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TWO NEW MALLEE SPECIES FROM SOUTH AUSTRALIA IN *EUCALYPTUS* L'HERIT. SERIES *RUFISPERMAE* MAIDEN

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Abstract

Two new South Australian species of *Eucalyptus*, series *Rufispermae* Maiden, are described. *E. percostata* Brooker & P. Lang is a mallee known from a few localities in the Southern Flinders Ranges. It has affinities with *E. dumosa* and *E. pileata* but differs from the former mainly by the strongly ribbed operculum wider than the hypanthium, and from the latter by dull and often glaucous leaves. *E. cretata* P. Lang & Brooker is a mallee or small tree from central Eyre Peninsula strongly resembling *E. cyanophylla* in gross morphology, but readily distinguished by its prominently glaucous branchlets, grey-green subglaucous leaves, and summer flowering time. A key to South Australian species of series *Rufispermae* is provided.

Introduction

Series *Rufispermae* was erected by Maiden (1925) and based on a single species, the Western Australian endemic *Eucalyptus woodwardii* Maiden. The series, now recognized to be one of the largest in the genus, comprises 18 published species with a further 6 unpublished taxa proposed by Brooker & Kleinig (1990). It was previously incorporated under the more broadly defined series *Dumosae* of Blakely (1934) which was reviewed by Brooker (1971) and subdivided into several groups based mainly on seed characters. These groups now stand as separate series within section *Dumaria* (Pryor and Johnson, 1971).

The two new species clearly belong in series *Rufispermae* by the following combination of characters: branchlets with glandular pith, two opercula, reniform cotyledons, inflexed stamens, versatile oblong-cuboid anthers, and red lustrous flattish seed with a shallow reticulum.

Both species were identified as potential new taxa in a morphometric study of the series by Lang (1983) which supports the relationships and affinities outlined in this paper.

Eucalyptus percostata Brooker & P. Lang, sp. nov.

E. percostata Brooker & Lang *ined.*, in Brooker & Kleinig (1990, p.334).

Ab *E. dumosa* A. Cunn. ex Oxley pedicellis latioribus saepe contractis, operculo valde costatis latiore quam hypanthio, et demum florenti praecipue differt. Fructus leviter costati saepe sunt.

Type: 25.v.1986, M.I.H. Brooker 9326 and D. Kleinig, track E of Devil's Peak, south of Quorn, South Australia, 32°27'S 138°01'E (holo: AD, iso: CANB,NSW).

Mallee to 4 m tall with smooth whitish and grey over coppery bark. *Branchlets* non-glaucous, quadrangular at first but becoming terete, with glandular pith. *Seedling* leaves remaining decussate for 3-4 pairs, petiolate, elliptical to ovate, to 65 x 40 mm. *Juvenile leaves* alternating, petiolate, broadly lanceolate to ovate, to 100 x 60 mm, dull, light green to bluish-

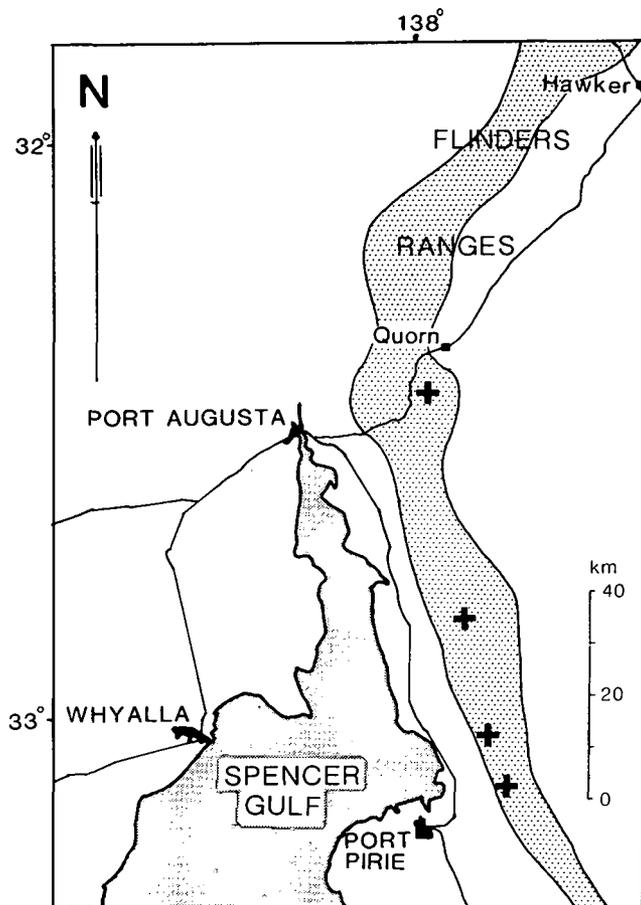


Fig. 1 Distribution of *E. percostata* (+).

green. *Adult leaves* alternating, petiolate, lanceolate, 75-120 mm long, 14-22 mm wide, 0.35-0.45 mm thick, dull with cuticular relief 0.025-0.045 mm high, non-glaucous to densely glaucous¹, concolorous, green, blue-green or bluish-grey, secondary veins 25-35° to midrib, reticulation dense, with numerous intersectional oil glands. *Inflorescences* non-glaucous, axillary, unbranched, 7-flowered; fruiting peduncles flattened, 16-20 mm long and 2-3 mm wide at mid-length. *Mature buds* shortly pedicellate; hypanthium cupular to obconical, often angular or lightly ribbed; operculum hemispherical to conical, not contracted to strongly rostrate, conspicuously wider than hypanthium at join, strongly and sharply ribbed, ribs to 0.8-1.3 mm high. *Stamens* strongly inflexed, all fertile; filaments creamy-white; anthers versatile, oblong-cuboid, opening by longitudinal slits. *Mature fruit* shortly pedicellate, cupular to obconical, (5.5-) 6.5-7.5 (-8.5) mm long and (5.5-) 6-7 (-7.5) mm wide at summit, mid-width/summit-width ratio (0.9-) 0.95-1 (-1.05), smooth or with regular ribs to 0.1-0.6 mm high; disc 0.7-1.2 mm wide, descending 0.8-1.7 mm below rim; valves (3-) 4 (-5), to rim level; pedicels (0.3-) 1.8-2.2 mm long, (1.9-) 2.3-3.2 mm wide at mid-length. *Seed* lustrous, red-brown, flattish, with shallow reticulum. Figs 2, 4.

