

***Eucalyptus macmahonii*, a New and Rare Mallee Species from Western Victoria**

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Abstract

Eucalyptus macmahonii K. Rule sp. nov., is a recently discovered Western Victorian species of mallee of the series *Rufispermae* with a sepaline operculum that is shed uncleanly. The species is described and its affinities, distribution and conservation status are discussed.

Introduction

The Mt Arapiles-Toooan State Park and a few adjacent reserves of mallee vegetation are located on the south-eastern side of the Little Desert in western Victoria, a region where semi-arid and temperate climates merge. Tragically, from a scientific view-point, they and meagre roadside and farm remnants are all that remain of the natural vegetation after vast tracts of land were cleared for wheat farms. As far as is known, the taxon described below is confined to two extremely small populations, one at Mt Arapiles and the other to the north-west of Mitre township near Nurcoung. Discovered by Dr Don McMahon in 1994, it is one of a few undescribed eucalypts in this region which occur as remnant populations in these small island reserves.

Taxonomy

Eucalyptus macmahonii K. Rule, sp. nov.

Eucalypto dumosae A. Cunn. ex Oxley affinis sed fragmentis induviis operculorum sepalinorum persistentibus, alabastris laevibus, et foliis adultis angustioribus nitidioribus differt.

Type: Victoria, southern side of Mt Arapiles, Mt Arapiles-Toooan State Park, 36°46' S, 141°50' E, *K. Rule 9512 and D. McMahon*, 26.iii.1995 (holotype MEL; isotypes AD, NSW, CANB).

Mallee to 5 m tall, usually erect and slender, lignotuberous. Canopy open or moderately dense with semi-erect, lustrous foliage. *Bark* red-brown, smooth throughout; old bark dark brown, deciduous in long ribbons. *Oil glands* present in pith of branchlets. *Cotyledons* reniform. *Seedling leaves* elliptical, shortly petiolate, opposite for 3 or 4 pairs, discolorous; upper surface dull, blue-green; lower surface pale green. *Juvenile leaves* alternate, lanceolate or elliptical-lanceolate, acuminate, 4–8 cm long, 1.4–2.5 cm wide; dull, grey-green, slightly discolorous, glandular; base tapered; venation densely reticulate; lateral and intramarginal veins somewhat obscure; petioles to 1 cm long. *Intermediate leaves* ovate-lanceolate, dull, blue-green, sometimes grey-green or lightly

waxy, slightly discoloured, slightly broader than both juvenile and adult leaves. *Adult leaves* narrow-lanceolate or lanceolate, often slightly falcate, uncinata, semi-erect, 7–11 cm long, 0.8–1.5 cm wide, lustrous, green, concolorous; venation faint, densely reticulate with numerous island and intersectional oil glands; intramarginal vein approximately 1 mm from margin; petioles angular, to 1.3 cm long. *Inflorescences* simple, axillary, 7–11-flowered; peduncles slightly flattened, dilated, relatively slender, to 1.2 cm long, 1.5–2 mm in diameter. *Floral buds* ovoid or slightly clavate, usually angular, shortly pedicellate, 0.7–0.9 cm long, 0.4–0.5 cm in diameter; operculum conical, approximately one-third the length of the hypanthium, non-striate; operculum scar present, the sepaline operculum shedding early, either from the abscission zone or splitting downwards from the apex of the bud, persisting most often as a tattered, small necrotic fragment adhering to the inner operculum. *Stamens* inflexed; anthers all fertile, versatile, sub-basifixed, oblong, dehiscent longitudinally; filaments white. *Ovary* 4-locular; ovules in 4 rows per locule. *Fruits* cupular or sub-cylindrical, smooth, tapering into a short pedicel or less often sessile, 0.6–0.9 cm long, 0.5–0.8 cm in diameter; walls thick; disc descending; valves 4 (rarely 3), below rim level. Fertile seeds lustrous, red-brown, reticulate, flattened. (Fig. 1)

Distribution and Habitat

Eucalyptus macmahonii occurs in mallee communities on sandy soils adjacent to the southern base of Mt. Arapiles and to the north-west of Mitre near Nurcoung on the southern edge of the Little Desert in western Victoria. The nearby town of Horsham has an average annual rainfall of c. 550 mm, with a winter maximum. Flowers spring.

