

TAXONOMIC NOTES ON SOME AUSTRALIAN SPECIES OF *INDIGOFERA* (FABACEAE – FABOIDEAE)

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Abstract

Five species of *Indigofera*, chiefly from central and northern Australia, are typified and provided with full descriptions and a few notes. Of these, two, *I. bancroftii* (Queensland) and *I. verruculosa* (Northern Territory), are described as new. The new name *I. helmsii* (*I. uncinata* Ewart & Kerr, non G. Don, nec Roxb.) is published, the circumscription and application of *I. adesmifolia* A. Gray is clarified and the new combination, *I. basedowii* ssp. *longibractea* (*I. longibractea* J.M. Black), is made.

Introduction

The genus *Indigofera* is represented in Australia by at least 35 species, some of which are naturalised introductions. Many of these species are poorly known and there is confusion over the application of some names, particularly *I. brevidens*. This is a preliminary paper to establish names for two taxa to be used in the forthcoming second edition of the 'Flora of Central Australia', to provide names for two species from northern Australia, and to clarify the application of a long-overlooked name.

1. *Indigofera helmsii* Peter G. Wilson, nom. nov.

I. uncinata Ewart & Kerr, Proc. Roy. Soc. Vic., n.s., 39:3 (1926) fig. 2, non G. Don, Gen. Hist. 2:208 (1832), nec Roxb., Fl. Ind. 3:382 (1832).

Lectotype (here designated): Mt Watson near Birksgate Range (Camp 17, Elder Exploring Expedition), *R. Helms*, 8.vii.1891 (AD 97310107).

Syntypes: Forrest Expedition, "F78 Spring" (Third Expedition, camp 78, vicinity of Elder Spring, 26° 15' 10"S, 129° 09'E) 23-27.viii.1874 (MEL 586329); Gawler Ranges, *R.F. Sullivan*; Camp 17, S.A., *R. Helms*, 8.vii.1891 (two labels with a single specimen, MEL 586332); Tarella, *W. Baeuerlen*, vii. 1887 (MEL 586333); Cobar, *J.M. Curran*, 1887 (MEL 586324).

Excluded syntypes: towards Alice Springs, *Flint*, 1882 (MEL 586330); Taylor, N.T., *A.J. Ewart*, vi. 1924 (MEL 586331, -36, -37, -38, -41); without locality, *Mueller*, i.1853 (MEL 586513, listed as doubtful by Ewart and Kerr).

Description

Shrub, usually around 0.6 m high but occasionally reaching 1 m or more; young stems distinctly square in section, green; hairs biramous, hyaline to almost black, appressed, scattered. *Leaves* pinnate, (5-) 7-11 -foliolate, up to 5 cm long; rachis furrowed, bearing groups of orange to red glandular hairs between the pairs of leaflets, stipellae 0.5-1.5 mm long; leaflets elliptical to obovate, obtuse and mucronate, 10-20 (-25) x 4-9 mm, glabrous on the upper surface and bearing scattered appressed hairs below. *Stipules* triangular, red-brown, 4-7 (-9) mm long, glabrous inside, usually persistent, recurved and spinescent. *Inflorescence* an axillary raceme (1.5-) 2-4.5 (-5.5) cm long; bracts subulate, 2.5-4 mm long; flowers deep pink. *Calyx* up to 3 mm long, covered with dark, appressed hairs; lobes as long as or shorter than the tube, unequal, up to 1.5 mm long. *Standard* broadly obovate, 5.5 x 4-5 mm, the outside covered with golden to dark brown hairs, the inside glabrous, deep pink with a white spot at the base; *wing* oblong to spatulate, 4.5-5.5 x 1-1.5 mm; *keel* 4.5-5 mm long, with an indumentum of

golden hairs at the tip and along the bottom. *Stamens* 9 + 1, the free ends pigmented, anthers apiculate. *Ovary* appressed-hairy, stigma capitate. *Pod* cylindrical, 20-30 x 2.5 mm, red-brown and sparsely hairy; endocarp with pale-brown spots. *Seeds* cuboid to compressed-cylindrical, 4-7 per fruit.

Habitat

This species is found on rocky hills or in rocky creek beds in ranges.