1. In this paper glaucous does not describe a colour but is always used in the second sense of Jackson (1928) to refer to a waxy bloom.

Etymology: The epithet is derived from the Latin *per* (very) and *costatus* (ribbed) and refers to the strong ribbing of the operculum.

Specimens examined

SOUTH AUSTRALIA: Flinders Ranges Region: 19.viii.1967, *T.R.N. Lothian 4210* (AD, CANB), near junction of Alligator and Mambray Creek National Parks [= Mt Remarkable National Park]; 19.viii.1967, *J.B. Cleland s.n.* (AD), Alligator Gorge; 1.ix.1977, *R. Sinclair "A", "B", "C", "D", "E", "F"* (all AD, CANB), c. 1 km NE Devil's Peak summit; 19.viii.1987, *Pt Augusta T.A.F.E. 62* (AD), Devil's Peak walking trail.

Northern Lofty Region: 16.ix.1977, *Woods & Forests Dept. for C.D. Boomsma "specimen no. 1"* (AD), near "The Bluff", Beetaloo Valley; 10.v.1981, *R.J.P. Davies "A" (AD), "B" (AD)*, B-B-Q trail, Telowie Gorge Conservation Park; 8.vi.1981, *A.G. Spooner 7787* (AD), just N Telowie Gorge in foothills.

Distribution and habitat

E. percostata is known from four localities in the Southern Flinders Ranges over a range of 75 km (Fig. 1). The three southern localities span an isolated zone of higher rainfall bounded by the 600 mm p.a. isohyet. The type locality at Devil's Peak is a smaller outlying pocket with slightly lower rainfall to the north.

With the general decline in rainfall northwards, *E. percostata* is replaced by the Flinders Ranges form of *E. dumosa* A. Cunn. ex Oxley which extends from at least as far south as Hawker, over 210 km NNE to Freeling Heights.

Both *E. percostata* and *E. dumosa* occur on well drained, elevated sites where heavier soils have developed. This occurs either where relatively soft parent rocks are exposed or in flatter areas amongst harder sandstones and quartzites where sediments can accumulate.

At Devil's Peak, *E. percostata* occurs on footslopes as the predominant mallee in an open scrub formation immediately above a zone of *E. odorata*. At Telowie Gorge it occurs on foothills and higher slopes of the western escarpment of the ranges.

Flowering period: May-September.

Notes and affinities

The species may be confused with the much more widespread *E. dumosa* particularly when buds are absent. *E. percostata* differs from *E. dumosa* principally in the strongly ribbed operculum wider than the hypanthium at the join, and the later flowering period. It is also characterised by broader, often tapering pedicels and a tendency for fruit ribbing (Figs 2, 3B). The Flinders Ranges form of *E. dumosa* is characterized by short pedicels sharply distinguished from the hypanthium, and smooth cupular fruits often smaller than in typical *E. dumosa* or *E. percostata* (Fig. 3C).

In bud and fruit morphology, *E. percostata* resembles typical *E. pileata* Blakely, at Desmond, south of Ravensthorpe, W.A. (Fig. 3A). However, it can be readily distinguished from *E. pileata* by its dull leaves which exhibit a similar range in colour to the Flinders Ranges forms of *E. dumosa*, varying from bright green to blue-grey.

Conservation status

E. percostata has a rather limited range and has been infrequently collected; at this stage it must be regarded as rare. The population at Devil's Peak is small but relatively secure. *E. percostata* also occurs in Mt Remarkable National Park and Telowie Gorge Conservation Park. Suitable habitat is well represented in both reserves and it is not likely to be under any threat. The status code 2RC- is suggested using the criteria of Briggs & Leigh (1989).

