

Dianella lignosa (Asphodelaceae), a new species from the north-west Kimberley region of Western Australia

Russell L. Barrett^{1,3}  and Matthew D. Barrett² 

¹National Herbarium of New South Wales, Australian Institute of Botanical Science, Australian Botanic Garden, Locked Bag 6002, Mount Annan, New South Wales 2567, Australia

²Australian Tropical Herbarium, Sir Robert Norman Building (E2), James Cook University, PO Box 6811, Cairns, Queensland 4870, Australia

³School of Biological Sciences, The University of Western Australia, Crawley, Western Australia 6009, Australia
Author for correspondence: russell.barrett@botanicgardens.nsw.gov.au

Abstract

We here describe *Dianella lignosa* R.L.Barrett & M.D.Barrett (Asphodelaceae) as a new species from the Kimberley region of Western Australia, previously included under *Dianella longifolia* R.Br. The new species is readily identifiable by its thick, woody lateral rhizomes, and also differs from *D. longifolia* in leaf and floral characters.

Keywords: Asphodelaceae; Australia; Systematics; Taxonomy

Introduction

Dianella Lam. is a genus of at least 45 species, and probably many more await formal description (Henderson 1987, 1988, 1991; Carr 2004; Muscat 2017; Muscat *et al.* 2019). The genus is now placed in an expanded definition of Asphodelaceae, having previously been placed within Hemerocallidaceae (Clifford *et al.* 1998) or Phormiaceae (Henderson 1987; Wheeler 1992; Green 1994). The morphology that defines the genus is relatively conserved, and there is a high degree of morphological similarity even with its sister genus *Eccremis* Baker, found in South America (Wurdack & Dorr 2009). Delimitation of species in the genus remains problematic, especially for widespread and morphologically variable taxa (Carr & Horsfall 1995; Carr 2006; Muscat *et al.* 2019).

A few *Dianella* species are considered widespread in the Pacific, as relatively recent dispersers from Australia (Muscat 2017; Muscat *et al.* 2019), largely mirroring dispersal patterns found in *Scaevola* L. (Goodeniaceae; Howarth 2003). The most widespread taxon endemic to Australia is *Dianella longifolia* R.Br. (Brown 1810), which is considered to have a broad distribution in eastern and northern Australia. In its traditional circumscription, the species occurs in south-east South Australia, Victoria, Tasmania, New South Wales, throughout Queensland as far north as the Torres Straight Islands, in the top-end of the Northern Territory and in the West Kimberley of Western Australia (Jessop & Henderson 1986; Henderson 1987; Stanley & Ross 1989; Wheeler 1992; Wilson 1993; Conran 1994; Morris 1994; Western Australian Herbarium 1998 onwards; Melzer & Plumb 2007). It is possible that plants from New Guinea incorrectly assigned to an Indian taxon,

D. ensifolia (L.) Redouté, could also form part of the *D. longifolia* complex (see Jessop 1979). Henderson (1987) recognised seven varieties in *D. longifolia* as an attempt to define some of the variation within this species.

The lectotype of *D. longifolia* is a specimen collected by Robert Brown near Keppel Bay, Queensland in August 1802, as designated by Henderson (1987: 480). In the strict sense, *D. longifolia* may well be restricted to eastern-central Queensland and appears to represent a form illustrated by Melzer & Plumb (2007). But considerable morphological variation is included within the name (e.g. Wilson 1993; Conran 1994; Morris 1994; Melzer & Plumb 2007; Barrett *et al.* 2018), and detailed field studies will be needed to define both *D. longifolia* and any potential segregates, especially if true *D. longifolia* is indeed restricted to eastern-central Queensland.

In a significant advance in our understanding of the *Dianella longifolia* species complex, Muscat (2017) and Muscat *et al.* (2019) produced the first molecular phylogenetic tree for *Dianella* based on relatively extensive sampling of species, in many cases including multiple individuals per species. Importantly, samples ascribed to *D. longifolia* from Western Australia (1 of 1) and the Northern Territory (2 of 3) were recovered as sister to *Dianella rara* R.Br. from the Glasshouse Mountains, Queensland, and *D. aff. nervosa* from Blackdown Tableland, Queensland, rather than the majority of samples ascribed to *D. longifolia*, which were placed in a separate clade with strong support. In the analyses of Muscat (2017) and Muscat *et al.* (2019, clade K, fig. 7), samples of *D. longifolia s. lat.* from the Northern Territory potentially form three independent lineages, and in the absence of fieldwork in that region and more detailed sampling for molecular phylogenetics, we refrain from ascribing samples from the Northern Territory to *D. lignosa* at this time. However, all Northern Territory collections should be critically compared to *D. lignosa* in case there are disjunct populations as one Northern Territory sample (DNA D0194440) was recovered sister to the Kimberley sample in Muscat *et al.* (2019).

