. As discussed above under *Calothamnus oldfieldii*, this species has been known by that name virtually since its publication. When Hawkeswood studied the type material at MEL he recognised that some specimens are the species that he named *C. kalbarriensis* but apparently did not check them against Mueller's protologue. He maintained the traditional application of the name *oldfieldii*, based on a presumed syntype that does not match Mueller's description.

Calothamnus planifolius* var. *pallidifolius Benth., *Fl. Austral.* 3: 177 (1867) *Type:* south-western Western Australia, 184-, *J. Drummond* 40 (*lecto*, here chosen: K); south-western Western Australia, 184-, *J. Drummond* 2: 72 (*syn:* BM, CGE, E, K (2 sheets), NSW, OXF, P).

Hawkeswood (1987: 103), stated that he selected the NSW sheet of *Drummond* 2: 72 as lectotype, but this contradicts the ambiguous statement on p. 100 which cited both a sheet at K and one at NSW after 'lecto, here designated', and the photograph of the NSW sheet on p. 101 is clearly annotated by him as 'isolectotype'. This sheet is a duplicate received from BM in 1915 and was not annotated by Bentham. Of the syntype sheets at K (all annotated by Bentham), that of *Drummond* 40 is better material than the two of *Drummond* 2: 72 and is a better choice as lectotype.

Calothamnus roseus A.S. George, *sp. nov.*

Ad *Calothamnum rupestrem* Schauer affinis, a qua foliis plerumque longioribus (25–45 mm longis), hypanthio indumento reflexo, fasciculis staminalibus roseis, pistillo brevioribus (20–25 mm longo), et fructu majore (13–16 mm longo), differt.

Typus: south-east of Ravensthorpe, Western Australia [precise locality withheld for conservation reasons], 29 September 2004, *A.S. George* 17657 & *E.G.H. Oliver* (*holo:* PERTH 06996809; *iso:* AD, CANB, K, MEL, NSW, PERTH).

Calothamnus sp. Kundip (A.S. George & E.G.H. Oliver ASG 17657), Western Australian Herbarium, in *FloraBase*, <http://florabase.dec.wa.gov.au> [accessed 11 December 2009].

Shrub to 2.5 m without lignotuber. *Bark* flaking in coarse strips. *Stems* glabrous. *Leaves* terete, pungent, 25–45 mm long, 0.5–0.7 mm wide, smooth. *Flowers* not or slightly immersed, 4-merous, mostly below leaves, strongly scented. *Hypanthium* 5–6 mm long, pubescent with reflexed hairs. *Sepals* 3.5–4 mm long, pubescent both sides. *Petals* 6–7 mm long, falling at anthesis. *Staminal bundles* equal, 28–33 mm long, deep pink. *Pistil* 20–25 mm long, strongly downcurved. *Fruit* ovoid, 13–16 mm long, smooth; 2 sepals enlarged, persistent, woody, 2 not enlarged, turned outwards, wearing off. *Seeds* narrow, 2–2.5 mm long, angular, smooth. (Figure 6)

Selected specimens examined. WESTERNAUSTRALIA: [localities withheld for conservation reasons], S.D. Hopper 4390 (PERTH); K. Newbey 2495 (PERTH).

Distribution and habitat. Occurs south of Ravensthorpe, south-western Western Australia. Grows in rocky, quartzitic soil in tall mallee shrubland.

Phenology. Flowers September–November.

Conservation status. Listed by Smith (2010) as Priority One under DEC Conservation Codes for Western Australian Flora under the name *Calothamnus* sp. Kundip (A.S. George & E.G.H. Oliver ASG 17657). Known from several populations over a range of c. 10 km.

Etymology. The Latin *roseus* (rose-pink) refers to the colour of the stamens.

Affinities. This differs from *C. rupestris* Schauer in the generally longer leaves, reflexed indumentum of the hypanthium, deep pink staminal bundles, shorter pistil and larger fruit. *Calothamnus rupestris* occurs around granitic outcrops along the Darling Scarp near Perth and at Boyagin Rock, with an outlier in sandy soil west of Wongan Hills.

Calothamnus scabridus A.S. George, *sp. nov.*

Frutex erecto-patens ad 1.5 m altus, sine lignotubero. Caules glabri. Folia teretia, acuta, pungentia, 2–7 cm longa, 0.8–1 mm lata, scabrida, cetera glabra. Flores 4-meri, inter vel infra folia vetusissima. Hypanthium immersum, 1.5–2 mm longum, glabrum; sepala 0.8–1 mm longa. Petala 1.8–2 mm longa. Fasciculi staminales 23–28 mm longi, aequales, pallide ad clare rubri. Pistillum 22–24 mm longum. Fructus depresso-globosus, laevis, 3–4 mm longus; 2 sepala persistentia, incurva. Semina 0.8–1 mm longa, laevia.

