

Phebalium bifidum (Rutaceae), a new species from the Capertee Valley, New South Wales

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Abstract

Weston, P.H.¹ and Turton, M.² (¹National Herbarium of New South Wales, Botanic Gardens Trust, Mrs Macquaries Road, Sydney, NSW 2000, Australia; ² PO Box 186 Wentworth Falls, NSW 2782, Australia) 2004. *Phebalium bifidum* (Rutaceae), a new species from the Capertee Valley, New South Wales. *Telopea* 10(4): 787–792. ***Phebalium bifidum*** P.H.Weston & M.Turton, is named, described and distinguished from its closest relatives, *P. obcordatum* and *P. glandulosum*. Illustrations, a distribution map, and modifications to existing keys are provided.

Introduction

In September 1998, the second author was conducting a survey of populations of the vulnerable taxon *Grevillea obtusiflora* subspecies *fecunda* in the Capertee Valley. During the course of this survey, a specimen was collected of an unusual *Phebalium*. This specimen and subsequent observations and collections by Margaret Turton and Haydn Washington, were sent to Peter Weston for identification. After examination, Weston confirmed that these specimens belonged to a rare, unnamed taxon, which had not previously been collected. Approximately 230 plants are known from two populations about three kilometres apart. Pending formal taxonomic description, it was given the informal 'phrase name' *Phebalium* sp. 'Capertee' (NSW 481881). It is named and described in this paper, using the morphological terminology discussed by Wilson (1970, 1998). The most recent taxonomic treatment of *Phebalium* (Wilson 1998) is an update of Wilson's earlier comprehensive revision of the genus (Wilson 1970). Wilson (1998) narrowed the circumscription of the genus to that of *Phebalium* section *Phebalium* of his earlier revision (Wilson 1970). Wilson (1970) formally recognised infraspecific variation at either varietal or subspecific rank in four polymorphic species in *Phebalium*. Our new taxon is morphologically distinct from all others that have been described, but it most closely resembles two other eastern Australia species, *P. obcordatum* and *P. glandulosum*, the latter of which is polymorphic, with four formally recognised subspecies.

Before describing the new taxon we wanted to clarify its relationships to other taxa and thus determine the most appropriate rank at which to recognise it. Consequently, we tried to conduct a preliminary cladistic analysis of *Phebalium*, using qualitative morphological characters that Wilson (1970) found to be taxonomically informative in the genus. This attempt failed, yielding hundreds of thousands of equally parsimonious trees, the strict consensus of which was almost completely unresolved (results not shown). The problem of the precise position of the new taxon could, in principle, be investigated as part of the molecular phylogenetic analysis of *Phebalium* that is now in progress (see Mole 2004) but that would be a major task. Preliminary results from that project (Mole 2004) suggest that a well resolved phylogeny down to subspecific level would require the sequencing of multiple genetic loci. Given our present inability to resolve detailed relationships amongst taxa in *Phebalium*, it seemed wisest to apply Wilson's (1970) criterion of phenetic distinctness in choosing the

taxonomic rank at which to recognise this taxon. Consequently, we decided to recognise this new taxon at specific rank, rather than to arbitrarily include it as a subspecies within one of the other known species that it closely resembles.

Taxonomy

***Phebalium bifidum* P.H.Weston & M.Turton, sp. nov.**

Frutex erectus; ramuli teretes, glandibus non protrudentibus. Folia adulta bilobata, 3.5–14 mm longa; lobi 0.5–3.0 mm longi, 0.6–1.2 mm lati; pagina adaxialis laminae costa impressa glandibus parum protrudentibus; pagina abaxialis laminae dense lepidota. Inflorescentia 2–11 floribus; pedicelli 2.5–7.5 mm longi; calyx cupulatus 0.9–1.5 mm longus, 2.0–2.5 mm latus, truncatus vel obtuse lobatus; petala 5 plus minusve elliptica, 3.0–3.5 mm longa, 1.4–1.8 mm lata, pagina adaxiali cremea vel vivida citrina; apiculum antherae glandiferum.

