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The name of South Australia's mangrove species

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Abstract

Reasons are presented for use of the name *Avicennia marina* (Forssk.) Vierh. subsp. *marina* (Avicenniaceae/Acanthaceae), instead of *A. marina* subsp. *australasica* (Walp.) Everett, for the only South Australian mangrove species.

Background

Avicennia marina (Forssk.) Vierh. is found in countries whose shores abut the Indian Ocean, through Malesia and, to a limited extent, in the western Pacific in Australia and New Zealand. It is the only mangrove species to occur in South Australia and in the last edition of the *Flora of South Australia* it was treated as *A. marina* var. *resinifera* (Forst.f.) Bakh. (Munir 1986).

Following the 1986 Flora treatment a revision of the family for Australasia by Duke (1991) recognised three varieties within *A. marina*. According to Duke, *A. marina* var. *marina* was found on the Western Australian coastline south of the Kimberleys, var. *eucalyptifolia* (Valeton) N.C.Duke was confined to northern Australia and var. *australasica* (Walp.) Moldenke ex N.C.Duke[1] was found on coastlines from Townsville to Adelaide.

Duke allocated South Australian material to var. *australasica* apparently on the basis of two collections from Port Gawler (*M.M.Retallick s.n.*); the specimens are in the Townsville herbarium and have not been seen by the authors. The variety *resinifera* was predated by var. *australasica* and so can no longer be used. Everett (1994) raised the varieties recognised by Duke to subspecies.

In 2004, the second author was writing an account of *Avicennia* for the *Flora of Australia* (Orchard subm.). He contacted the first author asking which name would be used in the forthcoming South Australian census (Barker et al. 2005). From the limited material available to him in the Australian National Herbarium, Canberra he had found that South Australian material matched the Western Australian subsp. *marina* more closely than subsp. *australasica*, since the sepals had glabrous rather than hairy margins.

[1] The combining authorship for this variety has still to be confirmed. This is the usual citation since Everett (1994) pointed out that Moldenke could not be cited as the combining author; whether the combination can be attributed to Duke (1991) needs further investigation. Since the varietal name is not used in the South Australian census this matter does not need to be resolved here.

Observations and discussion

The first author has made limited observations on the specimens of *Avicennia marina* held by the State Herbarium of South Australia. Only the three characteristics presently used to separate the three subspecies were investigated viz. hairiness of the sepals, nature of the bark and height of the style in relation to the stamens.

Sepals

Inspection of the collections supported the Orchard observations i.e. all specimens had sepals with a glabrous rim behind the ciliate edge, thus suggesting subsp. *marina* rather than subsp. *australasica.* Two specimens from Port Phillip Bay and Westernport Bay in Victoria (*St. John s.n.*; *Lothian s.n.*) provided the contrasting character found in subsp. *australasica* with the sepals with hairs to the edges.

Bark

Whether a specimen has rough (subsp. *australasica*) or smooth (subsp. *marina*) bark is usually difficult to assess since there is rarely true bark present in collections. However older branches were almost invariably smooth and many of them showed some evidence of chalkiness or pruinosity, characteristics associated with subsp. *marina*.

The only case where a specifically collected piece of mature bark was present was a Symon specimen (*Symon 3451*). This collection had already been identified by the second author, from a duplicate in CANB, as having the clearly fissured bark of subsp. *australasica*. Bark with the AD duplicate is also clearly fissured. However the sepals have a glabrous margin and the style is well below the anthers thus also placing this specimen with subsp. *marina*. This was the only case where obvious

fissuring was present on the bark and it may have had more to do with the age of the trees the specimens came from; photographs accompanying the specimen show very mature gnarled old trees.

Style length relative to anthers

The relative lengths of the style and anthers is also used to define the subspecies, with the style below the anthers indicating subsp. *marina* and level with them indicating subsp. *australasica*. This was not always able to be assessed because of a lack of flowers in many of the specimens. Buds or spent flowers, with only the sepals remaining, are more likely to be encountered.

In many of the specimens investigated where flowers were present, the style was below the anthers (e.g. *Cocks 23*, *Symon 2016*). In others (e.g. *Shore s.n.*), the end of the style was clearly at the same level as the anthers, and in one case (*Haase*, AD 99511290) the ovary was developing and the bifid style end protruding from an almost closed calyx, as in bud. In this latter case the corolla had already been lost suggesting pollination could be occurring in bud. However on this specimen, in one case where the corolla was still present, the clearly 2-lobed stigma was at the same level as the anthers, but the apparently unopened anthers seemed to be bereft of any pollen.