Typus: south-east of Manjimup [north-west of Denmark], Western Australia [precise locality withheld for conservation reasons], 7 November 1995, A.R. Annels & R.W. Hearn 5537 (*holo:* PERTH 04247531; *iso:* CANB, K, MEL, NSW, PERTH).

Calothamnus sp. Mt Lindesay (A.R. Annels et al. 4539), Western Australian Herbarium, in *FloraBase*, <http://florabase.dec.wa.gov.au> [accessed 11 December 2009].

Calothamnus sp. Mt Lindesay (B.G. Hammersley 439), Western Australian Herbarium, in *FloraBase*, <http://florabase.dec.wa.gov.au> [accessed 11 December 2009].



Figure 6. *Calothamnus roseus*. Holotype, south-east of Ravensthorpe, A.S. George 17657 & E.G.H. Oliver (PERTH 06996809). Scale bar = 5 cm

Erect *shrub* to 1.5 m, without lignotuber. *Stems* glabrous. *Leaves* terete, acute, pungent, 2–7 cm long, 0.8–1 mm wide, scabrid, otherwise glabrous. *Flowers* 4-merous, among or below oldest leaves, around stem. *Hypanthium* immersed, 1.5–2 mm long, glabrous. *Sepals* 0.8–1 mm long. *Petals* 1.8–2 mm long. *Staminal bundles* equal, 23–28 mm long, pale to bright red. *Pistil* 22–24 mm long. *Fruit* depressed-globose, smooth, 3–4 mm long; 2 sepals persistent, incurved. *Seeds* 0.8–1 mm long. (Figure 7)

Selected specimen examined. WESTERN AUSTRALIA: [locality withheld for conservation reasons], G.J. Keighery 12295 (PERTH).

Distribution and habitat. Restricted to two peaks north-west of Denmark, south-western Western Australia, in granitic loam in heath and mallee shrubland.

Phenology. Flowers October–December.

Conservation status. Listed by Smith (2010) as Priority Two under DEC Conservation Codes for Western Australian Flora under the name *Calothamnus* sp. Mt Lindesay (B.G. Hammersley 439). Known from several populations on two peaks *c.* 45 km apart. Both are within State Forest.

Etymology. The Latin *scabridus* (scabrid) refers to the leaves.

Affinities. This is related to *C. huegelii* Schauer and *C. montanus* but may be readily recognised by the scabrid leaves.

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Staff of the Western Australian Herbarium gave cheerful assistance over a number of years. Staff of the National Herbarium of Victoria supplied scanned images of type material there. I studied relevant material at the Royal Botanic Gardens, Kew, the Natural History Museum, South Kensington, and other European herbaria while on duty as Australian Botanical Liaison Officer at Kew in 2004–05. In his usual inimitable way, Paul Wilson discussed various nomenclatural matters. Dick Brummitt (RBG Kew) and Ted Oliver (Stellenbosch) were enthusiastic companions on our ‘Calothamnus crawl’ in 2004.