Type: New South Wales: Central Tablelands: Capertee Valley, *P.H. Weston 2609, D. Crayn, J. Allen & H. Washington*, 29 Aug 2003 (holo NSW 608407; iso CANB, BRI, K, MEL, MO, PERTH) [exact location withheld for conservation purposes].

Erect shrubs 0.2–1.5 m high. Branchlets erect to spreading, terete, densely covered in glossy, scale-like compound trichomes, which vary in colour when young from cream with a scattering of ferruginous scales to uniformly ferruginous, discolouring to matt grey with age; oil glands not raised, covered by scales. Leaves of sexually immature shoots ('juvenile leaves') at first cuneate, with a slightly emarginate apex, successive leaves developing a distinctly bilobed apex, the largest leaves reaching 16 mm long, 3.5 mm wide, with an apical sinus 1 mm deep, densely lepidote on abaxial surface. Leaves of sexually mature shoots ('adult leaves') spreading to erect, shortly petiolate, Y-shaped, bilobed, 3.5–14 mm long; petiole 0.3–1.0 mm long, densely covered in scales; adaxial surface of lamina dark green when fresh, fading to olive or greyish green when dried, with distinctly impressed midvein, with oil glands protruding slightly above surrounding epidermis, sparsely to moderately covered in scales when young, glabrescent with age; margins entire, revolute; abaxial surface of lamina densely covered in glossy cream scales and a scattering of ferruginous scales when young, the scales discolouring to grey with age, the midvein protruding slightly to prominently; basal part of lamina (proximal to the lobes) narrow-oblong to narrow-cuneate, 2–10 mm long, 1–1.8 mm wide, 0.5–0.85 the length of the whole lamina; lamina lobes oblong or tapering slightly to a truncate to obtuse tip, straight or laterally incurved, 0.5–3.0 mm long, 0.6–1.2 mm wide, diverging from each other at an angle of 25–90°; sinus between lobes v-shaped to u-shaped, 0.5–2.5 mm deep, 0.5–3.5 mm wide. Inflorescences umbelliform, sessile or rarely shortly pedunculate, terminal or rarely axillary, 2–11-flowered. Pedicels c. 0.4–0.5 mm thick at base, c. 0.7–0.8 mm thick at apex, 2.5–7.5 mm long, densely covered in glossy cream scales and usually a few scattered ferruginous scales. Mature bud broadly obovoid, c. 2.5 mm long, c. 2.0 mm wide. Calyx cupulate, 0.9–1.6 mm long, 2.0–2.5 mm wide, smooth or verrucose with slightly protruding oil glands, densely lepidote with scales grading in colour from predominantly cream at the base to ferruginous at the upper margin, truncate to obtusely lobed. Petals 5, spreading, ±elliptical, 3.0–3.5 mm long, 1.4–1.8 mm wide, cream to bright lemon yellow on adaxial surface, densely lepidote on abaxial surface with glossy cream scales in the basal half and ferruginous scales in the apical half. Stamens divergently and symmetrically spreading, cream to bright lemon yellow; staminal filaments filiform, 5.0–5.5 mm long, c. 0.1 mm thick; anthers elliptical, glandular-apiculate, 0.6–1.2 mm long. Ovary subspherical, 0.9–1.1 mm high, densely covered in shiny, colourless, semi-

