

**A case of mistaken identity: *Isotropis iophyta* (Fabaceae),
a new Western Australian Lamb's Poison previously confused
with *I. forrestii***

Juliet A. Wege¹ and Robert W. Davis

Western Australian Herbarium, Biodiversity and Conservation Science,
Department of Biodiversity, Conservation and Attractions,
Locked Bag 104, Bentley Delivery Centre, Western Australia 6983
¹Corresponding author, email: Juliet.Wege@dbca.wa.gov.au

SHORT COMMUNICATION

Several species of 'Lamb's Poison' (*Isotropis* Benth.: Mirbeliaceae, Fabaceae) have been reported as toxic to stock including *I. forrestii* F.Muell. (Bennetts 1935; Gardner & Bennetts 1952, 1956; Gardiner & Royce 1967; Cooper *et al.* 1986). According to Gardiner and Royce (1967: 512) '...in mid-October 1966, studies were made of *I. forrestii*, ingestion of which had just caused the death of 10 cattle on a station near Wiluna in the East Murchison division. Seeds of the variety were found in the rumen contents, and extracts of the plant produced acute death and typical renal damage in guinea-pigs'. Cooper *et al.* (1986) went on to demonstrate nephrotoxicity in sheep using dried and milled *I. forrestii* obtained from the Western Australian Department of Agriculture, noting that this material was originally collected from a Meekatharra farm after an outbreak of *Isotropis* poisoning in sheep. The toxic compound that caused the renal failure was subsequently extracted, found to be novel, and named Iforrestine (Colegate *et al.* 1989).

Examination of the *Isotropis* holdings at the Western Australian Herbarium (PERTH), including type material of *I. forrestii* and toxicological voucher specimens, has shown that these stock deaths were not caused by *I. forrestii*, rather a hitherto unnamed species that is widespread in Western Australia's arid zone. This new species is described below, and additional notes are provided for *I. forrestii* s. str., which is now only known from few collections.

Isotropis iophyta Wege & R.W.Davis, *sp. nov.*

Type: 3.8 km west of the Old Thaduna mail box on the track to Great Northern Highway, Western Australia, 18 July 2007, G. Byrne 2775 (*holo:* PERTH 07787502; *iso:* MEL 2326116 *n.v.*, NSW 830925 *n.v.*).

Isotropis sp. Arid zone (G. Byrne 2775), Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 3 April 2018].

Erect, open, somewhat spindly perennial *shrub* 30–100(–150) × 30–100 cm, with an indumentum of translucent or rusty brown, crispate or sinuous hairs mostly *c.* 0.1–0.2 mm long (to 0.5 mm on

fruit); stems dull green, young stems moderately hairy, glabrescent. *Leaves* scattered, unifoliolate, moderately hairy throughout; leaflet elliptic to oblong or narrowly ovate (rarely obovate), 8–35(–45) × 2.5–8.5 mm, with a deflexed apical mucro, base obtuse; petiolule geniculate at junction with petiole; petiole ascending to descending, 5–18 mm long. *Stipules* erect, narrowly triangular, acute, 0.8–1.3 mm long, hairy. *Inflorescence* a terminal (leaf-opposed) raceme, densely hairy, rachis c. 6–15(–25 in fruit) cm long with widely spaced flowers; pedicels shorter than the calyx, 4–8 mm long; bracts ovate, 1–1.5 mm long; bracteoles toward summit of pedicel, ovate, 0.7–1.1 mm long. *Calyx* divided to near base into an upper lip and 3 lower lobes, densely hairy externally, glabrous internally except for hairs at the tips of the lobes and sometimes toward the margins, tube 1.5–2.5 mm long; lobes with a blunt acumen, becoming strongly reflexed in flower and fruit; upper two lobes united for most of their length, 7–7.5 mm long, emarginate, with spreading lobes; lower lobes narrowly triangular, 5.5–7 mm long. *Corolla: standard* orange with faint dark red veins and a yellow patch at the base adaxially, orange with prominent dark red veins abaxially, broadly ovate, 11–13 mm long including the 2.2–3 mm long claw, 12.5–13.5 mm wide, retuse, ± slightly cordate at base; *wings* dark orange-red, narrow-obovate, 10.7–12 mm long including the 1.5–2 mm long claws, 3.5–4.3 mm wide, auriculate; *keel* dark orange-red, narrow-obovate with the apex slightly upturned and the lower margin slightly incurved, 9–11 mm long including the 1.5–2 mm long claws, 4.5–5 mm wide, auriculate. *Stamens* 10, ± uniform, filaments free; anthers versatile, c. 1–1.4 mm long. *Ovary* shortly stipitate, fusiform, villose, ovules numerous; style slender, incurved, with dense hairs on lower 2/3. *Pods* narrow-obovoid, tapered at both ends, 18–26 mm long with a stipe 2–3 mm long, densely hairy. *Seeds* reniform, dark reddish brown with prominent yellowish brown reticulations, 3.8–4 × 3–3.3 mm. (Figure 1)

Diagnostic features. *Isotropis iophyta* can be distinguished from all other species in the genus by the following combination of characters: an indumentum of translucent or rusty brown, curled or sinuous hairs over most of plant; elliptic or oblong or narrowly ovate (rarely obovate) leaflets; and reflexed calyx lobes. Note that the orange-red corolla can appear purple in pressed material.