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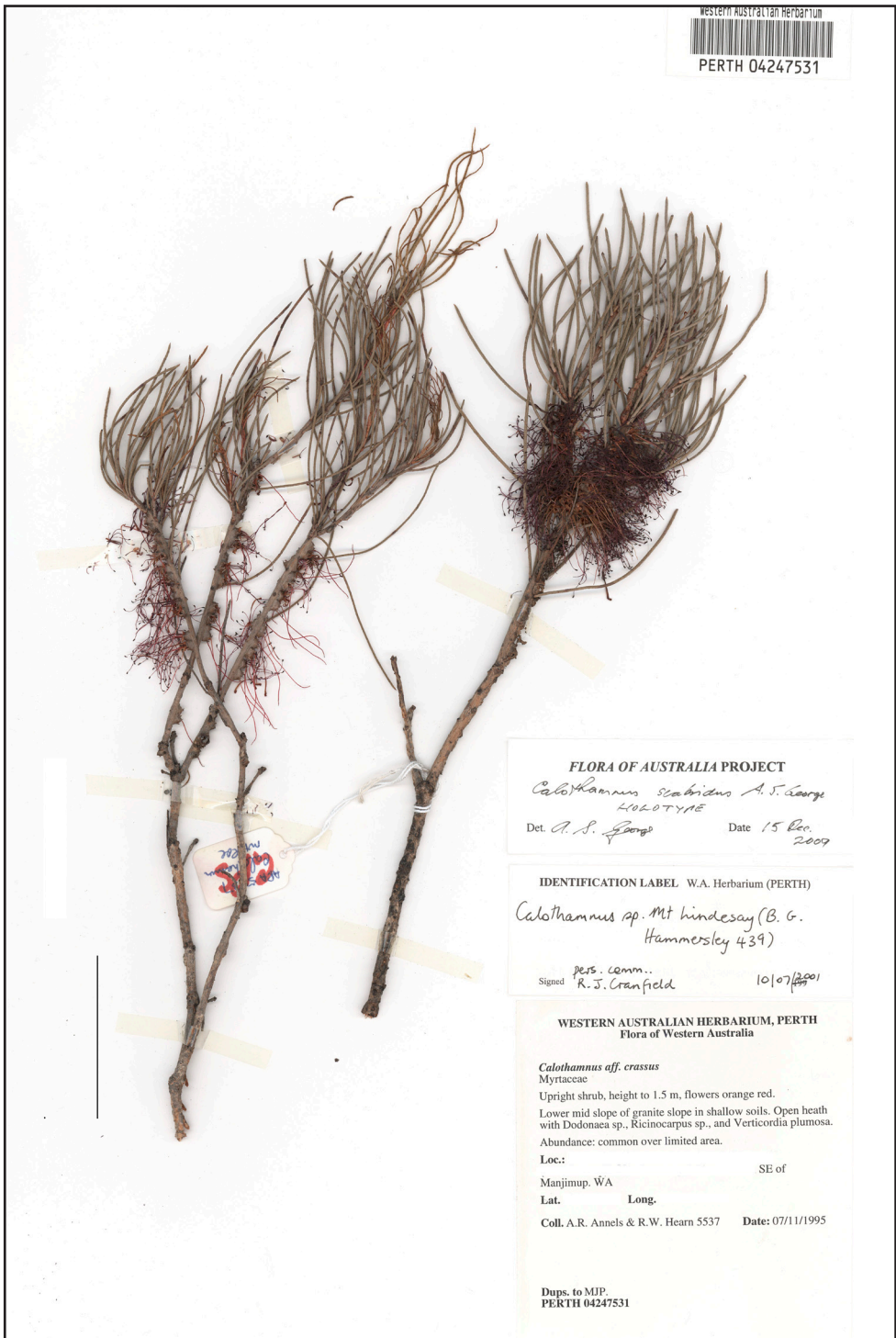


Figure 7. *Calothamnus scabridus*. Holotype, north-west of Denmark, *A.R. Annels & R.W. Hearn* 5537 (PERTH 04247531). Scale bar = 5 cm.

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Note added in proof

Edwards *et al.* (2010) have foreshadowed the merger of all nine genera (including *Calothamnus*) of the tribe Melaleuceae into a single genus, *Melaleuca* L., because their molecular analysis of species from all genera implies that *Melaleuca* is not monophyletic. They prefer merging these genera to splitting *Melaleuca* into ‘multiple genera’ because ‘it is desirable to avoid generation of many new genera with few representatives’. This view of small genera is their personal one and has no scientific basis. From the early years of classifying the Australian flora we have managed perfectly well with small genera—there are now hundreds of them. The authors’ use of ‘multiple’ and ‘many’ may be misleading, since an examination of their cladograms indicates that number of new genera (additional to those currently recognised) might be just eight or nine. They say that ‘current species-poor genera may retain recognition at the subgeneric level.’ If they are recognisable within the tribe Melaleuceae, why not call them genera? What is their argument for accepting subgenera with few species but not genera? Regarding *Calothamnus*, their study included one species (out of 41), using an independently supplied DNA sample for which the determination of the voucher was not checked. All the cladograms in their paper have unresolved nodes that should be investigated further, and they have not undertaken detailed morphological analyses for novel characters and states that would differentiate groups that could be recognised at generic rank. Their paper provides very useful data on the relationships between these genera, and groups within *Melaleuca*, but it does not provide a convincing basis for merging them. Using standard keys, we have been running down specimens to the currently-named genera for over 150 years (except *Petraeomyrtus*, named in 1999). *Calothamnus* is an easily recognisable genus that should be maintained.

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