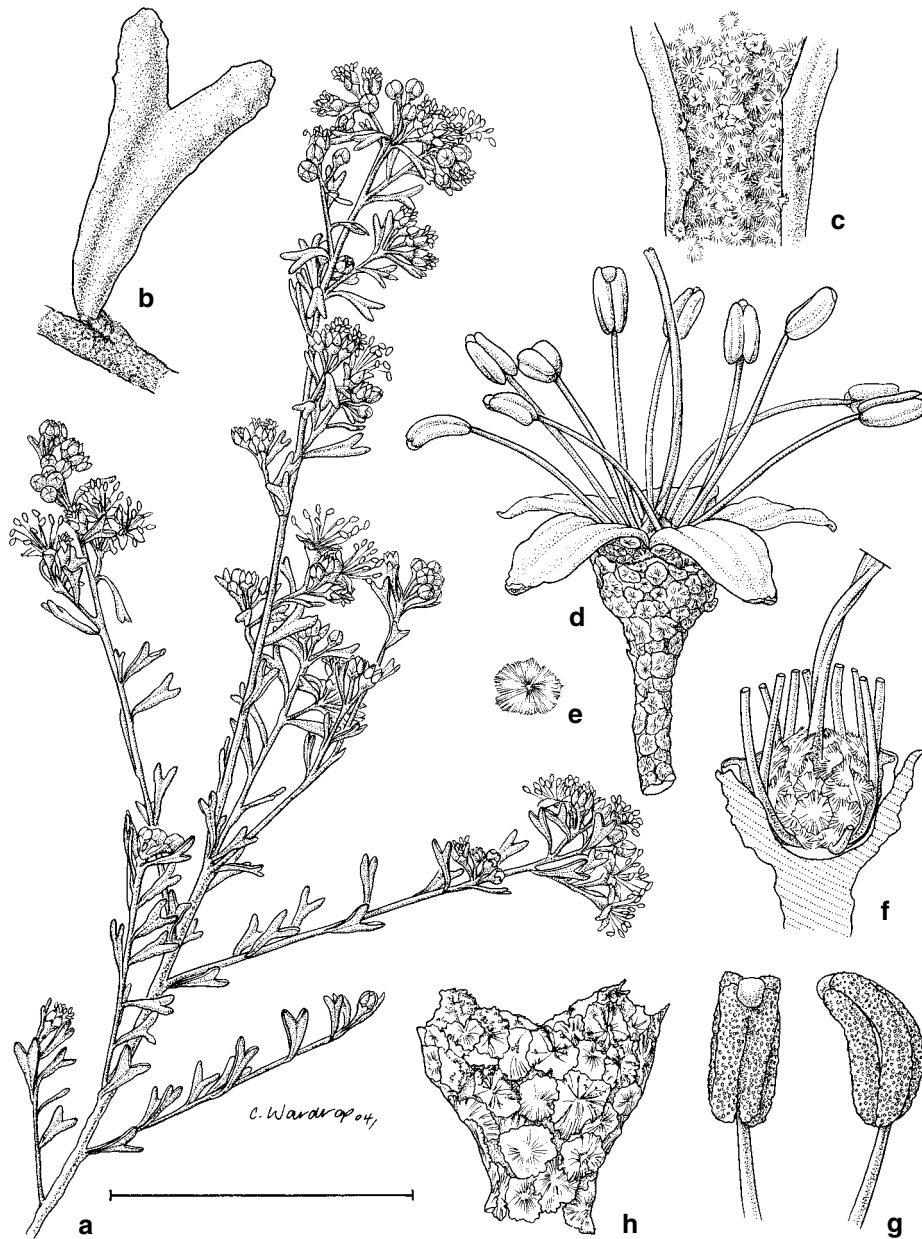


Fig. 1. *Phebalium bifidum* P.H. Weston & M. Turton. **a**, flowering shoot; **b**, adaxial surface of adult leaf; **c**, indumentum of scales on abaxial surface of adult leaf; **d**, flower; **e**, scale (trichome); **f**, ovary; **g**, anthers, lateral and abaxial views; **h**, calyx and tip of pedicel. From NSW 496205 and photographs supplied by Haydn Washington. Scale bar: a = 4 cm, b = 7.5 mm, c = 4 mm, d = 5 mm, e, g, h = 2.5 mm, f = 3.3 mm.