Etymology

The epithet honours Dr Don McMahon who is credited with the discovery of this new species and has been an active participant in the subsequent study. It is further to Dr McMahon's credit that he recognised that the species' floral buds possess a feature rare in the genus (see discussion below).

Associated Species

At Mt Arapiles, *E. macmahonii* grows in pure clumps. Other mallee species occurring in the immediate vicinity include *E. incrassata*, *E. leptophylla*, *E. dumosa*, *E. wimmerensis* and *E. leucoxydon* subsp. *stephaniae*. Near Nurcoung, *E. wimmerensis*, *E. leptophylla* and *E. froggattii* are associated species, and at one collection site a single mallee with features consistent with *E. polybractea* was present. At Mt Arapiles an individual has been located that appears to a hybrid between the new species and *E. wimmerensis*. No other interbreeding with any of the associated taxa has been observed.

Conservation Status

This species is one of Victoria's rarest and was uncollected prior to this study. The Mt Arapiles population, which occurs in two segments, is located in a nature reserve; on the southern side of the mountain several dozen plants are concentrated in six known clumps, and on the south-western side a single clump contains c. ten plants. In contrast, the population near Nurcoung is confined to small roadside remnants extending over a distance of more than 2 kilometres and its continued existence is extremely precarious. Searches for additional remnants in the district are required, particularly on private land around the south-eastern perimeter of the Little Desert. *Eucalyptus macmahonii* is considered vulnerable and a status of 2V using the coding method of Briggs and Leigh (1989) is suggested.



Fig. 1. *Eucalyptus macmahonii* (K. Rule 9512 and D. McMahon): **a** seedling, x1; **b** adult leaves and immature buds, x1; **c** young bud shedding sepaline operculum, x2.5; **d** bud with necrotic remnant of sepaline operculum, x4; **e** mature buds, x1; **f** fruits, x1.

Specimens Examined (all at MEL)

VICTORIA: Type locality, *K. Rule 9533*, 10.iv.1995, *K. Rule 9535*, 10.iv.1995, *K. Rule 9636*, 10.ii.1996, *K. Rule 9665*, 8.vii.1996; on the SW side of Mt Arapiles, *K. Rule 9534*, 10.iv.1995; 9.3 km E of the Nhill-Harrow Rd towards Mitre, *K. Rule 96106*, 26.ix.1996; 10.2 km E of the Nhill-Harrow Rd towards Mitre, *K. Rule 9663*, 8.vii.1996; 11.7 km E of the Nhill-Harrow Rd towards Mitre, *K. Rule 9513* and *D. McMahon*, 26.iii.1995, *K. Rule 9662*, 8.vii.1996.

Key to Victorian species in the series Rufispermae

1. Adult leaves lustrous, green2
1. Adult leaves dull, blue-green or blue-grey3
2. Peduncles markedly thick, 2.5–3.5 mm in diameter; operculum ribbed, slightly less than half the length of the hypanthium*E. phenax*
2. Peduncles relatively slender, 1.5–2 mm in diameter; operculum smooth, approximately one third the length of the hypanthium*E. macmahonii*
3. Adult leaves blue-grey; operculum prominently ribbed*E. cyanophylla*
3. Adult leaves blue-green; operculum faintly ribbed*E. dumosa*

Discussion

The known populations of *E. macmahonii* are relatively uniform except for limited variation in the size of their juvenile leaves, and an occurrence of lightly waxy intermediate leaves in the case of one individual at Mt Arapiles. Despite the small number of individuals, the new species has not lost its capacity to reproduce sexually: a moderate number of seedlings were present at each site, and viable, reasonably vigorous seedlings resulted from a series of seedlot trials. It is suspected that its rarity is the result of recent clearing rather than genetic decline.