Selected specimens (total seen 58)

WESTERN AUSTRALIA: Pass in the Blackstone Range, *A.S. George 8756*, 17.vii.1967; *A.S. George 12158*, 26.vii.1974 (PERTH).

NORTHERN TERRITORY: Mount Sonder, Heavitree Range, *G.W. Carr 1650 & Beaglehole 45429*, 11.vi.1974 (MEL, NSW); Mount Palmer, *Cleland*, 26.viii.1956 (AD); Haasts Bluff Reserve, *Cleland*, 23.viii.1956 (AD); Standley Chasm, *Hill & Lothian 962*, 17.vii.1958 (AD, NT); *Nelson 1633*, 8.ii.1968 (AD, BRI, NSW, NT).

SOUTH AUSTRALIA: North-Western Region: Upper slopes of Mount Woodroffe, Musgrave Range, *Symon 2680*, 11.viii.1962 (AD); Mount Lindsay, Birks Gate Range, *P.G. Wilson 2482*, 6.viii.1962 (AD).

Flinders Ranges: Southern slopes Yankaninna Range, *Lothian 2096*, 25.viii.1956 (AD); central Chace Range, *Crisp 857*, 1.ix.1974 (AD); "Baratta" station, just SE of The Bluff, *Whibley 4452*, 11.viii.1974 (AD); Mount Remarkable National Park, Mambray Creek, *Donner 4925*, 6.viii.1974 (AD).

Eyre Peninsula: Mount Wallaby, WNW of "Kondoolka" H.S., *Jackson 2032*, 24.ix.1972 (AD); Mount Double, *Weber 3377*, 4.x.1972 (AD); Wudinna Hill, *Ising*, 7.ix.1938 (AD); Cunyarie Hills, N of Kimba, *P.G. Wilson 1864*, 27.ix.1960 (AD); South Corunna Hill, *Chinnock 2006 & Copley*, 8.ix.1974 (AD).

NEW SOUTH WALES: Maccullochs Range, *Sikkes 1298 & Ollerenshaw*, 1.x.1973 (AD, NSW).

The groups of glandular hairs on the rachis recorded here for this species and for *I. adesmifolia* and *I. bancroftii* are dense clusters of multicellular club-shaped hairs that become orange or red with age, possibly due to the accumulation of tannin. These hairs may also be found in the axils of the stipules and bracts of the inflorescence.

In the protologue to *I. uncinata*, Ewart and Kerr say "this plant appears to be the same as that placed by Bentham as *Indigofera brevidens* var. *uncinata*". It is possible, but by no means certain, that Bentham (who did not cite a specimen) was describing the same taxon as Ewart and Kerr; these authors, however, treated the taxon as a new species rather than a new combination and this is followed here.

The protologue cites nine specimens as belonging to this taxon, including one listed as doubtful. These may readily be sorted into two taxa, *I. helmsii* and another species still to be positively identified. The latter group includes Ewart's own collections from Taylor on which the habit description is undoubtedly based (no specimen of *I. helmsii* has the habit described by Ewart and Kerr), but in choosing the lectotype I have selected a specimen from the first, and larger, group because the species was named for its spinescent stipules (which are not well developed in the second taxon) and the illustration shows a specimen with spinescent stipules and other attributes of *I. helmsii*. The specimen chosen as lectotype is the one that matches the illustration most closely.

2. *Indigofera basedowii* E. Pritzl, Fedde Repert. Sp. Nov. 15:356 (1918).

Type: 'Hab. in Australia centrali', *H. Basedow 33*, 1903 (B, destroyed).

Description

Shrub, up to 1.5 m high; stems terete, densely grey-pubescent, hairs biramous, the ends usually spreading. *Leaves* pinnate, 5-25 -foliolate, 2-7 cm long; rachis shallowly furrowed, stipellae up to 3 mm long; leaflets elliptical to obovate or cuneate; densely grey-pubescent. *Stipules* narrowly triangular, 3-7 (-9) mm long, persistent but not spinescent. *Inflorescence* an