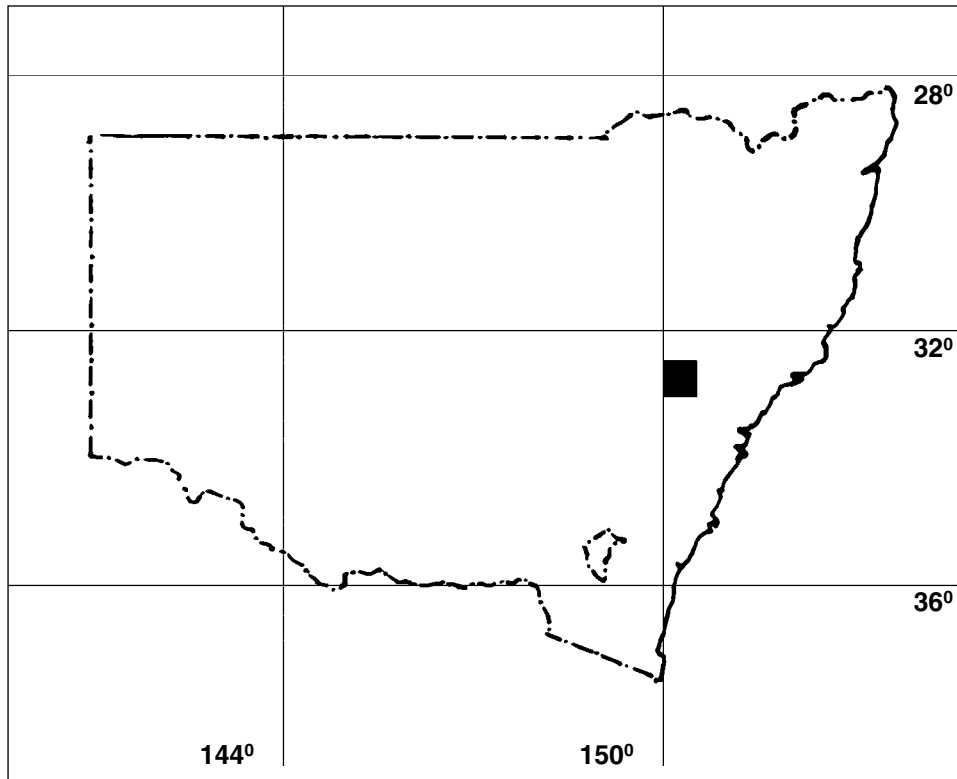


Fig. 2. Distribution of *Phebalium bifidum* (■) shown on a map of New South Wales.

transparent scales; style glabrous, \pm equal to stamens, cream to bright lemon yellow. Fruits and seeds not known. Fig.1.

Specimens examined: New South Wales: Central Tablelands: Capertee, *M. Turton*, 24 Sep 1998 (NSW 483804); Capertee, *M. Turton*, 11 Jun 2001 (NSW 483808); Capertee, *M. Turton*, 3 Oct 2001 (NSW 483809); Capertee Valley, *M. Turton*, 7 Oct 2002 (NSW 496205); Capertee Valley, *H. Washington*, 29 May 2001 (NSW 481881).

Derivation of epithet: From the Latin bi- (two) and -fidus (divided); referring to the bifid adult leaves, which distinguish this species most readily from its closest relatives.

Flowering period: August to October.

Habitat: dry sclerophyll woodland or heath, the former dominated by *Callitris endlicheri*, *Eucalyptus fibrosa*, and one or more other eucalypts, such as *E. crebra*, *E. punctata*, *E. tenella* and *E. macrorhyncha*, with shrubby and herbaceous species including *Acacia buxifolia* subsp. *buxifolia*, *Cryptandra amara*, *Grevillea obtusiflora* subsp. *fecunda*, *Leptospermum parvifolium*, *Leucopogon muticus*, *Leucopogon virgatus*, *Lissanthe strigosa* subsp. *subulata*, *Persoonia linearis* and *Stypandra glauca*, on structured loam soil derived from shale, siltstone, conglomerate and sandstone associated with the geology of the Permian, Shoalhaven Group (Bembrick 1980), at 460–500 m altitude. The area experiences hot, dry summers and moist to wet winters, with an average rainfall of 750–850 mm.

