Nuytsia The journal of the Western Australian Herbarium

22(5): 323–328 Published online 6 November 2012

A new species of *Monotoca* (Ericaceae: Styphelioideae: Styphelieae) from the south coast of Western Australia

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Abstract

Chapman, A.R. A new species of *Monotoca* (Ericaceae: Styphelioideae: Styphelieae) from the south coast of Western Australia. *Nuytsia* 22(5): 323–328 (2012). A new species, *Monotoca aristata* A.R. Chapman from the west of Fitzgerald River National Park is described and illustrated. It is distinguished from all other *Monotoca* species by the thick, aristate, linear-lanceolate leaves, with conspicuous veins on the abaxial surface. It is now the only representative of this genus in Western Australia.

Introduction

The endemic Australian genus *Monotoca* R.Br. (Ericaceae) consists of ten currently recognised taxa, distributed throughout eastern Australia including Tasmania. Three western species, previously considered to belong to that genus (Paczkowska & Chapman 2000) have recently (Albrecht *et al.* 2010; Albrecht & Hislop 2011) been segregated into the new genus *Dielsiodoxa* Albr. and placed, together with the monotypic *Oligarrhena* R.Br., into the tribe Oligarrheneae Crayn & Quinn. This resolves more than a century of uncertainty with respect to these species: while Bentham (1869: 232) regarded that the Western Australian species were 'better placed in *Monotoca* than in any other genus', other authors regarded that they were 'alien amongst this genus of plants' (Mueller 1867: 79)[1] and 'would certainly justify separation as a special genus' (Diels & Pritzel 1904: 480)[2].

Collections of unidentified material from near Mt Maxwell in the Fitzgerald River National Park in the 1960s and 1970s were provisionally identified as a new taxon belonging within *Monotoca*. In an early morphological cladistic analysis of the Epacridaceae (Powell *et al.* 1987) this taxon grouped in an unresolved polytomy with the eastern taxa, western taxa and the related genera *Acrotriche* R.Br., *Cyathodes* Labill., *Leucopogon* R.Br. sect. *Perojoa* (Cav.) Benth. and *Lissanthe* R.Br. in the Styphelieae (Benth.). The very small tubular flowers with erect lobes, a single-celled ovary, and the strong trend towards dioecy in all taxa served to distinguish *Monotoca s. lat.* in the analysis from the otherwise closely allied genus *Leucopogon*. This work led to a more detailed re-assessment of relationships within Epacridaceae (Powell *et al.* 1996).

Later evidence, both morphological and molecular (Powell *et al.* 1997; Taaffe *et al.* 2001; Kron *et al.* 2002; Quinn *et al.* 2003; Albrecht *et al.* 2010) strongly supported the grouping of this new taxon

[1] 'species inter plantas coordinales adspectus aliena' (Mueller 1867: 79).

[2] 'so daß sich die Abtrennung als besondere Gattung durchaus rechtfertigen würde' (Diels 1904: 480).

http://florabase.dec.wa.gov.au/nuytsia/
ISSN 2200-2790 (Online)
ISSN 0085-4417 (Print)

with the eastern species in the reduced circumscription of *Monotoca sens. str.* Accordingly, it is here described as *M. aristata* A.R.Chapman, the sole Western Australian representative of the genus.

Methods

This study is based on observations of herbarium collections housed predominantly at NSW and PERTH. Relevant type specimens of other Western Australian *Monotoca* species (now *Dielsiodoxa*) were obtained on loan from MEL, while others housed at G, K, P and W have also been examined. Floral material was rehydrated in 70% ethanol before dissection and measurement; fruit measurements were made on dried material. The distribution map was compiled using DIVA-GIS version 7.1.7.2 and is based on PERTH specimen data (Western Australian Herbarium, 1998–).

Taxonomy

Monotoca aristata A.R.Chapman *sp. nov.*

Folia effusa usque ad horizontalia, lineari-lanceolata, glabra, aristata; *lamina* crassa, plana usque ad convexa venis 5 parallelis abaxialibus instructa. *Inflorescentia* axillaris; *spicae* breves, floribus 1–3. *Ovarium* uniloculare, puberulentum; *stylus* brevis. *Monotoca* R.Br. ex Australia orientali affine.

Typus: Mt Maxwell, Western Australia [precise locality withheld for conservation reasons], 6 May 1975, *K.R. Newbey* 4727 [male plant] (*holo*: PERTH 5548365; *iso*: AD, BRI, CANB, HO, K, MEL, MO, NSW 299504).

