Telopea 13(1–2) 57–67

Two new species of *Triodia* (Poaceae: Triodieae) from the Kimberley region of Western Australia

Russell L. Barrett[1,2,3] and Matthew D. Barrett[1,2]

[1]*Botanic Gardens & Parks Authority, Kings Park & