

Progress towards resolution of the *Indigofera monophylla* complex (Fabaceae: Faboideae)

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Abstract

The application of the name *Indigofera monophylla* is clarified by reference to the type held in the Geneva herbarium and a revised description provided. The name has been widely applied to plants with rounded, unifoliate leaves and some workers have suggested that there are multiple species within this broadly defined group. One of these, with restricted distribution within the Pilbara bioregion, has previously been given the phrase name *Indigofera* sp. Bungaroo Creek (S. van Leeuwen 4301) and is formally named here as *Indigofera rivularis* Peter G. Wilson. Two additional species in this complex are also described: *Indigofera deserticola* Peter G. Wilson & Rowe, is a species of sandplains occurring within the Great Sandy Desert and Dampierland Bioregions, and *Indigofera rotula* Peter G. Wilson, which is a species with smaller leaves and flowers that occurs primarily in areas south of the Pilbara. A key to these species is provided.

Introduction

In recent works on Australian species of *Indigofera* (Wilson & Rowe 2004, 2015), *I. monophylla* DC. has been noted to be an extremely variable taxon in need of revision. Variation between plants in this group are primarily seen in habit, from semi-prostrate to erect, in leaf indumentum, from densely white-tomentose to sparsely appressed-hairy, calyx indumentum, from dark brown to grey-white, as well as in flower colour, varying from deep red to pale red. Additionally, the plants have been recorded from many different habitats, including sandplains and dunes, along sandy or stony seasonal watercourses and adjacent floodplains, on rocky ranges and slopes, and on limestone or granite substrates.

Binks et al. (2016) conducted a genetic analysis of *Indigofera monophylla* within the Pilbara region, one of six taxa within the region that were assessed for suitability as seed sources for post-mining land rehabilitation. Their study found that sampled populations of the *I. monophylla* complex in that region “exhibited moderate levels of differentiation and formed three genetic clusters”, one of which (‘Cluster Three’) was strongly genetically distinct from the other two. Examination of the type of *Indigofera monophylla*, as discussed below, clearly showed that it is representative of populations in genetic ‘Cluster One’ of Binks et al. (2016).

Examination of specimens has resulted in confirmation of specific rank for the taxon informally known as *Indigofera* sp. Bungaroo Creek (S. van Leeuwen 4301) (Western Australian Herbarium 1998–), and recognition of a further two new species. The first of these occurs on sandplains to the north and west of the Pilbara and very likely includes the two specimens that comprise ‘Cluster Three’ in the analysis of Binks et al. (2016).

The second new taxon has previously been recognised as distinct and occurs south of the Pilbara in shrubland, sometimes adjacent to watercourses but often near low, granite outcrops. Even after recognition of these segregates, *Indigofera monophylla* remains as a variable taxon. This is supported by the genetic structure of clusters ‘One and Two’ in the study of Binks et al. (2016).

Key to species in the *I. monophylla* group

1. Leaflet veins prominent below, often impressed above *I. monophylla*
1. Leaflet veins obscure to somewhat prominent below 2
2. Stipules short, triangular, 1–2 mm long; staminal tube 5.5–6.5 mm long 3
2. Stipules slender, 3–4.5 mm long; staminal tube 4–4.5 mm long *I. rotula*
3. Leaflet ovate to elliptical, silvery-grey to green; indumentum dense, appressed *I. deserticola*
3. Leaflet rounded, pale green-grey; indumentum sparse *I. rivularis*

Taxonomy

Indigofera monophylla DC., Prod. 2: 222 (1825)

Type citation: ‘? in Novae Hollandiae orâ orientali’

Holotype: Nouvelle Hollande, côte orient (G-DC, barcode G00497797, Fig. 1). Isotype: P, barcode P00298010.