axillary raceme, 6-16 (-18.5) cm long; bracts very narrowly ovate, subulate, 2.5-5 (-7) mm long, grey-tomentose; flowers deep pink to purple. *Calyx* 4-6 mm long, densely covered with dark brown to black hairs; lobes narrowly triangular, longer than the tube, up to 4 mm long. *Standard* obovate to orbicular, 5.5-8.5 x 4.5-8 mm, the outside densely grey-pubescent, the inside glabrous, deep pink to purple with a yellow spot at the base; *wing* oblong to narrow-obovate, 5.5-6.5 x 1-2.5 mm, more or less glabrous; *keel* 5.5-8.5 mm long, grey-pubescent at the tip and along the bottom. *Stamens* 9 + 1, filaments and tube pigmented, anthers apiculate. *Ovary* densely pubescent, stigma capitate. *Pod* cylindrical, 20-40 x 3-3.5 mm, pubescent; endocarp with orange spots. *Seeds* cuboid, 6-9 per fruit.

Key to the subspecies

Leaves usually 7-11 -foliolate, hairs all spreading, stipellae conspicuous a. ssp. *basedowii*

Leaves usually 15-21 -foliolate, hairs appressed on the upper surface, stipellae inconspicuous b. ssp. *longibractea*

a. ssp. *basedowii*

Leaves (5-) 7-11 -foliolate, (2.5-) 4-7 cm long; stipellae usually conspicuous, 1-3 mm long; leaflets elliptical to obovate, (8-) 10-20 (-25) x 4-10 (-14) mm, obtuse with a mucronate tip up to 3 mm long, hairs all with spreading tips, less dense above. *Stipules* (3-) 4-7 (-9) mm long. *Pod* very densely pubescent.

Distribution and habitat

The type subspecies occurs in the Northern Territory, mostly in the southern central region, and in the Everard Ranges in South Australia; it is commonly found in rocky gorges near creeks.

Selected specimens (total seen 20)

NORTHERN TERRITORY: King Creek, George Gill Range, *Chippendale NT 3657*, 15.viii.1957 (AD, BRI, NSW, NT); Mount Sonder, *Chippendale NT 4852*, 10.ix.1958 (AD, NSW, NT); Standley Chasm, *Nelson 1632*, 8.ii.1968 (AD, NSW, NT).

SOUTH AUSTRALIA: North Western Region: Mount Illbillee, Everard Range, *Forde 930*, 7.viii.1957 (AD, BRI, NSW).

From the published account of the Government Exploring Expedition (Basedow 1915), and from the known distribution of the subspecies, it seems likely that Basedow collected the type of this taxon between the 21st and the 25th of April, 1903 as the expedition travelled from the vicinity of Mount Chandler to beyond Moorilyanna Well heading towards the Musgrave Range.

b. ssp. *longibractea* (J.M. Black) Peter G. Wilson, comb. et stat. nov.

I. longibractea J.M. Black, Trans. Roy. Soc. S. Aust. 47:369 (1923).

Lectotype (here designated): Musgrave Ranges, *S.A. White 211*, 18.vii.1914 (AD 98233333, upper left hand element).

Leaves (11-) 15-21 (-25) -foliolate, 2-5 cm long; stipellae inconspicuous; leaflets oblong-elliptical to obovate or cuneate, 4-10 x 2-4.5 mm, obtuse or retuse, with a very short mucronate tip, hairs appressed on the upper surface, spreading and denser below. *Stipules* 3-7 mm long. *Pod* pubescent.

Distribution and habitat

This subspecies occurs in the Musgrave and Flinders Ranges, South Australia, and in the Waukeroo Hills, New South Wales; it occupies a variety of rocky habitats ranging from creeksides to scree slopes or ridges.

Selected specimens (total seen 14)

SOUTH AUSTRALIA: North-Western Region: 10 miles W of "Musgrave Park" HS., *George* 5180, 20.vii.1963 (AD, PERTH); Ernabella, *Turvey*, 2.vii.1966 (AD, NSW).

Flinders Ranges: Mount Caernarvon, *Bates* 710, v.1980 (AD); 6.5 km SE of "Arkapena" HS., *Crisp* 840, 1.ix.1974 (AD); Paralana Hot Springs, *Kuchel* 919, 22.viii.1963 (AD, CANB); Frome River, "Mount Serle" station, *Lothian* 2147, 25.viii.1956 (AD, NSW); Parachilna Gorge, *Lovett* 29, 2.viii.1969 (AD).

NEW SOUTH WALES: Waukeroo Hills, just N of Broken Hill, *Cunningham* 1376 & *Milthorpe*, 29.viii.1973 (NSW).