Selected specimens examined. WESTERN AUSTRALIA: Shed bore Doolgunna Station, Meekatharra, 29 July 2003, *G. Byrne* 258 (PERTH, NY *n.v.*); Hamersley Range National Park, between Mt Bruce and Joffre Falls, 17 July 1978, *C. Dawe* 53 (AD *n.v.*, BRI *n.v.*, CANB *n.v.*, PERTH); Fortescue River bed, Newman, 18 July 1982, *M.K. Deighton* 234 (PERTH); Tabimaya Well, 44 km ESE of Old Mary Mia, Little Sandy Desert, Carnarvon Range Conservation Park, 23 Aug. 1999, *D.J. Edinger* Nats 7 (PERTH); Lake Darlot, 14 Sep. 1927, *C.A. Gardner* 2136 (PERTH); Perry's Crossing, Bulloo Downs, June 1984, *B. Kok s.n.* (PERTH); Ned's Creek, near Homestead, 26 Aug. 1983, *A.A. Mitchell* 1153 (PERTH); c. 50 km NE of Tom Price on road from Mt Bruce to Wittenoorn, 6 Sep. 1995, *A.A. Mitchell* PRP 696 (PERTH); c. 23 km SW of Jigalong on road to Weelarrana Homestead, 30 Aug. 1995, *H.J.R. Pringle* PRP 497 (PERTH); Hamersley Range, 13.1 km SW of Mt Ella, 18 May 1995, *M.E. Trudgen, M. Trudgen & S. Deluca* MET 12716 (CANB *n.v.*, MEL *n.v.*, PERTH); Karijini Drive, 7.5 km W of Banjima Drive (E), Karijini National Park, 25 July 2004, *J.E. Wajon* 1125 (PERTH); Yampire Gorge, Karijini National Park, 13 Sep. 1991, *P.G. Wilson & R. Rowe* PGW 1070 (NSW *n.v.*, PERTH).

Toxicology vouchers. Wiluna District, Oct. 1966, *J. Morrissey s.n.* (PERTH); Murphy's Paddock, Narracoota, 20 Aug. 1966, *J. Morrissey s.n.* (PERTH); North Well, Killara Station, 60 km NE of Meekatharra, 14 Mar. 1979, *K. Shackleton & G. Gardiner s.n.* (PERTH). The *Shackleton & Gardiner* collection is annotated as a 'Voucher specimen for toxicological studies, A.H.L. [Animal Health Laboratories] South Perth'. John Morrissey was an employee of the Department of Agriculture and his two collections are interpreted as likely vouchers for the study mentioned by Gardiner and Royce (1967: 512, *addendum*).



Figure 1. *Isotropis iophyta*. A – habit; B – leaf showing the elliptic to oblong leaflet and geniculate petiolule, and young pod with strongly reflexed calyx lobes; C – flower, showing the orange standard with red veins and yellow eye, and orange-red wings. Photographs © G. Byrne from *G. Byrne 2775*.

Flowering and fruiting. Flowering material has been collected from mid-March to early September, and fruiting material from August to October.

Distribution and habitat. *Isotropis iophyta* is scattered across the Pilbara, Gascoyne and Murchison bioregions, extending into the south-western portion of the Little Sandy Desert. It grows in coarse sand or red loam in broad wash areas on plains, or in association with shallow drainage lines and creeks. Associated vegetation includes tall Mulga shrubland, and low open woodland of *Eucalyptus camaldulensis*, *E. victrix*, *E. xerothermica* or *Corymbia aspera*.

Conservation status. *Isotropis iophyta* is not considered to be of conservation concern—it has a widespread distribution that includes Karijini National Park and is noted to be common at some sites.

Etymology. From the Greek *ios* (poison) and *phyton* (plant), in reference to its known toxicity to live-stock.

Vernacular name. Eremaean Lamb's Poison.

Affinities. *Isotropis iophyta* has been previously confused with *I. forrestii*, a species that also has a spindly habit and reflexed calyx lobes, but can be differentiated by its indumentum of crispate or sinuous hairs (*cf.* appressed or antrorse, and particularly sericeous on the calyces). It also has more

numerous and conspicuous leaves with elliptic to oblong leaflets that are 2.5–8.5 mm wide (*cf.* few, inconspicuous leaves with broadly linear leaflets 0.7–1.5 mm wide). Additional notes on *I. forrestii* are provided below.