Monotoca sp. 2 (Mt Maxwell), J.D. Briggs & J.H. Leigh, *Rare or Threatened Australian Plants* 37, 127 (1988); revised edn, 55, 392 (1996).

Monotoca aristata A.R. Chapman ms, in G. Paczkowska & A.R. Chapman, *West. Austral. Fl.: Descr. Cat.* 242 (2000).

Monotoca sp. A ('aristata'), D.E. Albrecht, C.T. Owens, C.E. Weiller & C.J Quinn, *Austral. Syst. Bot.* 23: 320 (2010).

Monotoca sp. Mt Maxwell (K.R. Newbey 4727), Western Australian Herbarium, in *FloraBase*, http://florabase.dec.wa.gov.au/ [accessed 27 June 2012].

Moderately dense, bushy dioecious shrubs, 0.25–0.8(–1.5) m tall, 0.2–0.7 m wide; *stems* erect, light grey-brown, glabrous, with fibrous tesselated bark and often prominent leaf scars; older stems without leaves; young stems brown or grey-glaucous, slightly ribbed, usually glabrous. *Leaves* light yellow-green, evenly spaced, alternate, spreading to horizontal, non-imbricate, linear-lanceolate, 6.8–15.5 mm long, 1.1–2.5 mm wide [l:w 4.1–13.6]; apex acute to acuminate, straight, aristate to 1.0 mm; base somewhat obtuse; *petiole* 0.6–1.4 mm long, glabrous; *lamina* thick, convex to flat, glabrous, discolorous (paler abaxially); adaxial surface without conspicuous veins; abaxial surface with five conspicuous parallel veins (two marginal); margin straight to recurved, unthickened, entire. *Inflorescences* spreading spikes each 2–4 mm long, 1.2–3 mm wide [l:w 1–3.3], with 1 or 2(3) flowers per spike, usually terminated by a sterile bud, in clusters in the upper axils 10–15 mm long, 5–8 mm wide; peduncles puberulent; flowers small, erect, white or cream to pale green; male and female flowers dissimilar in size. *Bracts* solitary, small, uniform along spike, ovate, 0.5–1.0 mm long, 0.5–0.7 mm wide [l:w 0.9–1.5]; apices obtuse; midrib abaxially inconspicuous, with ciliolate margins, otherwise glabrous; *bracteoles* paired, ovate-orbicular, 0.7–1 mm long, 0.65–1

mm wide [l:w 0.9–1.2]; apices obtuse; midrib thickened towards apex, with ciliolate margins, otherwise glabrous. *Sepals* five, broadly ovate, 0.9–1.7 mm long, 0.8–1.2 mm wide [l:w 1–1.6]; apices obtuse; midrib abaxially inconspicuous, with ciliolate margins, otherwise glabrous. *Corolla tube* campanulate, glabrous externally and internally, in male flowers 1.4–1.6 mm long, 1.4–1.8 mm wide at throat, 0.5–0.8 mm wide at base, in female flowers 0.7–0.8 mm long, 1.2 mm wide at throat, 0.5–0.6 mm wide at base; *lobes* five, 0.6–1 mm long, 0.75–0.95 mm wide [l:w 0.8–1.1], acute, erect, externally glabrous, internally shortly pubescent in female flowers, in male flowers shortly pubescent mainly over the lower half leaving the upper 0.2–0.4 mm glabrous; much shorter than tube [lobe:tube 0.4–0.6] in male flowers, sub-equal [lobe:tube 1.0–1.2] in female flowers. *Anthers* five, in male flowers 1.4–1.5 mm long, 0.3–0.5 mm wide and connate over the lower third, much reduced in female flowers to 0.3 mm long, 0.2 mm wide; filaments attached well above the middle of the anther. *Gynoecium* conical; *ovary* spherical, 0.35–0.5 mm high, 0.3–0.5 mm at widest point, smooth or occasionally ribbed, sparsely puberulent, unilocular, with a single ovule pendulous from apex; *style* continuous with ovary, 0.35–0.5 mm long, 0.15–0.35 mm wide just below the stigma, 0.3–0.4 mm wide at base, glabrous, not exserted from tube; stigma scarcely differentiated although darker, <0.05 mm high in male plants, 0.1 mm high in female plants; *nectary* forming a continuous ring, 0.1–0.3 mm high, glabrous, with lobed upper margin. *Fruit* pale red to red-brown, ovoid, 1.8–2.8 mm long, 1.5–1.9 mm wide, exceeding calyx; apex pointed with short style persistent; surface smooth or rugose, puberulent, with fleshy mesocarp and thin bony endocarp. (Figure 1)