Black's concept of *I. longibractea* seems to have been somewhat confused. Specimens from Black's herbarium are now at AD and those with localities that match the ones given in the protologue include three different taxa, viz. *I. georgei* (Bloods Creek, S.A. *White* 13.vii.1921, AD 95848044), *I. basedowii* ssp. *basedowii* (Moorilyanna Native Well, S.A. *White* 13.vii.1914, 29.vii.1914, AD 95848009) and *I. basedowii* ssp. *longibractea* as lectotypified above. I do not believe the name could be dismissed as a *nomen confusum* since it has always been placed in the synonymy of *I. basedowii* sens. lat., and I here attach it by lectotypification to the South Australian (excluding the Everard Range populations) and New South Wales form with the higher number of leaflets. The subspecies do intergrade around the South Australian/Northern Territory border (e.g., Kelly Hills, Mackay Exploring Expedition, *Basedow* 71, vi. 1926 (AD) and "Lilla Creek", *A.L. Rose* NT 2990, 14.viii.1956 (AD)).

3. *Indigofera adesmiifolia* A. Gray, Bot. U.S. Expl. Exped. 1:405 (1854) 'adesmiaefolia'.

Holotype: 'Hunters River, New South Wales', U.S. Exploring Expedition, xii.1839 (G).

I. australis var. *signata* F. Muell. ex Benth., Fl. Aust. 2:200 (1864).

Type: between Ovens River and Mayday Hills, Victoria. *Mueller* (Syntype, K, photograph seen).

I. signata (F. Muell. ex Benth.) Domin, Bibl. Bot. 89 (3): 192 (1926).

I. australis var. *platypoda* Benth., Fl. Aust. 2: 200 (1864).

Type: New England, C. *Stuart* (Syntype, K, photograph seen).

I. signata var. *platypoda* (Benth.) Domin, Bibl. Bot. 89 (3): 192 (1926).

Description

Much branched shrub to around 1.5 m tall; stems terete, hairs biramous, appressed, scattered. *Leaves* pinnate, (9-) 11-19 (-23)-foliolate, up to 6.5 cm long, rachis flattened, 0.5-2.5 mm broad, bearing prominent groups of glandular hairs, stipellae very small; leaflets obovate, obtuse or emarginate, 1.5-5 x 1-2 mm. *Stipules* small, triangular, up to 1 mm long. *Inflorescence* an axillary raceme 2.5-5.5 (-7) cm long; flowers pink. *Calyx* 3 mm long; lobes shorter than the tube, unequal, up to 1 mm long. *Standard* obovate, 5.5-8 x 5-7 mm, the outside greenish and bearing dark brown hairs, the inside rose-pink with a darker zone in the centre and a white to green base; *wing* 6-7 mm long, rose-pink; *keel* 6-8 mm long, pink at the distal end, ciliate along the opening. *Stamens* 9 + 1, anthers apiculate. *Ovary* glabrous, stigma capitate. *Pod* cylindrical, 15-35 mm long, shortly beaked, chestnut-brown; endocarp with red-brown spots. *Seeds* cuboid, 6-8 per fruit.

Distribution and habitat

The species occurs in SE Queensland around Stanthorpe, through New South Wales on the

slopes and tablelands, and in Victoria in the Beechworth area; it is found in rocky places, mostly on volcanics (basalt, trachyte, granite) with some records from limestone and quartzite.

Selected specimens (total seen 73)

QUEENSLAND: 1.6 km E of Fletcher, *Armstrong 681*, 27.xi.1973 (BRI, NSW).

NEW SOUTH WALES: Dawsons Spring, Mount Kaputar National Park, *Coveny 8703 & Roy*, 17.xi.1976 (NSW); Munghorn Hill, Mudgee-Wollar road, *Johnson & Constable*, 9.viii.1950 (NSW); Wymah Gap, Wymah, *McBarron 5769*, 29.xi.1951 (NSW); Burrinjuck road, 1.5 miles (c. 2.4 km) from Burrinjuck, *Moore 1630*, 2.iv.1952 (NSW); Abercrombie Caves, *Rodd 500*, 23.vii.1967 (NSW); road to Ashford Caves, c. 8 km NE of Ashford, *T. & J. Whaite 3506*, 21.iv.1973 (NSW).