Kimberley plants previously referred to *Dianella longifolia* form relatively small tussocks of just a few ramets, with spaced, clonal tussocks joined by a woody rhizome (Fig. 1) although the connecting rhizomes eventually decay. The leaves are seasonally senescent, not evergreen, reflecting the long dry season in the Kimberley. Ongoing studies in the Kimberley region continue to reveal significant numbers of new species (Barrett 2015). *Dianella lignosa* joins a suit of recently named geophytic or perennial, petaloid monocots endemic to Western Australia (Macfarlane & Conran 2015; Macfarlane & Keighery 2015; Macfarlane *et al.* 2020), and particularly from the Kimberley region (Barrett 2018; Barrett & Barrett 2015; Barrett *et al.* 2015, 2021, 2022). *Dianella lignosa* is the only *Dianella* species known to occur in the Kimberley region.

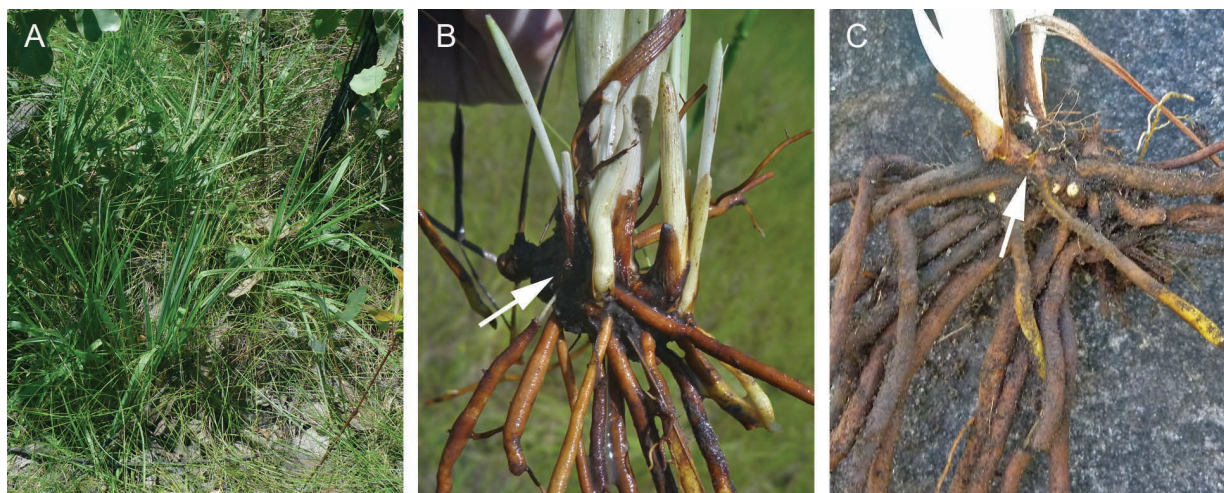


Fig. 1. *Dianella lignosa*. A. Habit. B, C. Plant bases with thickened, fibrous roots and arrows indicating thickened, woody rhizome (broken off near base of ramet). Vouchers: A, B: Eddins Range, 8 km N of Charnley River road crossing (not vouchered). C: M.D.Barrett & K.W.Dixon MDB 4651 (PERTH). Photographs by M.D.Barrett.

Methods

The description is based on field studies and specimens held at CANB, NSW and PERTH. Selected material held at MEL has also been examined. The format of the description follows Carr & Horsfall (1995).

Taxonomy

Dianella lignosa R.L.Barrett & M.D.Barrett, *sp. nov.*

Type: Western Australia: 9.9 km NE of Mount Agnes, headwaters of Prince Regent River, Mount Elizabeth Station, 28 Jan. 2007, R.L.Barrett & M.D.Barrett RLB 4054 (holo: PERTH 8042675; iso: DNA D0194440).

Illustration: Wheeler (1992: fig. 298d), as *D. longifolia* var. *longifolia*.