Distribution: known from only two populations of about 230 plants, about 3 km apart (Fig. 2).

Proposed conservation status: geographically restricted, endangered, not conserved (2E coding of Briggs & Leigh 1996). Clearing and habitat fragmentation are the most obvious threatening processes that endanger this species. *Phebalium bifidum* is known only from roadside verges and private land in a moderately disturbed rural area.

Notes: *Phebalium bifidum* most closely resembles *P. obcordatum* (as implicitly recircumscribed by Wilson, 1998) and *P. glandulosum*. It is most easily distinguished from both of those species by its strongly bilobed, Y-shaped leaves (broadly obcordate; sinus between lobes to 0.3 mm deep in *P. obcordatum*, linear to narrowly or broadly oblong-cuneate with a truncate to obcordate apex; sinus between lobes absent or up to 0.7 mm deep in *P. glandulosum*) and foliar oil glands protruding only slightly above the surrounding epidermis (protruding, hemispherical glandular pustules or undulate swellings in *P. obcordatum* and *P. glandulosum*). It also has a higher proportion of ferruginous to cream-coloured scales on lepidote organs than either *P. obcordatum* or *P. glandulosum*. From *P. obcordatum* it is also distinguished by its longer leaves (2.0–4.0 mm long in *P. obcordatum*), with the midvein being distinctly impressed on the adaxial surface (slightly sulcate with no definite midrib in *P. obcordatum*), the margins being revolute (flat to recurved in *P. obcordatum*), longer pedicels (2–3 mm long in *P. obcordatum*), and longer petals (to 2.5 mm long in *P. obcordatum*). From *P. glandulosum* it is also distinguished by its branchlets lacking raised oil glands (minutely to prominently glandular-verrucose in *P. glandulosum*).

P. bifidum is allopatric to both *P. obcordatum* and *P. glandulosum*, occurring 210 km east of the nearest populations of *P. obcordatum* and 65 km south of the nearest populations of *P. glandulosum* (subsp. *angustifolium*). It shares few associated species with either *P. obcordatum* or *P. glandulosum* although it does occur in structurally similar communities on similarly siliceous, nutrient-poor, well-drained soils.

Amendments to published keys to *Phebalium*: The keys published by Wilson (1970), Weston and Porteners (1991) and Weston and Harden (1995) need to be altered to accommodate *P. bifidum*. In all three keys, a couplet is reached where neither lead applies satisfactorily to *P. bifidum*: in Wilson (1970) 'Sectio 1. *Phebalium*: South Australian, Eastern Australian, and Tasmanian Species' at couplet 1; in Weston and Porteners (1991) at couplet 6; and in Weston and Harden (1995) at couplet 4. This part of all of these keys can be amended by inserting a new couplet prior to the problematic couplets listed above:

'A Leaves strongly bilobed, Y-shaped, the sinus between the lobes 0.5–2.5 mm deep, with oil glands protruding only slightly above surrounding epidermis; branchlets lacking protruding oil glands *P. bifidum*

A* Leaves either entire (sometimes with glandular-undulate margins), or shallowly bilobed (sinus between the lobes to 0.7 mm deep) but then branchlets and adaxial leaf surface covered in prominently protruding, hemispherical, oil glands.'

Acknowledgments

Jan Allen, Darren Crayn and Haydn Washington provided helpful comments on the manuscript and assistance in the field. Karen Wilson checked the Latin description. Catherine Wardrop drew figure 1.

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Manuscript received 21 January 2004

Manuscript accepted 1 July 2004