Erect to prostrate shrub or subshrub, 0.2–1 m high, with woody rootstock; young stems terete to ridged, usually grey-white, sometimes new growth distinctly rusty-brown, strigose or tomentose with dense to very dense, appressed to spreading, equally biramous hairs. Leaves unifoliolate with point of articulation; stipules narrowly triangular, (1–)1.5–3.5 mm long, not spinescent, usually persistent; petiole (3.5–)6–8.5(–10.5) mm long; rachis furrowed, often slightly; multicellular hairs at point of articulation, few, short and dark. Leaflet with small to conspicuous stipellae to 0.5 mm long; lamina obovate to orbicular, 10–40 mm long, (8–)10–25(–33) mm wide; upper surface grey to white with rather dense, appressed to spreading hairs; lower surface grey to white with appressed to spreading hairs; apex obtuse and mucronate; veins often impressed above and prominent below. Inflorescences 55–150 mm long, equal to, or longer than the leaf; peduncle 8–24 mm long; bracts triangular 1–2.5(–4) mm long; flowers red to deep red or maroon; pedicel c. 0.5 mm long. Calyx 2–3(–4.5) mm long, with unequal to subequal lobes less than to longer than the length of the tube and dense, white or brown, appressed hairs. Standard ovate, (5.5–)7–9 mm high, 4–6 mm wide, the back densely clothed with appressed, coppery (rarely white) hairs. Wings spatulate, 5.5–6.5 mm long, 2–3 mm wide, ±glabrous. Keel 7–9 mm long, 2–3 mm deep; lateral pockets 0.7–1.5 mm long; apex acute, hairs moderately dense to dense, golden brown, at the tip and along the bottom; margins ciliate. Staminal tube 4.5–5.5(–7) mm long, pigmented. Ovary moderately to densely hairy. Pod spreading to descending, terete, 17–32 mm long, 2–3 mm deep, grey, hairs moderately dense to dense, appressed; apex pointed; endocarp spotted; seed 4–8 per fruit.

Typification: The type citation reflects the wording on the tag attached to the specimen in the de Candolle herbarium (G-DC) at Geneva, although the origin of the collection is incorrectly marked as the east coast (‘côte orient’). The specimen tag also notes that it was received from Paris (“mus. de Paris”) in 1821. In the Geneva archives (Candolle 1830) it is recorded that de Candolle received, in August 1821, 220 duplicates from Paris mentioned as “pl. de Nouvelle Hollande (voy. Baudin)” (M. Callmander pers. comm.). The corresponding sheet at P, P00298010, is a duplicate of this and is, therefore, an isotype. No other duplicates were located at G (fide M. Callmander).

The isotype at P is labelled ‘Leschenault, Ile des Amiraux’, and would have been collected on 27 July 1801 by a party sent from the *Géographe* to explore that island. The name ‘Ile des Amiraux’ had been chosen by Baudin but it was subsequently changed to Depuch Island by Peron after Baudin’s death in Mauritius in 1803 (<https://slwa.wa.gov.au/freycinet/depuch-island>).

Notes: As accepted here, this taxon varies in habit from a low-growing multi-stemmed subshrub to a shrub up to c. 1 m high. It shows a range of variation in leaf size and morphology, with one specimen (*Nordenstam & Anderberg 306*) approaching *I. rugosa* Benth. in colour and density of indumentum and with inflorescence bracts and sepals longer than usual.

Other specimens have quite small leaves (*Wilson 1715* and *van Leeuwen 1813*) but these forms are geographically widely separated, suggesting that this feature is likely due to environmental factors. The genetic diversity underlying this observed variation in the Pilbara is amply demonstrated in Figure 10 of Binks et al. (2016) and Pilbara specimens from areas occupied by individuals of ‘Clusters One and Two’ in that study are included in the concept of *Indigofera monophylla*.

Conservation status: Not at risk.

Distribution and habitat: Western Australia: occurs mostly in the Pilbara Bioregion, north to the southern Kimberley with some extension south into the Carnarvon, and Gascoyne Bioregions (IBRA, 2012).

The species has been found on rocky hills on limestone and ironstone substrates, but also on loamy plains, and adjacent to watercourses. It is perhaps endemic to Western Australia but the possible relationship between the Pilbara populations and the few disjunct Northern Territory records from rocky substrates cited below (e.g. *Maconochie 707*; *Winkworth 430*) should be investigated. Connectivity between the Pilbara and southern parts of the Northern Territory is interrupted by the Gibson and Little Sandy Desert Bioregions, so the time of separation of the sites is likely to have been considerable.

Phenology: Flowering has mostly been recorded from late Autumn to early Spring.

Selected specimens (coast and offshore islands): Western Australia: Depuch Island, NW of Roebourne, *Royce 7078*, 28 May 1962 (PERTH 02809664); Watering Valley, Depuch Island, *Royce 7117*, 29 May 1962 (PERTH); Dolphin Island, Dampier Archipelago, *Royce 7204*, 5 June 1962 (PERTH); Barrow Island, *Butler 10*, 17 Aug 1973 (PERTH); 21 km S of Whim Creek, *Wilson 329*, 7 Jun 1988 (NSW, AD, PERTH).

