

**A new Fringe Lily from Kalbarri National Park
(*Thysanotus kalbarriensis*, Asparagaceae)**

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SHORT COMMUNICATION

The species of Fringe Lily (*Thysanotus* R.Br., Asparagaceae) described here from sandplains in Kalbarri National Park has been recognised for some time (Paczowska & Chapman 2000; Western Australian Herbarium 1998–). Recent research, including field observations, has provided the information needed to finalise its formal description.

Thysanotus kalbarriensis T.Macfarlane, C.J.French & Conran, *sp. nov.*

Type: Kalbarri National Park, Western Australia [precise locality withheld for conservation reasons], 1 October 2015, *T.D. Macfarlane* 6321 & *C.J. French* (*holo*: PERTH 09027661; *iso*: AD, CANB, K, MEL, PERTH 09027688).

Thysanotus sp. Kalbarri (D. & B. Bellairs 1523 A), Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 15 May 2018].

Thysanotus kalbarriensis H.R.White & T.Macfarlane ms, in G. Paczkowska & A.R. Chapman, *West. Austral. Fl. Descr. Cat.* p. 34 (2000), *nom. inval.*, *nom. nud.*

Short-lived, self-supporting (non-twining) *perennial* growing from a compact undifferentiated (non-rhizomatous) rootstock; rootstock covered with a soft, mealy layer, often bearing conspicuous buds for future shoots. *Roots* fibrous, neither tuberous nor noticeably thickened for storage. Scale leaves present, surrounding the base of stems, grading into green leaves. *Leaves* absent or present, 6–9 around the base of each stem, insignificant compared to the whole plant, 14–53 mm long, 0.8–1.6 mm wide, flat adaxially, convex abaxially, longitudinally ridged, hairy on both sides with dense, spreading, flexuous, 0.5–0.6 mm long, white, pointed hairs, short-lived, soon withering and remaining as blackish dried remnants. *Stems* of two kinds, sterile and fertile. *Sterile stems* apparently growing in the first season, several to numerous, much-branched, forming a dense interlocked tangle 10–25 cm high, the branching pattern similar to that of fertile stems but with much shorter internodes, dying and often turning orange in the second season; stem and branch apices bearing a bud with a pair of short bud

bracts, not developing flowers. *Fertile stems* growing in the second and subsequent seasons, several to numerous, 30–55 cm long, erect or ascending, straight or sometimes slightly zig-zag, paniculately branched from near the base; branches 1 or 2 per node, (8–)14–28 mm long, ascending. Axes (stems and branches) terete or slightly flattened-terete in lower part, ridged or sometimes ridged with the ridges becoming more prominent distally, conspicuously indumented with short, 0.1–0.3 mm long, stiff, straight or recurving, acute or blunt, sometimes flattened, white hairs, confined to ridges where the surface is ridged. *Umbels* numerous, terminal on branches and stems; outer bracts 1.5–3 mm long, equal or unequal, triangular in outline, greenish with a narrow membranous margin, often sparsely hairy on the surface and minutely ciliate; flowers usually 1–3, of different ages; umbels on old stems with 2 or 3(–8) pedicel remnants. *Pedicels* short, 3–5.5 mm long at anthesis, articulate 1–2.3 mm (one third to slightly more than halfway) from the base, erect in flower and fruit. *Perianth* 9.5–12 mm long. Sepals broadly linear, dark purple on upper surface with pale margins, 7-veined, the apex obtuse, apiculate. Petals purple, with a darker purple central stripe on upper surface, narrowly ovate to narrowly elliptic, the marginal fringe well-developed, 3–3.5 mm long, dense, of even length throughout except shorter at base of petal. *Stamens* 6, arranged in a tightly clustered group, semi-erect and bent to one side, the anthers of the outer (antisepaline) and inner (antipetaline) whorls unequal in length, but similar in shape, colour and texture; *outer anthers* lying above the inner ones in the anther cluster, 3.6–4.5 mm long, broadest at the base, tapering gradually toward the apex, straight to slightly incurved, twisted, slightly thickened on the outer (abaxial) side, the proximal half yellow, the distal half purple, the colours changing abruptly, dehiscing by pores situated on the inner (adaxial) side of the apex, the pores *c.* 0.4 mm long; *inner anthers* longer than the outer ones, 4.7–5.7 mm long, otherwise similar to the outer ones, the pores *c.* 0.7 mm long. *Ovary* ± spherical, green, with 2 ovules per locule; style purple, strongly bent to one side, well-separated from the stamen cluster and curving inward, the stigma facing the anther apices. Fruits not known. (Figure 1)