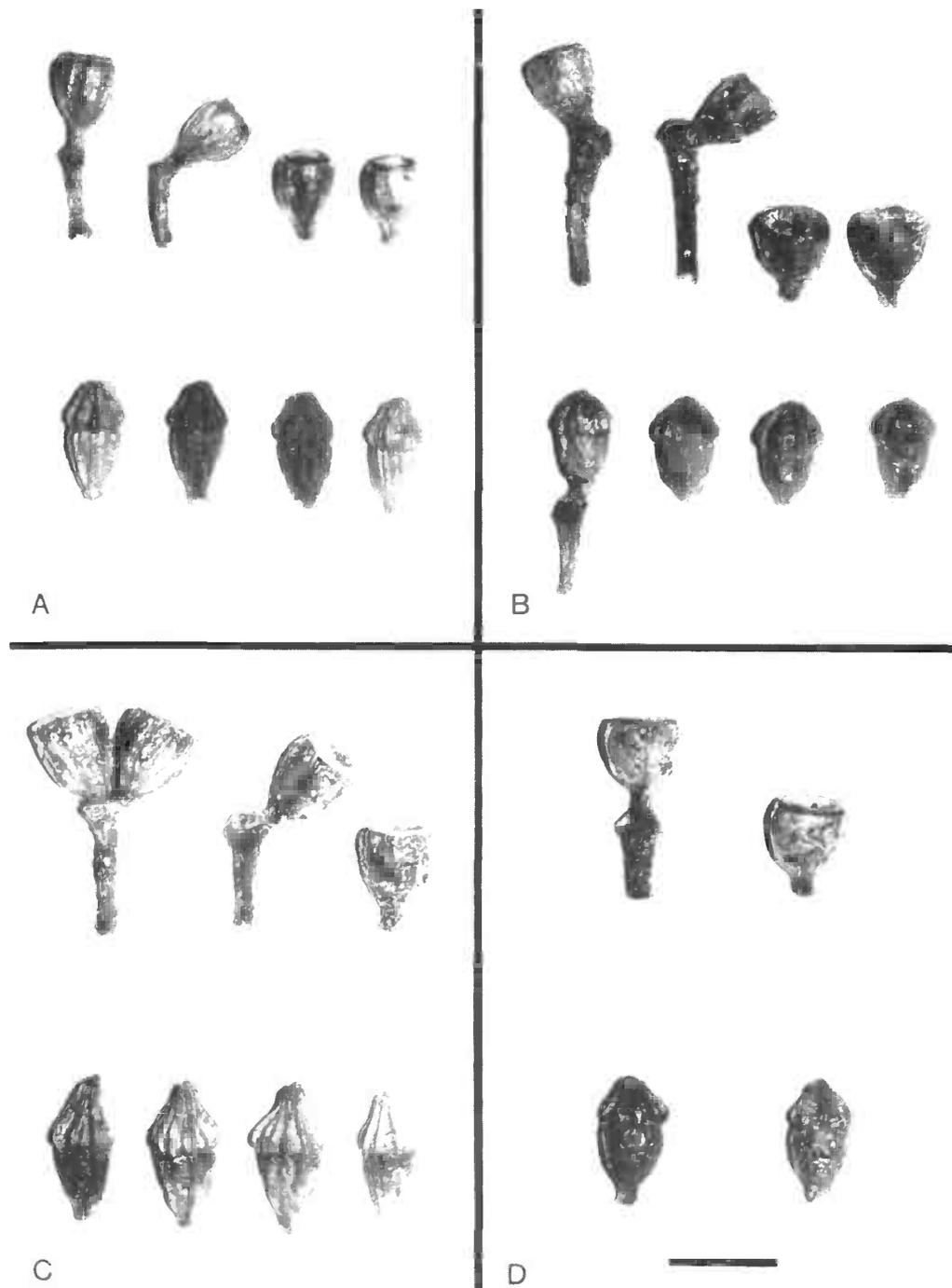


Fig. 2. *E. percostata*, fruits and buds: A, R. Sinclair "D", 1 km NE Devil's Peak; B, *ibid* "C"; C, R.J.P. Davies "B", Telowie Gorge; D, C.D. Boomsma 16.ix.1977, The Bluff, Beetaloo Valley. Scale = 1 cm.

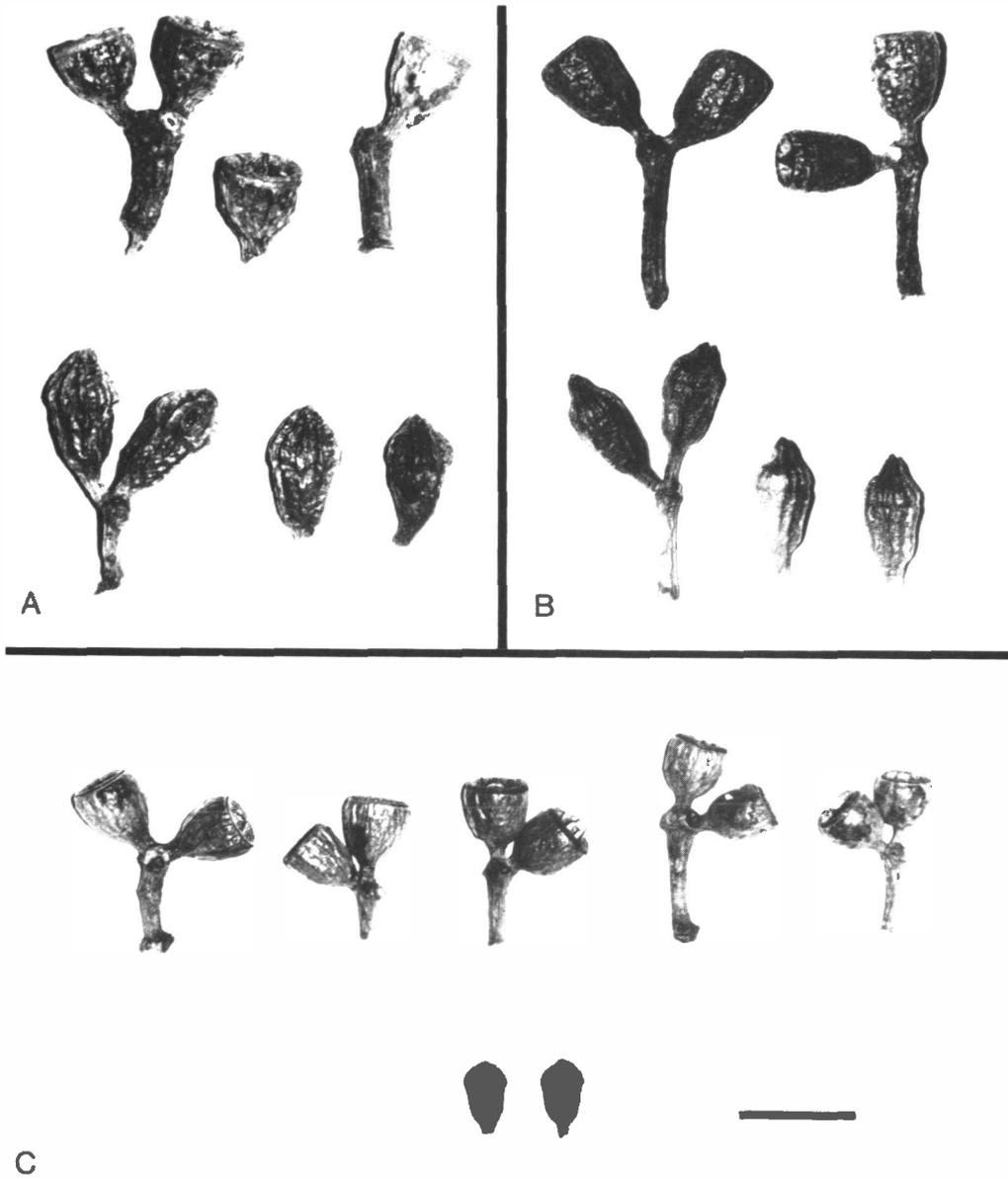


Fig. 3. Fruits and buds of taxa related to *E. percostata*: A, *E. pileata* from population at type locality, P.J. Lang 1380, 0.6 km S Desmond; B, *E. dumosa* from population near probable type locality, P.L. Milthorpe & G.M. Cunningham 6, 7.5 to 9 km W Ungarie, NSW (near the upper limit of operculum ribbing for typical *E. dumosa*); C, Flinders Ranges form of *E. dumosa*, P.J. Lang 853, 854, 856, 859, & 860, 2 km SE of Warraweena HS. Scale = 1 cm.