Other selected specimens: Western Australia: Great Northern Highway, c. 25 km W of Wolfe Creek turn-off, *Wilson 868 & Rowe*, 31 Aug 1991 (NSW, K, L, PERTH, RSA); 62 miles SW of Halls Creek, *Byrnes 2222*, 21 May 1971 (DNA, CANB, NSW, PERTH); Mt Fairburn, ESE of Fitzroy Crossing, *Bennett 1985*, 30 May 1967 (PERTH); Edgar Range, SE of Broome, *Kenneally 5541*, 9 Aug 1976 (CANB, PERTH); 33.3 km S of “Wallal Downs” turn-off, Great Northern Highway, *Wilson 897 & Rowe*, 4 Sep 1991 (NSW, E, PERTH, PRE); 52.6 km N of Shay Gap, *Wilson 898 & Rowe*, 4 Sep 1991 (NSW, PERTH); Near Wittenoom, *Gittins 1479*, Aug 1967 (NSW, CANB); Great Northern Highway, 21.3 km N of Yandeyarra turn-off, *Wilson 1715*, 30 May 2006 (NSW, AD, CANB, DNA, PERTH); Doolena Gap, George Range, *Wilson 998 & Rowe*, 8 Sep 1991 (NSW, K, PERTH); 70 km SE of Karratha on Robe River rail access track, *Mitchell 1854*, 17 May 1991 (PERTH, NSW); Gregory Range; opposite abandoned mine, *Wilson 945 & Rowe*, 5 Sep 1991 (NSW, PERTH); 6.1 km East of Oakover River Crossing of the Marble Bar–Telfer Rd, *Albrecht 11088*, 25 Aug 2004 (DNA, NSW); Millstream Station, *Beard 4544*, 17 Aug 1966 (PERTH); Mt Herbert, Chichester–Millstream NP, *Nordenstam & Anderberg 306*, 4 Oct 1989 (PERTH); Python Pool, east side of Mount Herbert, *Briggs 3651*, 17 Jun 1970 (NSW); 5 km from Mt Florence Homestead on track to the upper Sherlock River, *Mitchell PRP 1465*, 3 Sep 1996 (NSW, PERTH); Great Northern Highway, 9.2 km S of Bea Bea Creek, *Wilson 1732*, 1 Jun 2006 (NSW, AD, CANB, DNA, PERTH); Cape Range–Rough Range at 20.0 km on road to coast from Learmonth, *Briggs 8812 & Johnson*, 6 Aug 1991 (NSW, L, MEL, MO, PERTH); Bee Gorge, Hamersley Range, *Wilson 1068 & Rowe*, 12 Sep 1991 (NSW, PERTH); Saddle of Drillers Ridge, *van Leeuwen 1061*, 24 Sep 1991 (NSW, PERTH); Barlee Range Nature Reserve, 9.7 km W of Mount Palgrave, *van Leeuwen 1369*, 5 Aug 1993 (NSW, PERTH); Barlee Range Nature Reserve, SW of Jarradubundy Bore, *van Leeuwen 1813*, 21 Jun 1994 (PERTH, NSW); Towera Station, *Cranfield 1771*, 5 Aug 1981 (PERTH); Rocky Pool, Gascoyne River, *Kenneally 4667*, Oct 1975 (CANB, PERTH).

Northern Territory: Central Mount Stuart, *Maconochie 707*, 26 June 1969 (AD, DNA, NSW); Vaughan Springs, *Winkworth 430*, 4 July 1954 (CANB); Laura Vale, *Tietkens s.n.*, 24 May 1889 (AD, DNA, MEL).

Indigofera deserticola Peter G. Wilson & Rowe, **sp. nov.**

Diagnosis: Differs from *Indigofera monophylla* by having stems and leaves that are silvery-grey to green with dense appressed hairs, leaflets with lamina ovate to elliptical, and short stipules.

Holotype: Western Australia: Dampier: Great Northern Highway, 49 km S of Thangoo turn-off, *Peter G. Wilson 883 & R. Rowe*, 3 Sep 1991 (NSW, barcode NSW245871). Isotypes: PERTH 2116855, B, L, MO.