Diagnostic features. *Thysanotus kalbarriensis* may be distinguished from all other members of the genus by the following combination of characters: plants self-supporting (non-twining); rootstock compact, not developed as a thickened rhizome; roots fibrous, neither tuberous nor thickened for storage; stems and branches covered with short, stiff hairs; stamens 6, grouped in a tight, oblique cluster, the anthers of the two whorls unequal, straight to slightly incurved, bicoloured with the proximal half yellow and distal half purple.

Other specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 22 Aug. 1965, *A.C. Beaglehole* 11919 (PERTH); 23 Oct. 1993, *D. & B. Bellairs* 1523 A (PERTH, 2 sheets); 5 Nov. 1999, *D. & B. Bellairs* 6130; 1 Oct. 2015, *T.D. Macfarlane* 6325 & *C.J. French* (PERTH); 28 Sep. 1989, *B. Nordenstam & A. Anderberg* 111 (PERTH); 3 Nov. 1994, *S. Patrick* 2185 (PERTH); 2 Sep. 1980, *B. Wemm* 1524 (PERTH).

Phenology. Flowering has been recorded from August to early November. Fruiting time not recorded.

Distribution and habitat. Only known from Kalbarri National Park in the Mid West region of Western Australia where it grows on flat plains in yellow or grey sand in shrublands that are often dominated by *Banksia* and *Grevillea* species.

Conservation status. *Thysanotus kalbarriensis* is listed by Smith and Jones (2018) as Priority Two under Conservation Codes for Western Australian Flora, under the name *T. sp.* Kalbarri (*D. & B. Bellairs* 1523 A). Nine populations are known, extending over a distance of 36 km.



Figure 1. *Thysanotus kalbarriensis*. A – flowers, showing the oblique anther clusters; B – anther cluster, tightly arranged and bent to one side, showing the diagnostic bicolouration and unequal whorls; C – flowering plant *in situ*, showing the reddish, basal and densely branched sterile stems and the taller, green flowering stems; D – stem and branch with short, stiff hairs; E – plant base, showing the small rootstock with buds of future stems, black wispy remnants of withered leaves and bases of sterile and flowering stems. Images from T.D. Macfarlane 6321 & C.J. French. Photographs by C.J. French (A, B, D, E) and T.D. Macfarlane (C).

Etymology. The epithet *kalbarriensis* refers to the occurrence of the species near the town of Kalbarri.

Vernacular name. Kalbarri Fringe Lily.

Notes. Plants of *T. kalbarriensis* germinate in response to disturbance, especially fire, but will also sprout along road edges in response to grading. In undisturbed areas, the species is uncommon. Study of herbarium specimens and limited field observations indicate that plants grow as a compact, dense structure composed of much-branched sterile shoots in the first season to which new flowering shoots are added in the second season (and at least sometimes further new flowering shoots grow in one or two subsequent seasons). Shoots apparently live for one year.

Thysanotus kalbarriensis resembles *T. spiniger* Brittan, especially in its vegetative features including the indumentum on the stems and branches, but in *T. spiniger* the dense branching is of lateral branches from the main stem, not of separate sterile stems as in *T. kalbarriensis*. In both species, the densely branched shoots end in a semi-pungent point with a terminal bud bearing two small bracts. A conspicuous difference is that flowers of *T. spiniger* have anthers that are equal and wholly purple, whereas in *T. kalbarriensis* they are unequal and bicoloured (yellow in the proximal half and purple in the distal half). The distributions of these two species are separated by at least 150 km, with *T. spiniger* occurring southward from Mingenev.