Fig. 4 Holotype of *E. perostata* (M.H. Brooker 9326 and D. Keating).



Fig. 5. Holotype of *E. crevata* (P.J. Lang 1832).

Eucalyptus cretata* P. Lang & Brooker, sp. nov.E. sp. V*, in Brooker & Kleinig (1990, p. 336).Ab *E. cyanophylla* Brooker ramulis glaucis, foliis adultis cinereo-viridis et subglaucis, et aestate florenti differt.

Type: 28.xii.1989, *P.J. Lang 1832*, E side of Carappee Hill, 1.5 km N along track from junction with road to Darke Peak, at base of hill, Eyre Peninsula, South Australia, 33°25'15"S 136°16'40"E (holo: AD, iso: AD, CANB, CBG, DNA, K, MEL, NSW, PERTH).

Straggly, thin-stemmed mallee 1.5-3 m tall, to robust mallee or small tree, to 7 (-9) m tall; bark smooth to base, whitish and grey over coppery colour. *Branchlets* strongly glaucous with a white bloom, rarely slightly glaucous, red or purplish beneath, quadrangular at first but becoming terete, with glandular pith. *Seedling leaves* remaining decussate for first 4 pairs, elliptical to ovate, grey-green. *Juvenile leaves* alternating, petiolate, orbicular to ovate, to 210 x 120 mm, bluish-grey, strongly glaucous. *Adult leaves* alternating, broadly lanceolate to lanceolate, 90-120 (-135) mm long, (18-) 22-27 mm wide, 0.45-0.55 mm thick, dull with cuticular relief (0.035-) 0.045-0.065 (-0.075) mm high, slightly to moderately glaucous, concolorous, (blue-)grey-green, drying light green, secondary veins 25-40° to midrib, reticulation moderately dense and somewhat obscure, with numerous oil glands. *Inflorescences* strongly glaucous, rarely slightly glaucous, axillary, unbranched, 7- (9-) flowered; fruiting peduncles flattened, (7-) 10-16 mm long and 2-3.5 mm wide at mid-length. *Mature buds* pedicellate, hypanthium cupular to obconical; operculum hemispherical to conical, not contracted to bluntly umbonate or weakly rostrate, conspicuously wider than hypanthium at join, strongly ribbed, ribs to (0.4-) 0.5-0.8 (-1.2) mm high. *Stamens* strongly inflexed, all fertile; filaments creamy-white; anthers versatile, oblong-cuboid, opening by longitudinal slits. *Mature fruit* pedicellate, cupular to cylindroid or obconical, 7-9.5 (-10.5) mm long by 7-10 mm wide at summit, mid-width/summit-width ratio (0.85-) 0.95-1, smooth or with regular ribs to 0.1-0.6 (-0.9) mm high; disc 0.7-1.4 (-1.7) mm wide, descending 0.8-2.3 mm below rim; valves (3-) 4-5 (-6), below rim level or protruding; pedicels 2-4 (-5) mm long, 0.8-1.4 (-1.8) mm wide

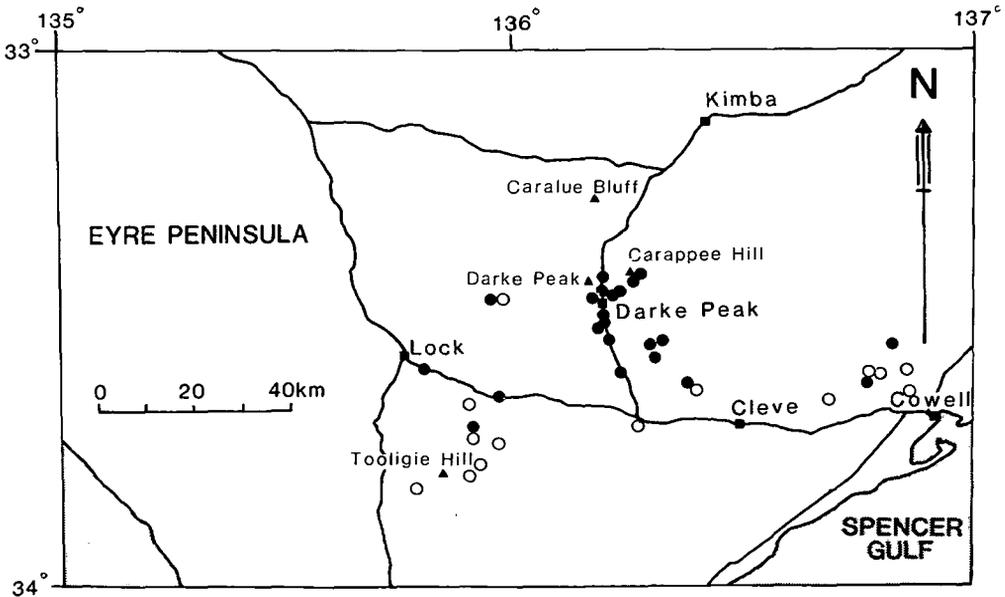


Fig. 6. Distribution of *E. cretata* (●), and *E. aff. cretata* intergrades with glaucous branchlets (○).