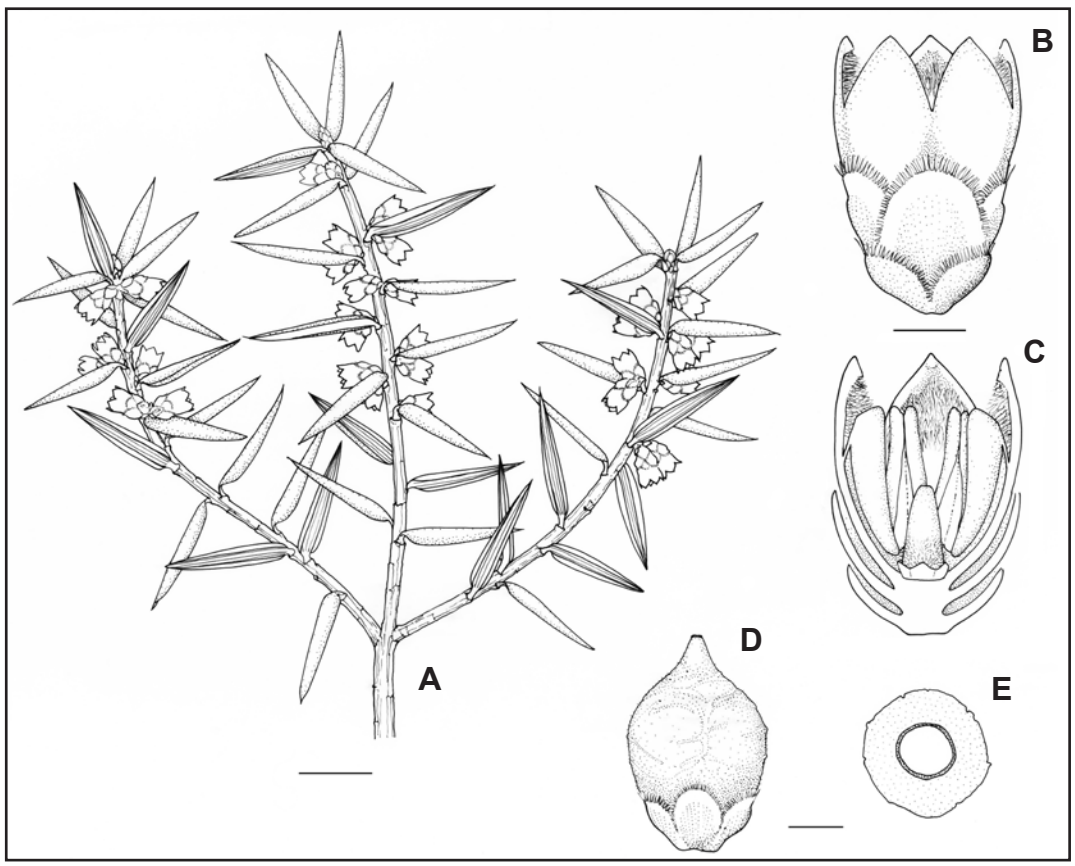

Figure 1. *Monotoca aristata*. A – flowering branchlet; B – flower; C – longitudinal section of functionally male flower; D – mature fruit; E – transverse section of mature fruit showing unilocular ovary. Scale bars: A = 5mm; B– E = 1mm. A–C drawn from *K.R. Newbey* 4727; D, E drawn from *P.G. Wilson* 4365.

Specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 6 Dec. 2003, *S. Barrett* 1211 (PERTH); 14 Mar. 2005, *S. Barrett* 1346 (PERTH); 18 Apr. 2005, *D. Brearley* ec 604-06 (PERTH); 6 Oct. 2000, *A.R. Chapman* 707, 708 (PERTH); 12 Dec. 2001, *A.R. Chapman* 719 (PERTH); 16 Oct. 1995, *J.A. Cochrane* 1599 (PERTH); 13 Oct. 1989, *B.J. Conn & J.A. Scott* BJC 3399, 3400 (PERTH); 10 Aug. 1985, *R.K. Crowden* 8508-121 (NSW); 21 June 1986, *E.J. Croxford* 4980 (PERTH); 15 July 1970, *A.S. George* 10065 (PERTH); 22 June 1987, *K.R. Newbey* 11736A, 11736B (NSW, PERTH); 15 June 2000, *L. Polomka & S. Patrick* SP 3404A, 3404B (PERTH); 16 June 2000, *L. Polomka & S. Patrick* SP 3406, 3407 (PERTH); 2 Aug. 1986, *J.M. Powell* 2381 (NSW, PERTH), 2381A (NSW), 2390 (NSW); 9 May 2003, *E.M. Sandiford* 722 (PERTH); 2 Oct. 1966, *P.G. Wilson* 4365 (NSW, PERTH).