When *E. macmahonii* was first brought to my attention, I assumed it to be a hybrid involving *E. wimmerensis* and *E. dumosa*. Subsequent seedling trials using seedlots collected from both the Mt Arapiles and Nurcoung sites showed no evidence of segregation towards either of the suspected parents. Furthermore, searches in the field located sufficient numbers of mallees at both sites which were regarded as being appreciably uniform in their morphology. This, and an absence of anomalous individuals (except for the apparent hybrid at Mt Arapiles) with features intermediate between *E. macmahonii* and either of the suspected ancestors, suggest that individuals are not of hybrid origin.

The condition where the sepaline operculum is not shed cleanly but persists as tattered remnants is rare in the genus and known in four other taxa belonging to the informal subgenus ‘Symphyomyrtus’ and two Northern Australian paper-fruited bloodwoods of the unrelated informal subgenus ‘Blakella’. Three of the ‘Symphyomyrtus’ species, *E. sturgissiana* L.A.S. Johnson & Blaxell, *E. denticulata* Cook & Ladiges and *E. benthamii* Maiden & Cabbage, although not closely related, belong to section *Maidenaria* where the sepaline operculum is usually shed cleanly well in advance of flowering. The fourth is an undescribed taxon occurring at Devils Peak in the southern Flinders Ranges, South Australia, which Brooker and Kleinig (1990) placed with the mallee-boxes (section *Adnataria*) and tentatively called *E. ‘desquamata’*. In the mallee-boxes, the sepaline operculum is normally retained until anthesis and shed with the petaline operculum. *Eucalyptus macmahonii* belongs to the section *Dumaria* (also ‘Symphyomyrtus’) where, as in section *Maidenaria*, the sepaline operculum normally is shed cleanly well in advance of flowering. Obviously, the phenomenon of the fragmented sepaline operculum is a development which provides no basis for linking any of these taxa genetically. Most certainly it is a useful diagnostic

character. Johnson and Hill (1990), for example, used it as one of their criteria for separating *E. dorrigoensis* (Blakely) L.A.S. Johnson & Hill from *E. benthamii*.

In their comments on *E. benthamii*, Johnson and Hill (1990) suggested that the expanding, immature bud of that species appeared to burst through its sepaline operculum to leave irregular dried remnants attached to petaline operculum. Observations of *E. macmahonii* are consistent with this. In addition, it has been found with this species that the shedding process and the fragmentation of the sepaline operculum follows no particular pattern. Fragmentation may occur in conjunction with abscission, the operculum splitting upwards from the base or by the operculum splitting downwards from the apex before abscission occurs.

Eucalyptus macmahonii is placed within the section *Dumaria*, characterised by juvenile leaves that are petiolate and alternate, adult leaves with densely reticulate venation and numerous intersectional and island oil glands and floral buds with an abscission scar, four ovular rows per locule, strongly inflexed stamens and oblong, basifixed, versatile anthers with longitudinal slits. Further, within this section, the new species is a member of the series *Rufispermae* whose features include oil glands in the pith of the branchlets and fertile seeds that are lustrous, red-brown, oblong and flattened and with a shallow reticulum. However, as discussed above, *E. macmahonii* differs from other members of this series in the unclean shedding of its sepaline operculum.

The relationship between *E. macmahonii* and other members of the series *Rufispermae* (Table 1), particularly those occurring in Victoria, is unclear. However, it is most similar to the widespread *E. dumosa*, from which it differs in its narrower juvenile leaves, its narrower, green, lustrous adult leaves, its shorter, thinner peduncles and its smooth opercula. Whilst its fruit sizes overlap those of some populations of *E. dumosa*, particularly in the Victorian Mallee, the associated form has appreciably larger fruits (to 10 mm long and 9 mm in diameter). Another similar species of limited occurrence in north-western Victoria is *E. phenax* Brooker & Slee (formerly *E. 'anceps'* (Maiden) Blakely). It also has lustrous, green adult leaves, but differs from the new species in its green juvenile leaves, its longer, striated opercula (slightly less than half the length of the bud), its thicker peduncles and its mostly sessile fruits with valves extending above the rim. A third relative, *E. cyanophylla* Brooker, is confined to the State's extreme north-west and is easily distinguished from *E. macmahonii* by its relatively broad, blue-grey foliage, its longer, thicker peduncles, its larger, prominently striated buds and its larger, rugulose or ribbed fruits (to 10 mm long and 9 mm in diameter).