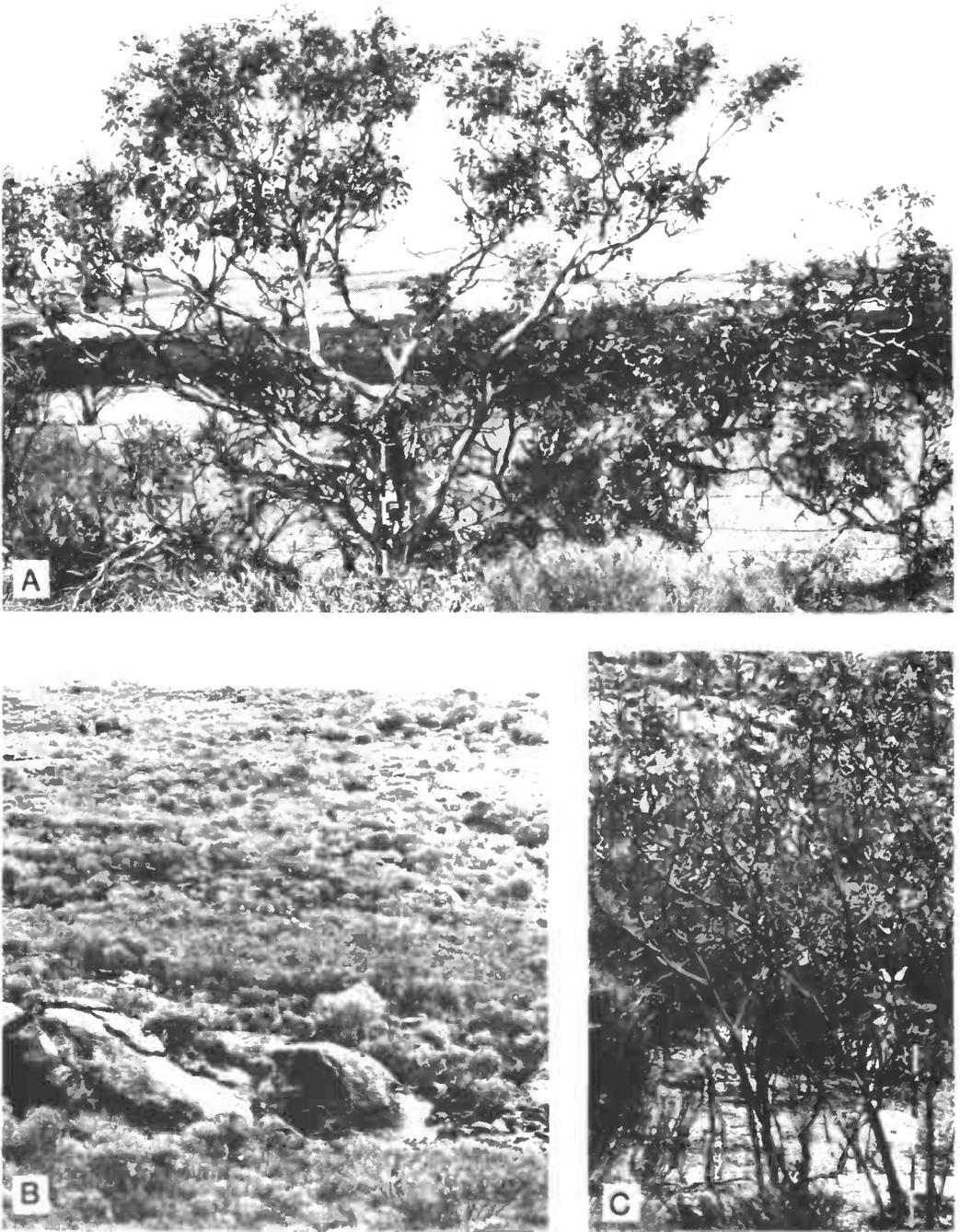


Fig. 7. *E. cretata*: A, small short-trunked tree 5 m tall at base of Caraptee Hill, *P.J. Lang 1044*; B, slope of Caraptee Hill with outcropping granite and patches of *E. cretata* low scrub; C, thin-stemmed mallee 3 m tall on slopes of Caraptee Hill, *P.J. Lang 1047*.

