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A NEW AUSTRALIAN SPECIES OF *DUBOISIA* R. BR. (SOLANACEAE)

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Abstract

A new species of *Duboisia*, *D. arenitensis* Craven, Lepschi & Haegi, is described from the Northern Territory, Australia. The species is illustrated, its distribution mapped, and an identification key provided. The hyoscine and hyoscyamine content of the single collection known is 0.137% and 0.04%, respectively.

Introduction

The solanaceous genus *Duboisia* R. Br., consisting of three species, occurs in Australia and New Caledonia with one species, *D. myoporoides* R. Br., common to both areas. The other two species, *D. hopwoodii* (F. Muell.)F. Muell. and *D. leichhardtii* (F. Muell.)F. Muell., are restricted to Australia. The genus was treated comprehensively by Haegi (1983) and has been treated (for differing numbers of species) in several floras (e.g. Heine, 1976; Purdie *et al.*, 1982; Stanley and Ross, 1986; Conn, 1993). Species of the genus contain alkaloids and *D. myoporoides* and *D. leichhardtii–myoporoides* hybrids are cultivated for alkaloid production, notably for hyoscine and hyoscyamine. Plantations have been established in southeastern Queensland for this purpose. A concise account of the commercial utilisation of *Duboisia* in Australia has been given by Matheson (1979).

During a botanical exploration trip to western Arnhem Land, Northern Territory, in March 1984, a *Duboisia* was collected by L.A. Craven and G.M. Wightman on the floristically rich sandstone plateau in this region. The plant could not be identified with any of the known species of the genus and further study of the herbarium material has demonstrated that it possesses a unique combination of character states. It has been concluded that this material represents a new species of the genus, described here as *D. arenitensis*.

Duboisia arenitensis Craven, Lepschi & Haegi, *sp. nov.*

Frutex 1.5 m altus. *Folia* glabra; petiolo vel obsoleto usque 20 mm longo; lamina angustissime elliptica usque anguste ovata interdum ovati-elliptica, saepe falcata, 70 × 15 mm usque 100 × 25 mm. *Inflorescentia* paniculata, foliosa proximale, bracteata distale; pedicello 1.5–3.5 mm longo. *Calyx* 2.25–4.5 mm longus; lobis angustissime triangularibus usque sublinearibus, 1.25–3 mm longis, longitudine 0.6–0.7 calycis. *Corolla* 5–8 mm longa; lobis anguste ovatis usque anguste triangularibus, 1.75–4 mm longis, longitudine 0.4–0.5 corollae. *Stamina* 4, duobus 1–1.5 mm longis et ceteribus 2–2.5 mm longis, staminodio carenti. *Fructus* non visus.

Typus: Australia, Northern Territory, vicinity of Mt Gilruth, lat. 13°10'S, long. 133°06'E, 27.iii.1984, *Craven & Wightman 8292* (holo.: CANB; iso.: A, AD, DNA, E, G, K, L, MEL, MO, P, US).