Loosely rhizomatous, caespitose perennial herb to 80(–100) cm high and c. 50 cm diameter at the base, ramets adjacent or up to at least 10 cm apart; arising from a thick woody horizontal rhizome up to 30 cm long, 3–6 mm diam, brown, with many thickened, fibrous, brown lateral roots, no evidence of tubers at time of excavation and apparently absent; stems of shoots 12–25 mm long, 4–7 mm diam. Leaves lorate, seasonally senescent, gradually tapering to the apex, 13–46 cm long, (4–)6–12 mm wide, conduplicate, deeply V-shaped in section, relatively soft (not leathery) pale to mid green or dull blue-green, aging grey-green, lightly discolourous, lamina smooth, dull, very finely scabrous along margins and abaxial midrib with a few distant, larger tubercles, keel sharp, but not thickened or winged, margins plane. Leaf sheaths equitant, loosely fan-shaped to tufted, loosely clasping, open (not at all fused), sheath 25–30 mm long, pale at the base. Inflorescence a compound, cymose panicle, ± erect, 40–78 cm long, scape slender, erect to somewhat arching; panicle 8–12 cm long, ± narrow-conical in outline, branches 1–5, spreading, relatively short; raceme-like cymules (2–)5–18 flowered, floral bracts small, ± narrowly triangular acuminate, pale green, 1.5–2.5 mm long, pedicels straight or slightly curved at anthesis, becoming recurved in fruit, (6–)8–21 mm long, regularly spaced. Flowers nodding to somewhat erect, medium sized, weakly but sweetly fragrant, opening early morning, lasting all day; perianth segments all similar, pale blue with a darker purple tint on veins; ± concolorous, adaxially slightly paler; segments erect to strongly recurved; narrow ovate-lanceolate to narrowly elliptic, subacute, 6–10 mm long, 1.8–2.2 mm wide, usually 5-veined. Stamens 4–7 mm long; filaments c. 2 mm long, weakly curved, cream ± translucent; strumae subconical, ± terete to slightly compressed in section, glabrous, bright yellow; anthers very pale yellow or cream, uniform in colour throughout; 3–4 mm long, c. 1 mm wide, very narrowly cuneate-lanceolate or subconical. Style very pale blue-purple, longer than the anthers, 3.5–6 mm long; ovary pale green, 3-locular, ± subglobular, c. 1 mm long, c. 1.3 mm wide. Fruit subglobose to obovoid, ± lumpy, mid-green becoming whitish with a pale blue to purple tint at maturity, somewhat glossy, 3.5–5 mm long, 2.5–4 mm wide. Seeds not seen. (Figs 1, 2)

Diagnostic characters: Differs from *D. longifolia* s. str. in having a thickened woody lateral rhizome (see arrows in fig. 1); the leaves lacking a thickened or winged keel and having plain margins; perianth segments all similar, erect to strongly recurved; fruit pale green to whitish with pale blue to purple tint at maturity.

Other specimens examined: WESTERN AUSTRALIA: 6.2 km ENE of Junction of Pitta Ck and Prince Regent River, 20 Mar. 2015, M.D.Barrett & K.W.Dixon MDB 4651 (PERTH); Grevillea Gorge, Synnot Range, 32 km NW of Beverley Springs Station Homestead, 14 Jan. 1996, R.L.Barrett & M.D.Barrett RLB 706 (PERTH); gully on top of sandstone plateau, 8.5 km ENE of Mount Agnes, near headwaters on N side of Prince Regent River, 6 Jan. 2001, R.L.Barrett & M.O'Connor RLB 1597 (CANB, PERTH); ISM2, step pavements of rough sandstone at top of large mesa, 3 km NNE of Prince Regent River from E boundary of Prince Regent Nature Reserve (1 km E of reserve), 22 Apr. 2008, R.L.Barrett & M.D.Barrett RLB 4532 (PERTH); south Bachsten Creek, NW of falls on N side of creek in small gully, Prince Regent Nature Reserve [National Park], 21 Jan. 2010, R.L.Barrett & V.Kessner RLB 6313 (PERTH); S of Bachsten Creek Camp, in Edkins Range, 25 Jan. 2010, M.Maier & P.Kendrick per R.L.Barrett RLB 6511 (PERTH); DMR 002 site, 1 km S of King Edward River on old Mitchell River Road, 34.3 km NW of Doongan Homestead, 17 May 2011, R.L.Barrett RLB 7187 (PERTH); 55 km by road WSW of Karungi [Karunjie] Station Homestead turnoff Chapman River - Gibb River - El Questro road, c. 170 km SW of Wyndham, 25 May 1976, A.C.Beauglehole ACB 51578 (PERTH); 5 km E of Gibb River, Kalumburu Mission road, Aboriginal Paintings area, between Donkey Creek and Gibb River, 190 km WSW of Wyndham, 6 June 1976, A.C.Beauglehole ACB 52273 (PERTH); Isdell River near Mount Barnett Homestead, June 1905, W.V.Fitzgerald 1051 (PERTH); Gibb River Homestead, 29 Jan. 1951, C.A.Gardner 9884, 9955 (PERTH).