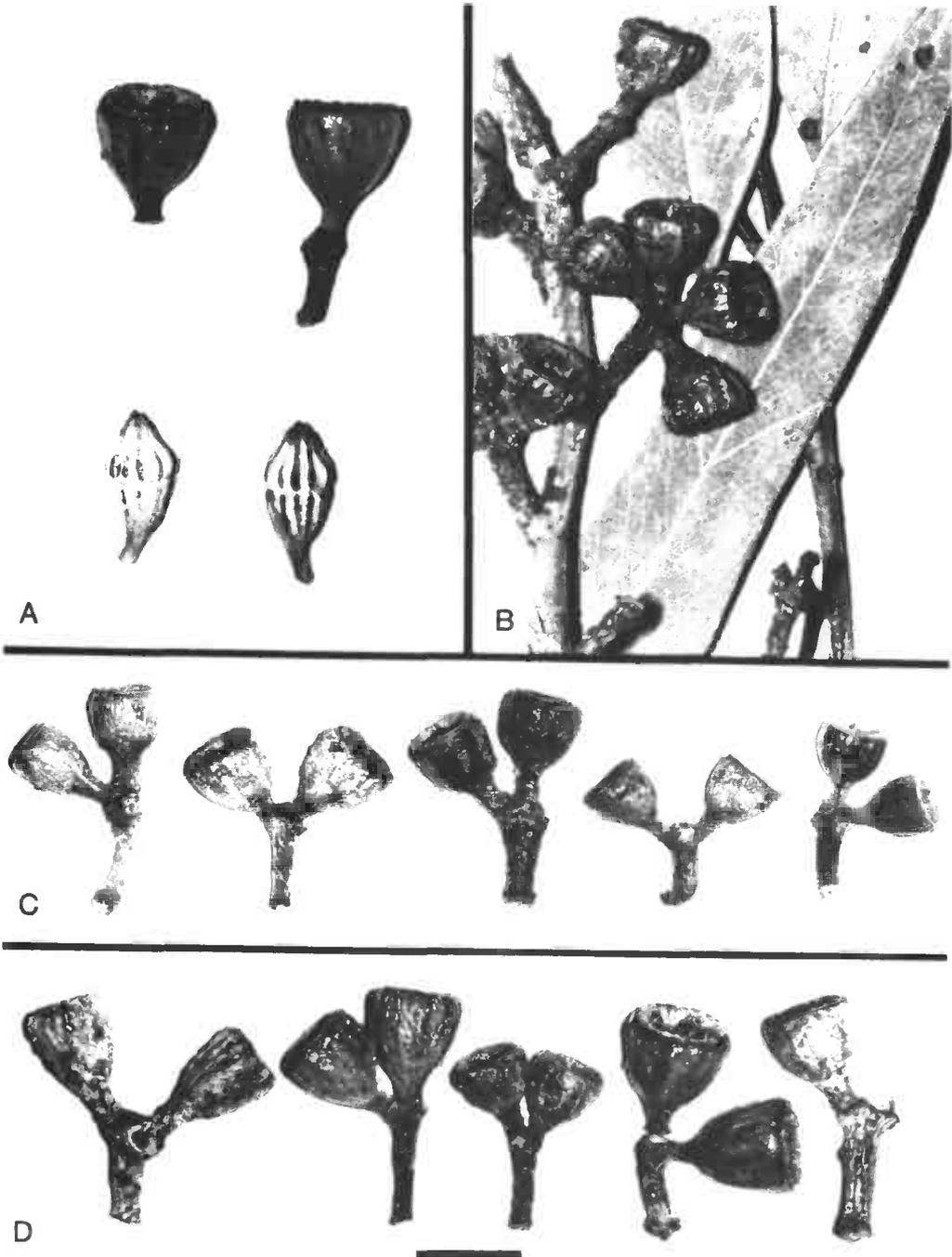


Fig. 8. *E. cretata*: A, fruits and buds, C.D. Boomsma 423, 3 km SW Carappee Hill; B, individual with pronounced fruit ribbing, C.D. Boomsma 420B, *ibid*; C, fruits from Carappee Hill, J.P. Conquest 24.x.1977, P.J. Lang 1045, 1044, 1047, 1048; D, fruits from plain between Carappee Hill and Darke Peak: P.J. Lang 1050. C.D Boomsma 420A, 420B, 423, P.J. Lang 1051. Scale = 1 cm.

at mid-length. *Seed* lustrous, red-brown, flattish, with shallow reticulum. Figs 5, 7, 8.

Etymology

The epithet from the Latin *cretatus* (marked with chalk) refers to the distinctive white bloom on the branchlets and inflorescences. The varietal epithet "argentea" proposed by J.M. Black could not be adopted because the combination *E. argentea* Cord. ex Blakely (1934, p.315) already exists.

Selected specimens examined

E. cretata s. str.

SOUTH AUSTRALIA: Eyre Peninsula Region: 30.viii.1935, *E.H. Ising 3767* (AD, CANB, FI, G), Darke Peak; 30.i.1951, *E.C. Black* sub *J.M. Black s.n.* (AD), Darke Peak; 30.viii.1959, *K.D. Rohrlach 455* (AD, BM, G, IA, K, L, P), S side Carapsee Hill; 9.x.1966, *D.N. Kraehenbuehl 2074* (AD, CANB), E of Prominent Hill, Hambidge Conservation Park, on small clay-pan depression; 28.i.1965, *R. Pearce s.n.* (AD), Miltalie, c. 10 km NW of Cowell; 20.vi.1967, *G.C. Cornwall 43* (AD, U), Carapsee Hill; 15.ix.1974, *D.E. Symon 9008* (AD, NSW), S end Carapsee Hill; 17.x.1977, *P.J. Lang 1044* (AD), 1045 (AD), Carapsee Hill, at base of hill, 0.4 km N from road to Darke Peak; 17.x.1977, *P.J. Lang 1047* (AD), 1048 (AD), Carapsee Hill, upper slopes (SE facing) of ridge, 1.3 km N from road to Darke Peak; 17.x.1977, *P.J. Lang 1050* (AD, CANB), 4 km NE Darke Peak P.O. on road to Carapsee Hill; 17.x.1977, *P.J. Lang 1051* (AD, CANB), Darke Peak school; 24.x.1977, *P.J. Lang 1142* (AD), road junction 2.2 km W Poolalie HS, c. 12 km NW Cleve; 3.ii.1979, *M.D. Crisp 5658* (AD, CANB, CBG, NSW, PERTH), 3 km N of Darke Peak town; 28.vi.1979, *C.D. Boomsma 420A* (AD, CANB, PERTH), 420B (AD, CANB), 423 (AD, CANB), 3 km SW Carapsee Hill on road to Darke Peak; 27.xi.1985, *P.J. Lang D8791* (AD), c. 6 km ESE of Lock on road to Rudall; 27.xii.1989, *P.J. Lang 1829* (AD, CANB) 1 km S Ulgera Gap on Coolanie-Yabmana road; 27.xii.1989, *P.J. Lang 1835* (AD, CANB, CBG, DNA, HO, K, MEL, NSW, PERTH), 0.9 km S Darke Peak silos.

E. aff. cretata (intergrades)

SOUTH AUSTRALIA: Eyre Peninsula Region: 18.x.1977, *P.J. Lang 1071* (AD, CANB), 1072 (AD), 4.7 km E by road from crossroads 1 km E Tooligie Hill P.O.; 24.x.1977, *P.J. Lang 1142* (AD), 1.5 km W Poolalie HS, c. 12 km NW Cleve; 24.x.1977, *P.J. Lang 1149* (AD), 0.3 km SW Coolanie; 8.v.1981, *P.J. Lang 1593, 1594, 1589* (all AD), c. 8 km NW of Cowell, Section 39, Hundred of Playford; 27.xi.1985, *P.J. Lang D8803* (AD), Section 1, Hundred of Hincks, c. 20 km due E of Peachna; 27.xi.1985, *P.J. Lang D8785* (AD), road junction c. 20 km SE of Lock and 6 km NW of Hincks Conservation Park; 7.v.1987, *M. Bennell & G. Carpenter D8741* (AD), Section 114, Hundred of Minbrie; 28.xii.1989, *P.J. Lang 1836* (AD, CANB, NSW), 1 km ESE Rudall.