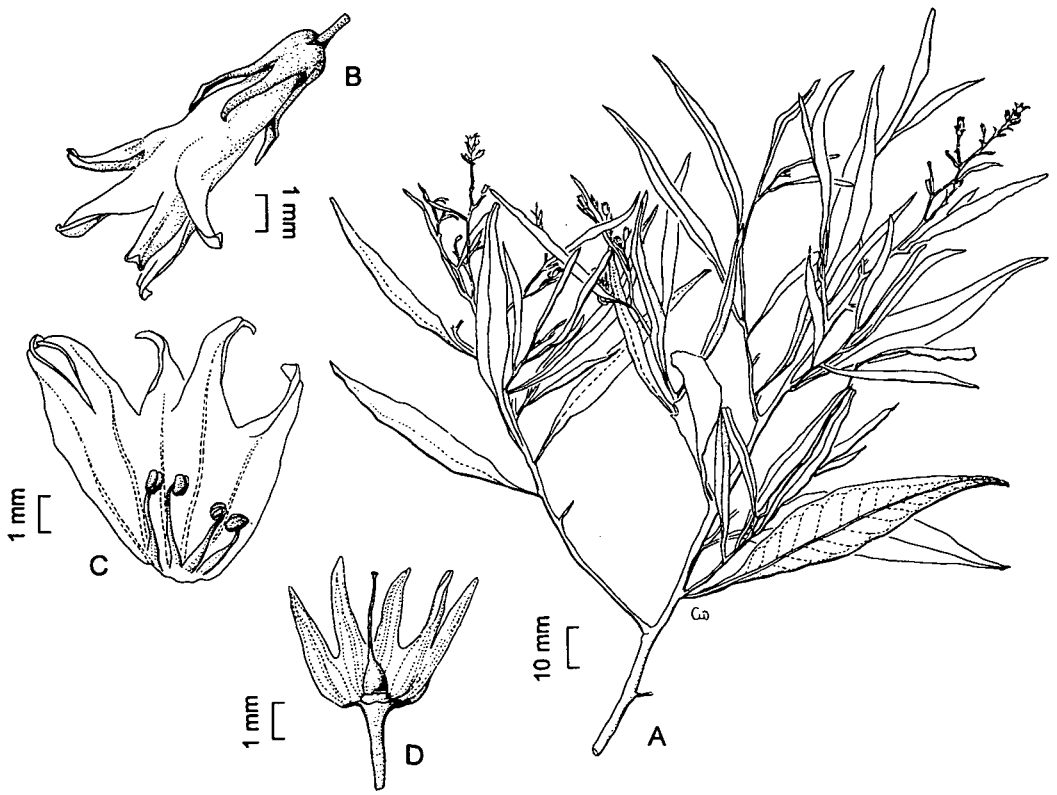


Fig. 1. *Duboisia arenitensis*. A, flowering branchlet; B, flower; C, Corolla of opened flower showing the four stamens; D, calyx of opened flower showing the gynoecium. From type collection.

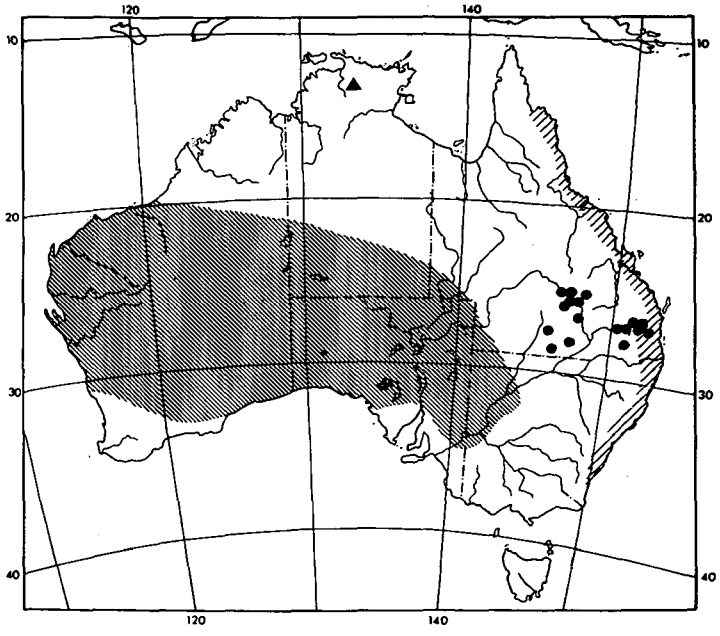
Shrub 1.5 m tall, branches glabrous excepting some minute deciduous hairs at the nodes. *Leaves* glabrous; petiole obsolete or up to 20 mm long; lamina narrowly to very narrowly elliptic to narrowly ovate or occasionally ovate-elliptic, often falcate, 70 × 15 mm to 100 × 25 mm, progressively becoming reduced on flowering branchlets and then sublinear and straight in shape and 30 × 2 mm, the base attenuate, the apex long acuminate, the margin flat and entire to slightly and irregularly sinuate, the midrib prominent abaxially and adaxially plane or adaxially impressed proximally and prominulous distally. *Inflorescence* paniculate, leafy proximally, bracteate distally, with minute glandular hairs on the axes and bracts; pedicel glabrous or with sparse minute glandular hairs, 1.5–3.5 mm long, straight to slightly curved. *Calyx* with minute glandular hairs, these sparse on the abaxial surface and

more numerous on the adaxial surface, 2.25–4.5 mm long; lobes very narrowly triangular to sublinear, 1.25–3 mm long, 0.6–0.7 times as long as the whole calyx, the apex acute to subobtuse. *Corolla* with minute simple and minute glandular hairs on the abaxial surface and glabrous on the adaxial surface excepting the dense minute papillae on the distal portion of the lobes, 5–8 mm long; lobes narrowly ovate to narrowly triangular, 1.75–4 mm long, 0.4–0.5 times as long as the whole corolla, the apex acuminate to narrowly acute. *Stamens* 4, 2 of these 1–1.5 mm long and the others 2–2.5 mm long, staminode absent. *Gynoecium* 2–3 mm long. *Fruit* not seen. Fig. 1.

Distribution and ecology

The species is known only from the type gathering which was collected near Mt Gilruth on the western Arnhem Land plateau. Map 1.

The solitary plant from which this collection was made grew in shrubby woodland on sandy alluvium along a seasonal creek on the sandstone plateau. Five or six additional plants were observed growing nearby in a similar habitat.



Map 1. Distributions of *Duboisia* species in Australia. *D. arenitensis* ▲; *D. hopwoodii* ▨; *D. leichhardtii* ●; *D. myoporoides* ▨.

Chemistry

Leaf material from the type collection has been analysed by Dr Bill Griffin, University of Queensland, Brisbane. The alkaloid content was low (hyo-scine 0.137%, hyo-scyamine 0.04%) (Griffin, pers. comm., 1990).

Although *D. arenitensis* may not warrant cultivating for its alkaloids alone, the species should be brought into cultivation for experimental purposes. A research program to obtain hybrids between the new species and those presently cultivated should be undertaken, and field research conducted to establish whether or not crop improvements could be made, either in alkaloid quality and/or quantity or in agronomic factors such as productivity, disease resistance, tolerance to harvesting, etc. Intergeneric and interspecific hybridisation is known to result in novel qualitative and/or quantitative chemical profiles in Solanaceae (Evans, 1986; El-Iman *et al.*, 1991) and the potential for *D. arenitensis* to contribute to crop improvement in *Duboisia* should be investigated.