Thysanotus fractiflexus Brittan exhibits zig-zag branching and also has the stems densely covered with short, stiff hairs; however, this species differs notably from *T. kalbarriensis* in having a well-developed rhizomatous rootstock and anther whorls that are not only unequal but also dimorphic and wholly purple. The zig-zag branching at the lower nodes differs in appearance from the branching of *T. kalbarriensis* in being often simple or with simple lateral branching rather than densely, dichotomously branched.

Thysanotus sabulosus Brittan differs vegetatively from *T. kalbarriensis*, being smaller (to 25(–30) cm high) and lacking highly branched sterile stems, but in other respects it seems to be the most similar species. Like *T. kalbarriensis*, the rootstock is small and undifferentiated into a rhizome, the several, separate branching stems live for one season, and the plants are evidently short-lived disturbance opportunists. The anthers of *T. sabulosus* are similar to those of *T. kalbarriensis*: they are bicoloured, although mainly purple with varying amounts of yellow toward the base (Brittan 1981), are unequal between the whorls, and are in a cluster bent to one side. *Thysanotus sabulosus* has a limited range in the southern Wheatbelt, from Jitarning to east of Lake Grace, separated from *T. kalbarriensis* by 620 km.

The contrasting yellow and purple of the bicoloured anthers is not uncommon in *Thysanotus* flowers, though the flower parts that bear the different colours vary. Other species with bicoloured anthers that resemble those of *T. kalbarriensis* in having a yellow proximal part changing abruptly to a dark purple distal part include *T. sabulosus*, *T. pauciflorus* R.Br. and the tri-staminate group of *T. glaucifolius* Brittan, *T. glaucus* Endl., *T. multiflorus* R.Br., *T. teretifolius* Brittan and *T. triandrus* (Labill.) R.Br. Species with colour contrast that differs in some way from this pattern include *T. baueri* R.Br. (the purple more bluish), *T. isantherus* R.Br. (the purple more reddish, the yellow much paler), *T. vernalis* Brittan (anthers proximally white, the yellow colour residing in the distal part of the filament), *T. tenellus* Endl. (anther colour transition more gradual), and *T. pseudojunceus* Brittan, *T. sp.* Badgingarra (E.A. Griffin 2511) and occasionally *T. sparteus* R.Br. (inner whorl of anthers purple, the shorter outer whorl yellow). Species that share with *T. kalbarriensis* the tight cluster of anthers that are bent strongly to incline horizontally or angled somewhat upwards include *T. acerosifolius* Brittan, *T. arbuscula* Baker, *T. cymosus* Brittan, *T. scaber* Endl. and *T. spiniger*. The only species that shares both features of colour contrast and six anthers in a tight, bent cluster is *T. sabulosus*, according to Brittan's (1981) description.

Acknowledgements

This species was originally identified as an undescribed taxon with preliminary recording of descriptive data by Helen Coleman (née White) while working with TDM on *Thysanotus* taxonomy in 1992–4. Helen's contribution is acknowledged with appreciation. The valuable collections by the Kalbarri residents B. Wemm, and D. and B. Bellairs were instrumental in bringing the species to attention.

References

- Brittan, N.H. (1981). Revision of the genus *Thysanotus* R.Br. (Liliaceae). *Brunonia* 4: 67–181.
- Paczowska, G. & Chapman, A.R. (eds) (2000). *The Western Australian Flora: a descriptive catalogue*. (Wildflower Society of Western Australia (Inc.), the Western Australian Herbarium and the Botanic Gardens and Parks Authority: Perth, Western Australia.)
- Smith, M.G. & Jones, A. (2018). *Threatened and Priority Flora list 5 December 2018*. Department of Biodiversity, Conservation and Attractions. <https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants> [accessed 10 April 2019].
- Western Australian Herbarium (1998–). *FloraBase—the Western Australian Flora*. Department of Biodiversity, Conservation and Attractions. <https://florabase.dpaw.wa.gov.au/> [accessed 15 May 2018].