Distribution: Considered to be endemic to the north-west Kimberley region of Western Australia, from Charnley River (Beverley Springs) north to Theda and Doongan and east to Gibb River Stations.

Habitat: Usually found growing in sandy soils derived from sandstone, on sand flats or among broken sandstone on ridges, in woodland dominated by *Eucalyptus miniata* and *E. tetradonta* or sometimes *Corymbia latifolia*. Grows in association with *Buchanania oblongifolia*, *Cajanus marmoratus*, *Commelina ensifolia*, *Decaschistia occidentalis*, *Eriachne* spp., *Erythrophleum* sp., *Galactia tenuiflora*, *Haemodorum ensifolium*, *H. flaviflorum*, *H. griseofuscum*, *H. interrex*, *Murdannia graminea*, *Pandanus spiralis*, *Petalostigma pubescens*, *Polycarpha longifolia*, *Sarga* spp., *Triodia* spp. and *Triumfetta* spp. Once recorded from the margin of a rainforest patch growing on basalt immediately below sandstone, growing with *Eulophia picta*.



Fig. 2. *Dianella lignosa*. A. Habitat. B. Habit. C. Leaves. D. Inflorescence. E, F. Flowers. G. Infructescence. H, I. Fruit. Vouchers: A: R.L.Barrett RLB 7187; B: R.L.Barrett & M.O'Connor RLB 1597; C: R.L.Barrett & V.Kessner RLB 6313; D, I: R.L.Barrett & M.D.Barrett RLB 4054; E, H: M.D.Barrett & K.W.Dixon MDB 4651 (all PERTH); G: Edkins Range, 8 km N of Charnley River road crossing (not vouchered). Photographs A–E, I by R.L.Barrett; F–H by M.D.Barrett.

Phenology: Flowers are recorded during January, probably continuing to April. Fruit recorded from January–April.

Conservation status: Not well collected due to its wet-season flowering period and seasonally senescent leaves, but probably relatively frequent within its area of distribution and not considered threatened. Occurs in the Prince Regent National Park.

Common name: Kimberley Flax Lily.

Etymology: From the Latin *lignosus* (wood-like) in reference to the distinctive woody lateral rhizome.

Affinities: This species resembles *Dianella longifolia* R.Br. var. *longifolia* and has previously been included under that species name (Henderson 1987; Wheeler 1992). *Dianella lignosa* differs in the thickened woody lateral rhizome (compact in *D. longifolia*); narrower leaves that lack a pronounced keel and have plane margins (keeled and with usually recurved margins in *D. longifolia*); flowers with all perianth parts similar and erect to strongly recurved; and pale fruit.

Kimberley material also has affinity to specimens from New Guinea generally referred to *D. ensifolia*, but that name is incorrectly applied to those specimens, and *D. ensifolia* correctly applies to an Indian taxon with much broader, glossy leaves. The name *D. ensifolia* has also been misapplied in Australia, including to Kimberley specimens by Fitzgerald (1918). Material from New Guinea examined at CANB and NSW does not appear to have the woody rhizome present in Kimberley and Northern Territory populations historically included under *D. longifolia*.

Notes: Specimens from the Northern Territory are more robust, with larger leaves, inflorescences and flowers. They probably represent a discrete species, but they are mentioned here as they are clearly closer to *D. lignosa* than they are to *D. longifolia* as the Northern Territory and Kimberley plants all have thickened, woody lateral rhizomes. The description above is based only on specimens from the Kimberley region.

Flowers have been observed (at c. 4 pm) being buzz-pollinated by a native bee similar in appearance to a honeybee (notes on *M.D.Barrett & K.W.Dixon MDB 4651*).