VICTORIA: c. 2 km E of Mount Pilot, c. 9.6 km N of Beechworth, *Beauglehole 43599*, 23.xi.1973 (MEL, NSW).

This taxon is clearly distinct from *I. australis*. Apart from the obvious differences in leaf morphology, *I. adesmiifolia* differs in the more distinctly toothed and less obviously ribbed calyx, the rose-pink and green flower, and the dark brown indumentum on the back of the standard. The two species occupy different habitats but in at least one locality, on the west side of the Weddin Range, the species intergrade.

The type locality is most likely to be in the vicinity of Puen Buen (32° 02'S, 150° 48'E) which is the only part of the range of this species visited by members of the U.S. Exploring Expedition. Wilkes (1845, 2:255) states "some others of our gentlemen paid a visit to Peuen Beuen (sic), the seat of Mr Stevens, near the headwaters of the Hunter river"; this was in mid-December, 1839.

The type specimen has its leaf rachis up to 1 mm wide, which would have put it in the variety *signata* of *I. australis*. The variety *platypoda* of Bentham represents one extreme of a range of variation, viz., those specimens with the rachis width over 1 mm. Although the leaves of these specimens have commonly become phyllode-like by the shedding of their leaflets, the recognition of two subordinate taxa does not seem to be warranted on the evidence at present available, although detailed research could possibly justify it.

I have not lectotypified Bentham's two varietal names since I have not yet examined all specimens listed in the protologues. From the descriptions and from the photographs of syntypes seen so far, there is no doubt that these taxa are conspecific with *I. adesmiifolia*.

4. *Indigofera verruculosa* Peter G. Wilson, sp. nov.

Species verruculis numerosis in omnes partes instructa ab aliis speciebus australiensibus facile distinguenda.

Holotype: Little Nourlangie Rock, Northern Territory, *Dunlop 4943*, 10.iii.1979 (BRI) Fig. 1. (*Isotypes*: DNA, NSW).

Description

Diffuse shrub to 1.5 m high; stems slender, terete, hairs biramous, appressed, rather sparse; the whole plant covered with numerous small warty protuberances. *Leaves* pinnate, (7-) 9-13-foliolate, 3-8 cm long; rachis furrowed, stipellae very small, up to 0.5 mm long; leaflets opposite and well spaced on the rachis, discolorous, darker and with more hairs on the upper surface, elliptical to narrowly elliptical, lateral leaflets (3.5-) 5-11.5 x 1.5-2.5 mm, terminal leaflet 9-19 x 2-3.5 mm, acute or obtuse, with a short mucronate tip. *Stipules* small, linear, up to 1.5 mm long. *Inflorescence* an axillary raceme up to 14.5 cm long; flowers pale purple, borne on slender pedicels 2-4.5 mm long; bracts narrowly triangular, under 1 mm long, deciduous. *Calyx* 2 mm long, bearing scattered hairs and warts; lobes deltoid, acute, 1 mm long. *Corolla* sparingly pubescent on the back of the standard and the tips of the wings and keel,

warts occasionally present; *standard* obovate, 5-5.5 x 3-3.5 mm, with a distinct apiculum 0.5 mm long; *wing* 4.5 x 0.8-1.5 mm; *keel* 5.5-6 x 2.5-3 mm. *Stamens* 9 + 1, anthers, spiculate. *Ovary* glabrous but warty, stigma capitate. *Pod* narrowly cylindrical, 7-20 x 1.5-2.5 mm, dark brown, studded with warts; endocarp with dark brown to black spots. *Seeds* irregularly shaped, 0.8-1.3 mm in diameter, 5-6 per fruit.

Distribution and habitat

Appears to be confined to the Arnhem Land escarpment where it occurs in sandstone heath communities.

Specimens examined

NORTHERN TERRITORY: Little Nourlangie Rock, 12° 52'S, 132° 48'E, *Dunlop 4754*, 19.iii.1978 (DNA); top of Jim Jim Falls, 13° 17'S, 132° 51'E, *Dunlop 5668*, 30.i.1981 (BRI, DNA, NSW); near Three Pools, Ngarradj escarpment, 12° 29'S, 132° 54'E, *Russell-Smith 977*, 15.i.1984 (DNA).