Distribution and habitat. *Monotoca aristata* occurs on the southern slopes of Mt Maxwell and exposed ridges to the east where it is common in patches of open banksia heath on well-drained, dark grey, stony quartzite sand. Three small, disjunct populations occur around the locality of Wellstead, some 70 km to the south-west of Mt Maxwell, where it occurs on flats in white sand over laterite (Figure 2).

Phenology. Buds observed from December to May, flowers from May to early August, with the peak in June. Flowers remain on a significant proportion of plants (those without fruit) into December. Plants with more or less mature fruits observed from June onwards, with the peak in October.

Pollen. Albrecht *et al.* (2010) report that *M. aristata* pollen are pseudomonads of the unique 'Monotoca-type' (Martin 1993), as in the rest of both *Monotoca sens. strict.* and *Dielsiodoxa*. Fossil pollen of this type has been recorded in early Pliocene assemblages from Lake Tay (as Gen. and sp. nov. B) by Bint (1981). Lake Tay is *c.* 200 km to the north-east of the Fitzgerald River and between the ranges of known populations of *D. leucantha* (E.Pritz.) Albr. and *D. oligarrhenoides* (F.Muell.) Albr.

Figure 2. Distribution of *Monotoca aristata* (●) in south–west Western Australia. *Interim Biogeographic Regionalisation Version 6.1* (Department of the Environment, Heritage, Water and the Arts 2008) boundaries are indicated in grey.

Conservation status. *Monotoca aristata* has been assigned Priority Two status under the Department of Environment and Conservation (DEC) Conservation Codes for Western Australian Flora (Smith 2012). Most of the known populations are conserved in the extreme west of the Fitzgerald River National Park with another occurrence around the locality of Wellstead within remnant vegetation, including a small population in Mettlers Lake Nature Reserve.

Etymology. The specific epithet refers to the distinctly aristate leaves.

Notes. *Monotoca aristata* has no close allies in the genus, differing from all other *Monotoca* taxa in possessing thick, strongly ribbed, linear-lanceolate leaves with five conspicuous parallel veins on the abaxial face, and also by the presence of short, dense puberulence on the interior of the corolla lobes.

Monotoca aristata is the sole representative of *Monotoca* in Western Australia, with all others occurring on the east coast of Australia from Tasmania and the South Australian/Victorian border to northern Queensland. This disjunction is significant with reference to the biogeography of the tribe and, together with the palynological evidence, may suggest a more continuous distribution for the genus in the past.

Observations in the field and of recent paired specimen collections (*A.R. Chapman* 707, 708; *B.J. Conn* 3399, 3400; *L. Polomka & S. Patrick* SP 3406, SP 3407) suggest that this new taxon is functionally dioecious. The male plants (such as the type material) possess flowers that are hermaphroditic (Figure 1) but do not bear fruit, their flowers persisting on the plants throughout while the female plants, with much-reduced anthers, bear the fruit. Conn notes on the labels of his two collections that 'of 100 plants sampled: 33 produced fruits; 59 lacked fruits, flowers or aborted flowers; eight had mostly aborted flowers/fruits'. Dioecy has been noted in a number of eastern species of *Monotoca* and related genera in the Styphelieae (e.g. Albrecht 1996: 490; Stevens *et al.* 2004: 152–153, 179).

Acknowledgements

This work began while I was working at NSW and I would like to take this opportunity to thank Dr Jocelyn Powell for her mentorship during my years there and Ken Newbey for his tireless endeavours and submission of the material which first alerted me to this new taxon. I wish to thank the staff at MEL for the loan of various type specimens. I would also like to thank Lynda Harrington for the fine illustration, Paul Wilson for the Latin diagnosis and both editor and referee for their constructive comments on the manuscript.

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