Distribution, habitat and variation

E. cretata has a limited distribution on central Eyre Peninsula (Fig. 6) with its major occurrences associated with two prominent inselbergs which intrude through the extensive sand dune system: Carapsee Hill, composed of granite (N.C.S.S.A., 1974), and Darke Peak Range, composed of quartzite. *E. cretata* is notably absent from Caralue Bluff, a third inselberg of quartzite a little further north. The main occurrence is on the plain along the eastern side of Darke Peak Range. From Darke Peak township it extends along roadsides for about 6 km north and 7 km south, 2 km west to the base of the Range and 4 km north-east towards Carapsee Hill. A major population also occurs on the lower slopes of Carapsee Hill and around its base, principally on the south and east sides. This distribution mostly coincides with the areas of plain that have been shielded from the south-east trending dunes in the shadow of the inselbergs (Crocker, 1946, p. 87).

Smaller outlying populations occur in Hambidge Conservation Park west of Darke Peak Range, from Lock south-east towards Hincks Conservation Park, and at scattered localities in the system of low hills and ranges mainly north-west of Cleve and north-west of Cowell. The annual average rainfall is from 350 to 415 mm.

E. cretata usually grows in pure stands on grey-brown calcareous loams or clays, sometimes exhibiting gilgai formation. It is also common on fluvial sandy loams and red-brown clays derived from gneissic and granitic rocks.

Two variant forms or ecotypes of *E. cretata* may be recognised within the Carappee Hill-Darke Peak district, although these are not considered distinct enough to warrant taxonomic status. On the rocky slopes of Carappee Hill *E. cretata* is a straggly thin-stemmed mallee 1.5-3 m tall, growing in patches of low scrub interspersed with *Melaleuca uncinata* and *E. calycogona* on a skeletal, gravelly, dark red-brown loam (pH 6.5-7) derived from the granite. These forms tend to have twisted branches, very broad, ovate, sub-adult leaves, and relatively small, smooth fruits (Figs 7C, 8C). At the base of Carappee Hill, gravelly, sandy loam (pH 7) overlies medium clay (pH 8.5-9). Here and elsewhere on the plain, *E. cretata* is a robust mallee or small tree to 7 m high. These forms tend to have more erect branches, longer more lanceolate leaves, and larger fruits that are often ribbed (Figs 7A, 8A, 8B, 8D).

Intergrades of *E. cretata* may morphologically approach *E. pileata*, *E. dumosa*, or *E. "anceps"*² and can be recognized by their weakly glaucous branchlets and/or smaller fruits and leaves (Fig. 9A). They may also have a more typical mallee habit with spreading stems and a denser canopy (Fig. 9B).

Although variable, *E. cretata* is a discrete and well-defined taxon in the Carappee Hill-Darke Peak district where the most extensive populations occur. The flowering period is consistent and intermediate forms are very rare despite contact with non-glaucous species of series *Rufispermae*, namely *E. "anceps"* and *E. pileata* s. lat.

In smaller outlying populations intergrades are more prevalent and may occur alone, or together with typical *E. cretata* and/or other taxa of series *Rufispermae*.

These intergrades occupy an even wider range of habitats. They occur east of Tooligie Hill on brown sandy clay-loam over red calcareous heavy clay (pH 9). On the escarpment immediately north-west of Cowell they grow on rocky limestone slopes associated with an interesting convergent form of *E. socialis* with glaucous branchlets. About 25 km south-east of Lock they grow on small low-lying flats with heavy, dark grey-brown calcareous loam, which are scattered through the irregular dunefield. On these flats they form an almost pure community of stunted shrubs 1-2 m tall with little or no understorey. Examples of this unusually low mallee scrub adjoin, and probably extend into, Hincks Conservation Park.

Flowering period: (December) January-February.

Notes and affinities

The glaucous eucalypt at Carappee Hill and Darke Peak has long been regarded as a possible new South Australian taxon. J.M. Black annotated one herbarium specimen (*E.C. Black, AD97631412*) collected in 1951, as *E. pileata* "var. *argentea*". Presumably, it fitted the existing broad concept of *E. pileata* on the basis of the strongly ribbed operculum. Eichler (1965) recognized a possible outlier of the Western Australian taxon *E. clelandii* (Maiden) Maiden, based on an early determination by Maiden of a Darke Peak collection (*W. Gill, xii.1914 [NSW]*). Boomsma (1981) treated it as a southern outlier of *E. striatocalyx* W. Fitzg., although he had earlier proposed describing it as a subspecies of *E. cyanophylla* Brooker, (Boomsma, pers. comm.).

The distinctness of *E. cretata* from its nearest relatives is largely due to the single character of glaucous branchlets. This feature is characteristic of many taxa of series *Rufispermae* in Western Australia, but its only other South Australian occurrence in the series is in north-western desert forms currently included in *E. striatocalyx*.

Of existing taxa, *E. cretata* is morphologically most similar to *E. cyanophylla* but can be

2. Both authors believe that at least most of the type material of *E. anceps* (R. Br. ex Maiden) Blakely is *E. rugosa* R. Br. ex Blakely, and the taxon known as *E. anceps* requires a new name.