Notes

In the features reported in this paper, there is no single character state which distinguishes *D. arenitensis* from its congeners; the species is separated on a combination of characters. The major differences between the species are given in Table 1.

Duboisia arenitensis not only extends the geographic range of the genus into the northern part of the Northern Territory (Map 1), but also extends its ecology. The species occurs within the monsoon zone of northern Australia where it is a component of the woodlands developed on the extensive sandstone plateau of Arnhem Land. *Duboisia myoporoides* occurs in the coastal region of eastern Australia, usually in humid eucalypt forests or rainforests and often in disturbed sites. *Duboisia leichhardtii* occurs in open eucalypt forest and eucalypt woodlands in southcentral and southeastern Queensland. The remaining species, *D. hopwoodii*, is widely spread within the arid zone and occurs in a range of communities including mallee and mulga woodlands.

The specific epithet is derived arbitrarily from the geological name for sandstone, arenite, and refers to the colloquial name used by botanists for sandstone plateau country of northern Australia, i.e. "the sandstone".

Table 1 – Major distinguishing characters of *Duboisia* species

	D. arenitensis	*D. hopwoodii*	*D. leichhardtii*	*D. myoporoides*
Leaves	Usually petiolate, rarely subsessile or sessile. Petiole 1–20 mm long.	Sessile to subsessile, rarely petiolate. Petiole 3–10 mm long.	Sessile to petiolate. Petiole 1–8 mm long.	Sessile to petiolate. Petiole 1–30 mm long.
Lamina	Narrowly elliptic to narrowly ovate, rarely sublinear (on flowering branchlets). Often falcate.	Narrowly to very narrowly elliptic to linear.	Narrowly to very narrowly ovate-elliptic, rarely narrowly ovate or narrowly elliptic.	Narrowly obovate to narrowly obovate-elliptic.
Lamina length	30–100 mm	24–125 mm	51–135 mm	38–150 mm
Lamina breadth	2–25 mm	1–13 mm	7–22 mm	1–43 mm
Lamina apex	Long acuminate	Narrowly acute to acuminate, rarely apiculate.	Acuminate or narrowly acute.	Blunt, acute to obtuse, rarely rounded.
Pedicel length (in flower)	1.5–3.5 mm	1.5–5 mm	10–16 mm	2–7 mm
Calyx length	2.25–4.5 mm	1.5–4.5 mm	1.5–3.2 mm	1.2–3.2 mm
Calyx lobe shape	Very narrowly triangular to sublinear	Triangular to broadly triangular, occasionally acuminate.	Very narrowly triangular to more or less linear.	Triangular to broadly triangular.
Calyx lobe length	1.25–3 mm	0.3–2 mm	0.5–1.5 mm	0.2–0.8 mm
Calyx lobe length: overall calyx length.	0.6–0.7	0.3–0.8	0.5–0.6	0.1–0.3
Corolla length	5–8 mm	7–15.5 mm	13–19 mm	4–7 mm
Corolla lobe shape	Narrowly ovate to narrowly triangular.	Broadly ovate to ovate-elliptic or orbicular.	Very narrowly triangular to linear.	Broadly ovate to ovate-elliptic or rarely orbicular.
Corolla lobe length:	1.75–4 mm	1–5 mm	6.5–11.5 mm	1.3–3.5 mm
Corolla lobe length, overall corolla length	0.4–0.5	0.1–0.3	0.5–0.6	0.3–0.5

Key to the species of *Duboisia*

1. Leaves with the lamina mostly narrowly elliptic to linear.
   2. Leaves petiolate, rarely subsessile or sessile. Calyx lobes very narrowly triangular to sublinear. Corolla lobes narrowly ovate to narrowly triangular, 0.4–0.5 times as long as the corolla; corolla 5–8 mm long ..... *D. arenitensis*
   2. Leaves sessile or subsessile, rarely petiolate. Calyx lobes triangular to broadly triangular. Corolla lobes broadly ovate to orbicular, 0.1–0.3 times as long as the corolla; corolla 7–15.5 mm long ..... *D. hopwoodii*
1. Leaves with the lamina mostly obovate to obovate-elliptic or ovate to narrowly ovate or ovate-elliptic.
   3. Leaves with the lamina mostly obovate to obovate-elliptic, apex acute to obtuse. Corolla lobes broadly rounded ..... *D. myoporoides*
   3. Leaves with the lamina mostly ovate to narrowly ovate or ovate-elliptic, apex acuminate. Corolla lobes narrowly acute.
      4. Pedicel 1.5–3.5 mm long. Corolla 5–8 mm long, corolla lobes 1.75–4 mm long ..... *D. arenitensis*
      4. Pedicel 10–16 mm long. Corolla 13–19 mm long, corolla lobes 6.5–11.5 mm long ..... *D. leichhardtii*

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