Erect shrub, 0.6–1(–1.5) m high; young stems ridged, grey or yellowish-brown, strigose with dense to very dense fine, appressed, equally biramous hairs that persist on older stems. Leaves unifoliolate; stipules triangular, (0.5–)1–2 mm long, rarely longer, pubescent; usually persistent; petiole (1.5–)3–7 mm long, rachis slightly furrowed; multicellular hairs at point of articulation sparse to moderately dense, conspicuous, red to dark brown, club-shaped; stipellae (0.2–)0.5–1 mm long; lamina ovate to elliptical, (10–)15–30(–43) mm long, (5.5–)8–15(–24) mm wide, upper and lower surfaces silvery-grey to green, with moderately dense to dense appressed hairs; veins not prominent; apex obtuse and mucronate. Inflorescences 20–70(–85) mm long, equal

to, or longer than, the leaves; peduncle (1.5–)2–7(–10) mm long; bracts triangular (0.5–)1–2 mm long; flowers pink to purple; pedicel 0.7–1.5 mm long. Calyx (1.5–)2–3(–4.0) mm long, with subequal lobes shorter than, or equal to, the length of the tube and moderately dense, grey, appressed hairs. Standard pink to purplish, ovate to narrowly orbicular, 7.6–9.4 mm high; (5.5–)6–7(–7.5) mm wide; apex obtuse and shortly mucronate, the back densely clothed with golden brown hairs. Wings narrow obovate, 7–8.5 mm long; 2.5–3 mm wide. Keel 8–8.9 mm long; 2.2–3 mm deep; lateral pockets 1.1–1.6 mm long; apex acute; hairs moderately dense, grey-brown at the tip and along the bottom. Staminal tube 5.5–6.5 mm long, pigmented. Ovary moderately hairy. Pod spreading to descending, terete, 14–28 mm long, c. 2–3 mm deep; hairs moderately dense to dense, appressed; apex pointed; endocarp spotted; seed 4–8 per fruit.

Etymology: From the Latin (plural) *deserta*, deserted places/deserts, and the suffix *-cola*, an inhabitant, a reference to the Great Sandy Desert where this species occurs.

Note: Given that there are specimens cited here from north of Nullagine (*Burbidge 1169* and *Burbidge 1171*), it is very likely that it was specimens of this taxon that comprised ‘Cluster Three’ in the study by Binks et al. (2016). Those authors suggested that the two samples in this cluster “may represent a separate taxonomic entity”.

Conservation status. Not assessed but widespread and unlikely to be at risk.

Distribution and habitat: Western Australia: sand plains and Pindan country south of Broome, predominantly in the Dampierland and Great Sandy Desert Bioregions (IBRA, 2012) but also extending into the eastern Pilbara, far north eastern Gascoyne and Little Sandy Desert Bioregions. The extent of its distribution in desert areas is uncertain due to limited access. The status of collections of *I. monophylla sens. lat.* from the Northern Territory are uncertain as there are only a few collections at the margins of the Tanami and Gibson Deserts. However, one collection from east of the Northern Territory border (*Lang 5*) appears to represent this taxon.

Phenology: Flowering has been recorded from late Autumn to late Spring.

Selected specimens examined: Western Australia: Jigalong Depot, *Royce 1517, 1540*, 12 May 1947 (PERTH); Anketell Ridge, Great Sandy Desert, *Mitchell 1111*, 14 May 1979 (DNA); Edgar Range, SE of Broome, *Kenneally 5523*, 7 Aug 1976 (CANB, PERTH); 116 miles [c. 186 km] from Broome towards Port Hedland, *Gittins 1459*, Aug 1967 (NSW); c. 160 km south-southwest of Broome on Great Northern Highway, *Briggs 3654*, 17 Jun 1970 (NSW); 100 miles [c. 160 km] N of Anna Plains, *Beard 4076*, 10 May 1965 (NSW); Great Northern Highway, 35.5 km S of Lagrange Mission turn-off, *Wilson 885 & Rowe*, 3 Sep 1991 (NSW, E, PERTH, PRE, US); 122 km from Broome towards Port Hedland along Great Northern Highway, *Telford 11736*, 15 May 1992 (NSW, CANB PERTH); Fortescue: S of Mt Edgar Station, Nullagine Road, *Burbidge 1169, 1171*, 12 Jun 1941 (PERTH); Carrowina Creek, *Wilson 959 & Rowe*, 6 Sep 1991 (NSW, PERTH); Near Rudall R., *George 10859*, 24 May 1971 (CANB, NSW, PERTH); Bore 4 m [6.4 km] W of N.T. border (50 m [80 km] W of Mongrel Downs), *Maconochie 989*, 20 Apr 1971 (DNA, NSW); Dovers Hills, *George 8984*, 27 July 1967 (NSW, PERTH); Djaluwon Creek, near S end of Lake Gregory, *George 15421*, 26 Apr 1979 (DNA, PERTH).