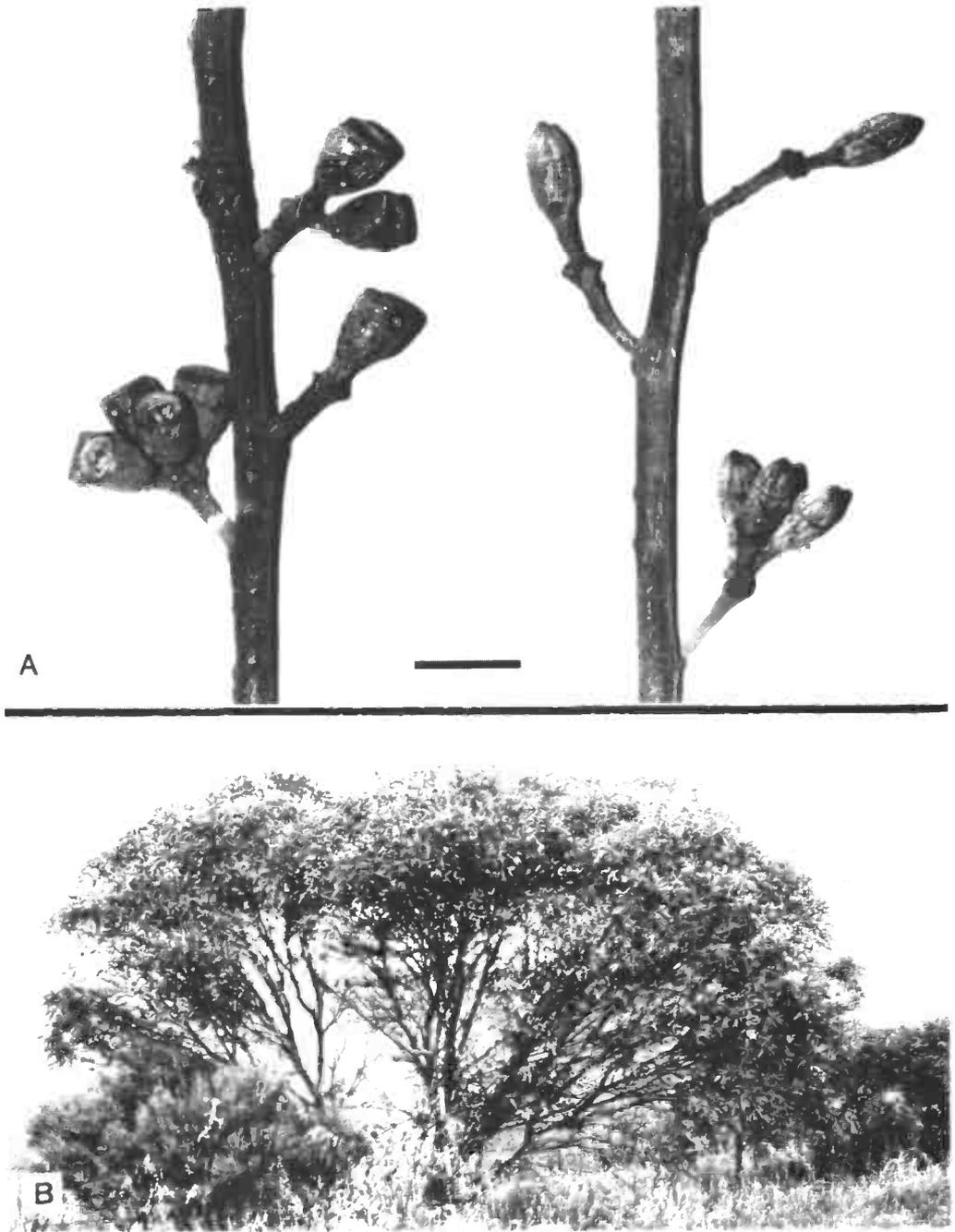


Fig. 9. *E. aff. cretata* (intergrade) P.J. Lang 1072, c. 6 km E Tooligie Hill, showing: A, lightly glaucous branchlets, fruits and buds (scale = 1 cm); B, spreading mallee habit (3.8 m tall) with dense canopy of fine foliage.

distinguished by its glaucous branchlets, its grey-green and subglaucous leaves (rather than bluish grey and strongly glaucous), and summer rather than winter flowering. It is also allied to north-western desert forms currently included in *E. striatocalyx* but differs in consistently having glaucous branchlets, and in shorter pedicels, smaller fruits, and absence of rough basal bark. It differs from the superficially similar *E. sheathiana* Maiden, *E. georgei* Brooker & Blaxell and allied forms with glaucous branchlets in Western Australia in its strongly ribbed operculum and coarse, broadly pedicellate fruit.

Conservation status

E. cretata is well conserved in Carapsee Hill Conservation Park and smaller outlying occurrences are represented in Hambidge Conservation Park. In the Darke Peak district its habitat is highly prized for agriculture and although widespread, it occurs mainly in road and railway reserves and other small remnants. Overall, it is considered to be rare and the status code 2RCa is suggested using the criteria of Briggs & Leigh (1989).

Key to species of series *Rufispermae* in South Australia

- A Mature leaves finally glossy and green:
 - B Fruits sessile:
 - C Fruit length/width ratio < 0.8, peduncles 4-8 mm long *E. conglobata*
 - C Fruit length/width ratio > 0.8, peduncles 7-15 mm long *E. "anceps"*
 - B Fruits pedicellate:
 - D Mallee; leaves always glossy; operculum much wider than hypanthium *E. pileata*
 - D Tree; leaves initially dull, ageing glossy; operculum slightly wider or flush with hypanthium *E. calcareana*
- A Mature leaves dull, green to bluish-grey:
 - E Fruiting pedicels 4-7.5 mm long, sharply defined; fruits to 13 mm long; often with fibrous bark basally *E. aff. striatocalyx*
 - E Fruiting pedicels < 4 mm long, sharply defined or broadly grading into hypanthium; fruits to 10 mm long; entirely smooth-barked:
 - F Leaves coarse and thick, 2-3 cm wide, glaucous; fruits 7-10 mm long:
 - G Branchlets glaucous, leaves grey-green *E. cretata*
 - G Branchlets non-glaucous, leaves bluish-grey *E. cyanophylla*
 - F Leaves moderately fine and thin, 1-2 cm wide, green and non-glaucous to strongly glaucous; fruits 5.5-8.5 mm long:
 - H Operculum much wider than hypanthium, strongly ribbed (ribs 0.8-1.3 mm high); fruit often weakly ribbed *E. percostata*
 - H Operculum more or less flush with hypanthium, weakly ribbed (ribs 0.1-0.5 mm high); fruit smooth *E. dumosa*

Acknowledgements

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