Table 1. Diagnostic features of Victorian species in the series *Rufispermae*

Character	<i>E. macmahonii</i>	<i>E. dumosa</i>	<i>E. phenax</i>	<i>E. cyanophylla</i>
<i>Bark</i>				
Texture	smooth throughout	smooth throughout or box-barked on lower trunk	smooth throughout or basally box-like	smooth throughout or basally box/like
Colour	red-brown	white, pink or grey	white or light grey	brown, white or light grey
<i>Juvenile leaves</i>				
Shape	lanceolate to elliptical-lanceolate	broad-lanceolate to ovate	broad-lanceolate or ovate	lanceolate, broad-lanceolate or ovate-lanceolate
Length (cm)	4–8	8–14	6–10	8–14
Width (cm)	1.4–2.5	2–6	2–3.5	5–8
Colour	blue-green or grey-green	blue-green or grey-green	light green	blue-green or grey-green

Table 1. Continued

Character	<i>E. macmahonii</i>	<i>E. dumosa</i>	<i>E. phenax</i>	<i>E. cyanophylla</i>
<i>Adult leaves</i>				
Shape	narrow-lanceolate to lanceolate	narrow-lanceolate to lanceolate	lanceolate	broad-lanceolate or slightly ovate, often slightly falcate
Length (cm)	7–11	6–10	7–13	7–16
Width (cm)	0.8–1.5	1.5–2.5	1–2.0	1.5–3.2
Colour	green	blue-green or grey-green	green	blue-green
Lustre	lustrous	dull or sub-lustrous	lustrous	dull
Petiole length (cm)	up to 1.3	up to 1.8	up to 2	up to 2.2
<i>Peduncle</i>				
Length (cm)	up to 1.2	up to 2.0	up to 1.4	up to 1.2
Diameter (mm)	1.5–2	2–3	2.5–3.5	2.5–3.5
Shape	angular	angular to slightly	slightly flattened	slightly flattened
<i>Buds</i>				
Shape	ovoid, not constricted at abscission zone	ovoid-cylindrical, not constricted at abscission zone	clindrical, constricted at abscission zone	cylindrical or slightly cylindrical, constricted at abscission zone
Length (cm)	0.7–0.9	0.8–1.0	0.6–1.0	0.8–1.1
Diameter (cm)	0.4–0.5	0.4–0.5	0.4–0.5	0.5–0.9
Length relative to hypanthium length	c. 1/3	usually c. 1/3	slightly shorter	slightly shorter
Operculum shape	conical	conical, sometimes beaked	conical, sometimes shortly beaked	conical
Operculum ornamentation	smooth	slightly ribbed	slightly ribbed	prominently ribbed
Outer operculum shedding	uncleanly	cleanly	cleanly	cleanly
Pedicel	sub-sessile or shortly pedicellate	sub-sessile or shortly pedicellate	sessile or less often sub-sessile	sub-sessile or shortly pedicellate
<i>Fruits</i>				
Shape	cupular or sub-cylindrical	cupular or sub-cupular	cupular	cupular
Length	0.6–0.9	0.4–1.0	0.6–0.9	0.8–1.0
Diameter (cm)	0.5–0.8	0.4–0.9	0.5–0.7	0.7–0.9
Pedicel	sessile or sub-sessile	sessile or shortly pedicellate	mostly sessile	sessile or sub-sessile
Ornamentation	smooth	smooth or slightly ribbed	faintly ribbed	ribbed or rugulose

Acknowledgments

Whilst the contributions to Dr Don McMahon have been duly recognised, the splendid assistance given on many occasions by Mr Peter Hawker of Natimuk, the Park Ranger for the Mt. Arapiles-Tooan State Park, is also acknowledged. Mr Neville Walsh of the National Herbarium of Victoria is thanked for providing the Latin diagnosis and

for assistance in the field, as is Dr Tim Entwisle for his advice with the preparation of this manuscript and Mali Moir for the excellent line drawings.

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Manuscript received 10 September 1996, accepted 28 October 1996