Like *I. forrestii*, *I. sp.* Yalgoo (S. Patrick 2375) has an indumentum of sericeous, appressed or antrorse hairs that distinguishes it from *I. iophyta*, although the hairs can become sinuous and spreading (but never curled) on the calyces. *Isotropis sp.* Yalgoo also has orange-yellow standard (*cf.* orange) and erect rather than reflexed calyx lobes, and grows in association with granite outcropping in the Yalgoo and southern Murchison bioregions, outside of the known range of *I. iophyta*.

Isotropis iophyta has also been confused with *I. atropurpurea* F.Muell., a widespread arid zone species with a comparable indumentum morphology; however, the hairs are noticeably denser in *I. atropurpurea*, obscuring the surface of the leaflets and stems (including the old stems) and giving the plant a velvety texture (*cf.* stems and leaflets with moderately dense hairs not obscuring the surfaces, with the stems glabrescent). Unlike *I. iophyta*, the calyx lobes in *I. atropurpurea* do not reflex in flower and fruit, and its leaflets are broadly elliptic to suborbicular or ovate (*cf.* elliptic to oblong, narrowly ovate, or rarely obovate). Although Jobson (2014) circumscribed *I. atropurpurea* as purple-flowered, all vouchered images held at PERTH show the standard to be orange with red veins and the wings and keel dark red, while collection notes associated with PERTH specimens describe the flowers as various shades of orange, red or purple. We have observed that, like *I. iophyta*, the orange-red flowers of *I. atropurpurea* often dry to purple on pressed material.

Isotropis iophyta also has morphological affinity to *I. foliosa* Crisp, a species endemic to south-eastern Queensland and north-eastern New South Wales and with a similar leafy habit and flower colour; however, *I. foliosa* has a grey-sericeous indumentum, broader leaflets (10–23 mm wide *cf.* 2.5–8.5 mm), and its calyx lobes are not reflexed (Crisp 1987).

Additional notes on Isotropis forrestii. Gardner and Bennetts (1952) correctly applied the name *I. forrestii*, citing collections by Forrest (1882) and Dalton (1925), noting ‘apart from these two records of an apparently rare species we have no knowledge concerning this plant’. We find that little has changed: now represented by five gatherings centred on the Gascoyne bioregion, *I. forrestii* remains a poorly known species, with all but one collection having been made prior to 1960 (Western Australian Herbarium 1998–). It has recently been listed as Priority One under Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–). A paucity of material at the Western Australian Herbarium precludes us from providing a revised description at this point in time. A description is provided in Gardner and Bennetts (1952: 88) and the following combination of features can be used to identify this species: a spindly habit with few, inconspicuous leaves; broadly linear leaflets, (4–)7.5–20 × 0.7–1.2 mm; an indumentum of appressed or antrorse and sericeous hairs that are especially conspicuous on the calyces and pedicels, with the stems glabrescent; calyx lobes becoming reflexed. Flower colour is recorded as orange on *B. Jeanes* 52 (PERTH), although appears purple on the dried specimen; Gardner and Bennetts (1952) record the flowers as deep bluish-purple although did not view living material.

Acknowledgements

We acknowledge Geoff Byrne for use of his images, and staff at the Western Australian Herbarium for curatorial support. Kelly Shepherd and an anonymous reviewer are thanked for providing comments that improved the manuscript.

References

- Bennetts, H.W. (1935). Plants poisonous to live-stock in Western Australia. *Journal of the Royal Society of Western Australia* 21: 11–23.
- Cooper, T.B., Huxtable, C.R. & Vogel, P. (1986). The nephrotoxicity of *Isotropis forrestii* in sheep. *Australian Veterinary Journal* 63(6): 178–182.
- Crisp, M.D. (1987). A new species of *Isotropis* Benth. and a new record of *Daviesia* Smith (Fabaceae: Mirbelieae) from Queensland. *Austrobaileya* 2(4): 412–415.
- Gardner, C.A. & Bennetts, H.W. (1952). Poison plants of Western Australia. Toxic plants of the genus *Isotropis* including the so-called “Lamb Poison”. *Leaflet No. 1097. Reprinted from The Journal of Agriculture of Western Australia 3rd Ser. 1(2), March–April.*
- Gardner, C.A. & Bennetts, H.W. (1956). *The toxic plants of Western Australia.* (West Australian Newspapers, Perth.)
- Gardiner, M.R. & Royce, R.D. (1967). Poisoning of sheep and cattle in Western Australia due to species of *Isotropis* (Papilionaceae). *Australian Journal of Agricultural Research* 18: 505–513.
- Jobson, P.C. (2014). Two rare new species of *Isotropis* (Fabaceae: Faboideae: Mirbelieae) from tropical northern Australia. *Telopea* 17: 347–354.
- Western Australian Herbarium (1998–). *FloraBase—the Western Australian Flora.* Department of Biodiversity, Conservation and Attractions. <https://florabase.dpaw.wa.gov.au/> [accessed 19 September 2019].