Acknowledgements

We thank Karen Muscat for discussions on relationships of tropical Australian *Dianella*. Butch and Robyn Maher are thanked for their company and for sharing local knowledge on field trips over the past 15 years. Paul Doughty and the Western Australian Museum are thanked for allowing us to participate in biological surveys in the Prince Regent River Reserve in 2007 and 2010. Pat Dundas, Maurice O'Connor, Michi Maier (Biota), Peter Kendrick (DPaW) and Butch Maher (Fitzroy Helicopters / All Sky Helicopters) are thanked for assistance with collecting species in the North Kimberley. Terry Macfarlane, Richard Jobson and James Clugston are thanked for constructive comments on the manuscript.

Funding

This paper was assisted by an Australian Biological Resources Study (ABRS) Bush Blitz Applied Taxonomy Grant (ATC214–10) to R.L. Barrett, B.J. Lepschi & L. Broadhurst. Some of the fieldwork associated with the discovery of these species was supported by a grant to the Western Australian Museum by Alcoa of Australia for the Alcoa Frog Watch programme and a personal donation from Harry Butler.

References

- Barrett MD (2018) Three new species of Asparagales from the Kimberley region of Western Australia. *Telopea* 21: 25–37. <https://dx.doi.org/10.7751/telopea11463>
- Barrett RL (2015) Fifty new species of vascular plants from Western Australia—celebrating fifty years of the Western Australian Botanic Garden at Kings Park. *Nuytsia* 26: 3–20. <https://florabase.dpaw.wa.gov.au/science/nuytsia/764.pdf>
- Barrett RL, Barrett MD (2015) Twenty-seven new species of vascular plants from Western Australia. *Nuytsia* 26: 21–87. <https://florabase.dpaw.wa.gov.au/science/nuytsia/730.pdf>
- Barrett RL, Barrett MD, Clements MA (2022) A revision of Orchidaceae from the Kimberley region of Western Australia with new species of tropical *Calochilus* and *Dipodium*. *Telopea* 25: (in press). <https://doi.org/10.7751/telopea15711>
- Barrett RL, Cosgrove M, Milner RNC (2018) *Field guide to plants of the Molonglo Valley: natural temperate grassland, box gum woodland, riparian vegetation*. (Australian Capital Territory Government, Parks and Conservation Service: Canberra)
- Barrett RL, Hopper SD, Macfarlane TD, Barrett MD (2015) Seven new species of *Haemodorum* (Haemodoraceae) from the Kimberley region of Western Australia. *Nuytsia* 26: 111–125. <https://florabase.dpaw.wa.gov.au/science/nuytsia/731.pdf>
- Barrett RL, Macfarlane TD, Keighery GJ (2021) Taxonomic revision of *Corynotheca* (Asparagaceae), with two new species and four new combinations. *Telopea* 24: 7–52. <https://doi.org/10.7751/telopea15372>