Northern Territory: Birrindudu Station, *Lang 5*, 22 Jul 1993 (DNA, NSW).

***Indigofera rivularis* Peter G. Wilson, sp. nov.**

Diagnosis: Differs from *Indigofera monophylla* by its relatively tall, erect habit, generally shorter stipules, and sparse indumentum.

Holotype: Western Australia: Tributary of Cave Creek; gorge N of the Mount Brockman Road, Hamersley Range, *Peter G. Wilson 1795*, 10 Jun 2006 (NSW, barcode NSW988888). Isotypes: CANB, MEL 2435248A, PERTH.

Indigofera sp. Bungaroo Creek (*S. van Leeuwen 4301*), Western Australian Herbarium, in FloraBase, <https://florabase.dpaw.wa.gov.au/search/current/20317> [accessed 29 April 2021].

Erect shrub, 1–2.5 m high; young stems ridged to terete, speckled with very dense, appressed white and brownish, strigose, equally biramous hairs. Leaves unifoliolate with point of articulation; stipules triangular, often narrowly, (0.5–)1–2 mm long, not spinescent, ± persistent; petiole (4–)5–10 mm long; rachis furrowed, often slightly; multicellular hairs at point of articulation moderately dense, usually conspicuous, red to dark brown, conical. Leaflet with inconspicuous stipellae 0.2–0.4 mm long; lamina broadly ovate, elliptical or orbicular; (15–)25–40(–60) mm long, 12–32 mm wide; upper surface grey-green with sparse, appressed hairs; lower surface grey-green with sparse, appressed hairs; apex obtuse and mucronate; veins not prominent. Inflorescences (35–)50–80(–100) mm long, longer than the leaf; peduncle 5–12 mm long; bracts narrowly triangular 1–2 mm long; flowers deep pink to red; pedicel 1.5–2 mm long, lengthening to c. 3 mm in fruit. Calyx (2.0–)2.8–3.6 mm long, with unequal lobes longer than the length of the tube and dense, grey to brown or golden-brown, appressed spreading hairs. Standard deep pink to maroon or red, broadly ovate, 7.5–8.5 mm high, 6–7 mm wide, the back densely clothed with golden-brown hairs. Wings spatulate, 6–7.5 mm long,

2–3.5 mm wide. Keel 6.5–8.5 mm long, 2–2.5 mm deep; lateral pockets 1.5 mm long; apex acute; hairs margins ciliate. Staminal tube 5.5–6.5 mm long, colourless or free ends and tube pigmented. Ovary moderately to densely hairy. Pod spreading to descending, \pm terete, (23–)25–36(–40) mm long, 3–4 mm deep, brown; hairs short and somewhat crisped, moderately dense to dense, appressed; apex pointed; endocarp spotted; seed (4–)8–10 per fruit.

Etymology: The epithet is taken from the Latin *rivularis*, pertaining to small streams, and alludes to the frequent association of this species with rocky creeks that are tributaries of the Robe and Ashburton Rivers in the Pilbara.

Conservation status: Listed by Smith & Jones (2018) as ‘Priority Three’ under Department of Biodiversity, Conservation and Attractions Conservation Codes for Western Australian Flora, as *Indigofera* sp. Bungaroo Creek (S. van Leeuwen 4301) (Western Australian Herbarium 1998–). This level of listing indicates that the species is not believed to be under immediate threat but is nevertheless in need of further assessment.

Distribution and habitat: Western Australia: occurs in the Pilbara IBRA region, along rocky creek-lines in open low woodland of eucalypts and Acacias on ironstone substrates.

Phenology: Flowers May to July.

Selected specimens examined: Western Australia: Duck Creek, out from Mt Brockman, *Blockley 311*, 9 July 1966 (CANB, PERTH); c. 9 km along Duck Creek track off the Nanutarra–Paraburdoo road, *Peter G. Wilson 1103, 1104 & R. Rowe*, 14 Sep 1991 (NSW, PERTH); about 22 km W from Hamersley Hsd, just N of road to Brockman, *Mitchell PRP 1053*, 13 May 1996 (NSW, PERTH); 12.8 km ESE of Mount Rica, 32.2 km SW of Mt Elvire, 39.5 km NNW of Mt Farquhar, Hamersley Range, *van Leeuwen 4301*, 13 Oct 1998 (NSW, PERTH); West of Bungaroo Creek, Western Hamersleys, *Mitchell 10567 & Newland*, 16 Oct 2014 (NSW, PERTH); Headwaters of the Robe River, Hamersley Plateau, *Mitchell 10042 & Holm*, 18 Jul 2011 (NSW, PERTH); Yathalla Creek, near Mt Rica, *Gardner 6389*, 22 Oct 1941 (PERTH).