I. verruculosa has no clear affinities with any other Australian species although it may be related to the little-known *I. mckinlayi* F. Muell. The species is very distinctive in having numerous small warty protuberances on almost all parts; it is likely that these are similar in structure to the spots in the endocarp and consist of several swollen cells rich in tannin (Gillett 1958:2).

5. *Indigofera bancroftii* Peter G. Wilson, sp. nov.

I. bancroftii ab *I. pratense* foliolis minoribus infra densissime albo-tomentosis, inflorescentibus brevioribus paucifloribus differt.

Holotype: 17 km from Mutchilba on the road to Irvinebank via Stannary Hills, Queensland, 17° 16'S, 145° 12'E, *Clarkson 4235*, 12.i.1982 (BRI) Fig. 2. *Isotypes*: PERTH, QRS, UNSW).

Description

Erect shrub, to 1.5 m high; stems somewhat angular, brown to chestnut-brown when young, paler when older, covered with more or less appressed biramous hairs. *Leaves* pinnate, (11-) 15-21 (-27)-foliolate, rachis narrow, furrowed, bearing groups of orange-red glandular hairs, stipellae absent; leaflets oblong-elliptical to obovate with slightly recurved margins, obtuse or emarginate, mucronate, (2-) 4-11 x 1-4 mm; green with scattered appressed hairs above, white with dense hairs below. *Stipules* narrowly triangular, 1-3.5 mm long. *Inflorescence* an axillary raceme 2-8 (-10) cm long; flowers blue-mauve to purple. *Calyx* 2.5 mm long, lobes shorter than the tube, unequal. *Standard* 9-12 x 8-9 mm, the outside pale with white hairs, the inside glabrous, purple with pale longitudinal lines; *wing* 8-12 x 3-3.5 mm, purple, with hairs on the tip and upper margin; *keel* 10-13 mm long, pubescent at the distal end. *Stamens* 9 + 1, anthers apiculate; ovary densely pubescent, stigma capitate. *Pod* cylindrical, 25-40 (-50) x 3-4 mm, with an acute apex, pale brown and lightly pubescent; endocarp with orange-brown spots. *Seeds* cuboid, c. 1.5 mm long, 5-8 per fruit.

Distribution and habitat

This species appears to be restricted to drier areas between 17° 10'S and 20° 40'S. It is found on rocky hills in shallow soils in open eucalypt forest or woodland.

Selected specimens (total seen 18)

QUEENSLAND: Cook District: Stannary Hills, *T.L. Bancroft*, 1908 (BRI); W of the road from Ravenshoe to

Koombooloomba Dam, *Clarkson 2670*, 11.x.1979 (BRI, QRS); Tinaroo Forestry Reserve, *Clarkson 5082*, 21.xii.1983 (BRI); 1.5 km W of Herberton on Herberton-Petford road, *Conn 1141 & Clarkson*, 26.v.1983 (BRI); Stannary Hills road, *Dockrill 642*, 9.ii.1973 (BRI, QRS); Baal Gammon mining lease, 17° 23'S, 145° 20'E, *Hyland 10330*, 22.iii.1980 (QRS); headwaters of Archer Creek, 8 km W of Ravenshoe, *Lockyer 189A, B*, 11.iii.1979 (BRI); Herberton-Irvinebank road, c. 1.9 km E of Irvinebank, *Staples 080574/6*, 8.v.1974 (QRS); Herberton-Irvinebank road, c. 1.9 km E of Irvinebank, *Staples 2901*, 6.iv. 1975 (BRI); 2 km E of Watsonville, Herberton-Irvinebank road, *Wilson UNSW 13350*, 16.iv.1982 (NSW, UNSW).

North Kennedy District: Pentland, *Abell 71*, v.1974 (BRI); behind Mt Spec, *White 1324*, xi.1956 (BRI).

I. bancroftii is most closely related to *I. pratensis* sens. lat., which it resembles in having angular stems, and in its flower and fruit morphology, but from which it differs in leaf morphology and indumentum, in flower colour, and in the shorter and fewer-flowered inflorescence. It is named in honour of Dr Thomas L. Bancroft (1860-1933) who had a great interest in the flora of the Stannary Hills area and collected a number of new species there.

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