- Brown, R. (1810) *Prodromus Florae Novae Hollandiae, volume 1*. (Richard Taylor: London)
- Carr GW (2004) *A world checklist of Dianella (Hemerocallidaceae)*. Unpublished ms. (Ecology Australia Pty Ltd: Fairfield)
- Carr GW (2006) *Dianella tenuissima* (Hemerocallidaceae), a remarkable new species from the Blue Mountains, New South Wales, Australia. *Telopea* 11(3): 300–306. <https://www.biodiversitylibrary.org/item/266865#page/59/mode/1up>
- Carr GW, Horsfall PF (1995) Studies in Phormiaceae (Liliaceae) 1. New species and combinations in *Dianella* Lam. ex Juss. *Muelleria* 8(3): 365–378. <https://www.biodiversitylibrary.org/item/209924#page/107/mode/1up>
- Clifford HT, Henderson RJF, Conran JG (1998) Hemerocallidaceae. In Kubitzki K (ed.) *The Families and Genera of Vascular Plants. Volume III. Flowering Plants. Monocotyledons. Lilianae (except Orchidaceae)*. pp. 245–253. (Springer -Verlag: Berlin)
- Conran JG (1994) *Dianella*. In Walsh NG, Entwisle TJ (eds) *Flora of Victoria. Vol. 2*. pp. 647–651. (Inkata Press: Melbourne)
- Fitzgerald WV (1918) The botany of the Kimberleys, north-west Australia. *Journal and Proceedings of the Royal Society of Western Australia* 3: 102–224. <https://www.biodiversitylibrary.org/item/172166#page/114/mode/1up>
- Green PS (1994) *Dianella*. In Wilson AJG (ed.) *Flora of Australia. Volume 49. Oceanic Islands*. pp. 505–507. (Australian Government Publishing Service: Canberra)
- Henderson RJF (1987) *Dianella*. In: George AS (ed.) *Flora of Australia. Volume 45*. pp. 194–225. (Australian Government Publishing Service: Canberra)
- Henderson RJF (1988) Nomenclatural studies in *Dianella* Lam. ex Juss. (Phormiaceae) 1. *Austrobaileya* 2(5): 419–426.
- Henderson RJF (1991) Studies in *Dianella* Lam. ex Juss. (Phormiaceae) 2. *Austrobaileya* 3(3): 473–480.
- Howarth DG, Gustafsson MHG, Baum DA, Motley TJ (2003). Phylogenetics of the genus *Scaevola* (Goodeniaceae): implications for dispersal patterns across the Pacific Basin and colonization of the Hawaiian Islands. *American Journal of Botany* 90(6): 915–923. <https://doi.org/10.3732/ajb.90.6.915>
- Jessop JP (1979) *Dianella*. In van Steenis CGGJ (ed.) *Flora Malesiana. Volume 9. Part 1*. pp. 206–209. (Sijthoff & Noordhoff: Alphen aan den Rijn)
- Jessop JP, Henderson RJF (1986) *Dianella*. In Jessop, JP, Toelken HR (eds) *Flora of South Australia. Vol. 4*. (edn 4) pp. 1754–1755. (South Australian Government Printer: Adelaide)
- Macfarlane TD, Conran JG (2015) *Lomandra marginata* (Asparagaceae), a shy-flowering new species from south-western Australia. *Australian Systematic Botany* 27(5–6): 421–426. <https://doi.org/10.1071/SB14045>
- Macfarlane TD, Conran JG, French CJ (2020) *Caesia arcuata* (Hemerocallidaceae) from Western Australia, a new rarity with curved inflorescence branches. *Nuytsia* 31: 239–242. <https://florabase.dpaw.wa.gov.au/science/nuytsia/984.pdf>
- Macfarlane TD, Keighery GJ (2015) Two new species of *Tricoryne* (Hemerocallidaceae) from south western Australia. *Australian Systematic Botany* 27(5–6): 415–420. <https://doi.org/10.1071/SB14046>
- Melzer R, Plumb J (2007) *Plants of Capricornia*. (Capricorn Conservation Council: Rockhampton)
- Morris DI (1994) *Dianella*. In: Curtis WM, Morris DI (Eds) *The student's flora of Tasmania. Part 4B. Angiospermae: Alismataceae to Burmanniaceae*. pp. 377–378. (St David's Park Publishing: Hobart)
- Muscat KM (2017) Classification and phylogeny of the plant genus *Dianella* Lam. ex Juss. PhD Thesis. School of Botany, The University of Melbourne. <http://hdl.handle.net/11343/191284>
- Muscat KM, Ladiges PY, Bayly MJ (2019) Molecular phylogenetic relationships reveal taxonomic and biogeographic clades in *Dianella* (flax lilies; Asphodelaceae, Hemerocallidoideae). *Systematics and Biodiversity* 17(3): 308–329. <https://doi.org/10.1080/14772000.2019.1607617>
- Stanley TD, Ross EM (1989) *Flora of south-eastern Queensland, volume 3*. (Queensland Department of Primary Industries: Brisbane)
- Western Australian Herbarium (1998 onwards) *FloraBase—the Western Australian Flora*. (Department Biodiversity, Conservation and Attractions: Perth) <https://florabase.dbca.wa.gov.au/> (accessed: 15 December 2021)
- Wheeler JR (1992) Phormiaceae. In JR Wheeler (ed.) *Flora of the Kimberley Region*. pp. 993–994. (Department of Conservation and Land Management: Perth)
- Wilson KL (1993) *Dianella*. In Harden GJ (ed.) *Flora of New South Wales. Volume 4*. pp. 74–79. (New South Wales University Press: Kensington)
- Wurdack KJ, Dorr LJ (2009) The South American genera of Hemerocallidaceae (*Eccremis* and *Pasithea*): two introductions to the New World. *Taxon* 58(4): 1122–1132. <https://doi.org/10.1002/tax.584006>