Indigofera rotula Peter G. Wilson, **sp. nov.**

Diagnosis: Differs from other species in the *Indigofera monophylla* group by its generally smaller leaves with spreading hairs (particularly on the undersurface), longer stipules, and smaller flowers (staminal tube to 4.5 mm long) with relatively long sepals.

Holotype: Western Australia: Austin: 0.5 km E of Aleenya Well, Yarlalweelor Station, *Cranfield 5594*, 10 Aug 1986 (PERTH). **Isotype:** NSW, barcode NSW 1101902.

Shrub or subshrub 0.25–1 m high; young stems terete, moderately densely hairy with white to grey, dense equally biramous hairs, sometimes with ascending arms. Leaves unifoliolate with point of articulation; stipules slender, (1.5–)3–4.5 mm long, \pm persistent, with marginal and axillary red to dark brown, club-shaped multicellular hairs, petiole 2.5–4.5 mm long; rachis hairy, obscurely furrowed; multicellular hairs at point of articulation few; petiolule 0.6–1.4 mm long. Leaflet with small stipellae 0.6–1.5(–2.5) mm long; lamina ovate to broadly elliptical, 9.5–16 mm long, 7.5–13 mm wide; upper surface grey with moderately dense, appressed to slightly spreading hairs; lower surface paler grey, the hairs often more flexuose; apex obtuse and mucronate; veins slightly impressed above, raised but not prominent below. Inflorescences 20–50(–60) mm long, longer than the leaf; peduncle 9–10(–15) mm long; bracts narrowly triangular 1.5–2 mm long, \pm persistent till anthesis; flowers red; pedicel 0.5–1 mm long. Calyx to 2.5 mm long, clothed with dense, dark brown appressed hairs; lobes unequal to subequal, longer than the length of the tube. Standard red, ovate to orbicular, 4.5–6.5 mm high, 4–5 mm wide, the back densely clothed with dark hairs. Wings paler, spatulate, 4.5–5 mm long, 1.5–2 mm wide. Keel red, 6–6.2 mm long, 2.5 mm deep; lateral pockets 1–1.3 mm long; apex obtuse to rounded; hairs sparse, along the bottom towards the tip; margins ciliate. Staminal tube 4–4.5 mm long, pigmented. Ovary moderately to densely hairy. Pod spreading to descending, terete, 21–25 mm long, 2.5–3 mm deep, grey to brown, strigose to tomentose; hairs moderately dense to dense, appressed to spreading; apex pointed; endocarp spotted; seed c.7 per fruit.

Etymology: From the Latin *rotula*, a little wheel, with reference to the smaller, rounded laminae. The epithet is a noun in apposition.

Conservation status: Not assessed.

Distribution and habitat: Western Australia: mostly south of the Pilbara Bioregion, in the Carnarvon, Gascoyne and Murchison Bioregions (IBRA, 2012). Recorded as occurring in shrubland, sometimes adjacent to watercourses or near low, granite outcrops. Recorded in flower from late Autumn to early Spring

Selected specimens examined: Western Australia: near Lake Austin, *Peipers s.n.*, 1895 (MEL565583); 17 miles W of Kalli, *Gardner 14512*, 30 Aug 1963 (PERTH); East of Kalli Homestead, *Wilson 1167 & Rowe*, 19 Sep

1991 (NSW, PERTH); Pettiford Pool, Garden Gully Creek, *Wilson 1147 & Rowe*, 18 Sep 1991 (NSW); 100 m N of Yoothapina turn-off, Great Northern Highway, *Wilson 1150 & Rowe*, 18 Sep 1991 (NSW, PERTH, PRE); Carnarvon road [North West Coastal Highway], *Demarz 3337*, 14 Aug 1971 (PERTH); Gifford Creek Station, *Wilcox Q145*, 7 Jul 1970 (PERTH); 1 km WSW of Deep Yunda Bore, Milly Milly Station, *Cranfield 5323*, 24 Apr 1986 (PERTH); Peak Hill road, *Brockway 17*, May 1953 (PERTH); Ullawarra Station, *Royce 6504*, 17 Aug 1961 (PERTH).

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