In another specimen from the top of St Vincents Gulf (*Dangerfield*, AD 96410087) stamens appressed around the stigma in bud were bereft of pollen and, even though they elongated normally with the opening of the flower, they remained sterile; in this case the flower was functionally female. There were no developing fruits on this specimen. In contrast, another collection from the same locality (*Weber 504*) had buds in which stamens were producing pollen and the stigma was at the same level as the anthers; a fruit was present with this specimen but it was not clearly attached to the branch and so may have developed elsewhere.

The floral biology of the taxon, in South Australia at least, is in need of further investigation and it might be wise not to set too much store in the style length with respect to the stamens character until there is a better understanding of just how the flowers function.

Conclusion

The sepal characteristic is readily assessed in most specimens and in all of the State Herbarium collections studied the margin was invariably glabrous. The bark on the branches of all but one specimen was smooth and often pruinose. The length of the style with respect to the anthers seems more likely to be related to the floral biology and does not appear to be a reliable character in assessing the subspecies.

South Australian material has been identified with subsp. *marina* rather than subsp. *australasica* since the original Orchard query (Barker et al 2005). There do not seem to be any significant differences between specimens from the various regions of South Australia, i.e. material from Spencers Gulf appear similar to that from St Vincents Gulf. The only reason for retaining subsp. *australasica* in the South Australian census is that the specimens that Duke used to conclude that SA specimens were subsp. *australasica* have not been seen.

More recently Duke (2006: 76) has written that

> "trees of *A. marina* around Adelaide are genetically intermediate between two varieties, var. *marina* and var. *australasica*. Populations in Spencer Gulf and along the west coast of Eyre Peninsula might be more closely related to var. *marina*, while those to the east are perhaps more like var. *australasica*."

The morphological observations above do not seem to support this supposition and all material in South Australia appears more closely allied with the Western Australian taxon, subsp. *marina*, than to subsp. *australasica*. However further genetic and floral biology studies are needed to confirm these observations, particularly since an allozyme study by Duke et al. (1998) did indicate introgression between subsp. *marina* and subsp. *australasica* in the Adelaide region.

Specimens cited

South Australia: **Spencers Gulf:** *B.Haase s.n.*, 11 Apr. 1995, Australian Arid Lands Botanic Gardens, Port Augusta (AD 99511290); *M.M.Retallick s.n.*, s.dat., Port Gawler (AIMS 955, 1017-8; *n.v.*); *E.P.Shore s.n.*, 30 Mar. 1964, Point Lowly (AD 96518183); *D.E.Symon 3451*, 23 Feb. 1965, between Pt Lowly and Bucky Head (AD, CANB, K, SPN). **St Vincents Gulf:** *F.B.Cocks 23*, 21 Mar. 1963, Port Gawler (AD); *B.G.Dangerfield s.n.*, 25 Nov. 1963, Port Wakefield (AD 96410087); *D.E.Symon 2016*, 2 Mar. 1962, top of [St] Vincent Gulf (AD); *J.Z.Weber 504*, 11 Jan. 1967, Port Wakefield, 1 km W of port (AD, NSW).

Victoria: *P.R.H.St. John s.n.*, 10 May 1913, Williamstown district (AD 98631200); *T.R.N.Lothian s.n.*, 21 Jan. 1954, Tooradin (AD 97728312).

References

Barker, W.R., Barker, R.M., Jessop, J.P. & Vonow, H.P. (eds) (2005). Census of South Australian vascular plants (ed. 5.00). *Journal of the Adelaide Botanic Gardens Supplement* 1.

Duke, N.C. (1991). A systematic revision of the mangrove genus *Avicennia* (Avicenniaceae) in Australasia. *Australian Systematic Botany* 4: 299–324.

Duke, N.C., Benzie, J.A.H., Goodall, J.A. & Ballment, E.R. (1998). Genetic structure and evolution of species in the mangrove genus *Avicennia* (Avicenniaceae) in the indo-west Pacific. *Evolution* 52: 1612–1626.

Duke, N.C. (2006). *Australia's mangroves: the authoritative guide to Australia's mangrove plants.* (University of Queensland: Brisbane).

Everett, J. (1994). New combinations in the genus *Avicennia* (Avicenniaceae). *Telopea* 5: 629.

Munir, A.A. (1986). Avicenniaceae. In: Jessop, J.P. & Toelken, H.R. (eds), *Flora of South Australia* 3: 1178–1180. (Government Printer: Adelaide).

Orchard, A.E. (subm.). Avicenniaceae. In: *Flora of Australia* 30.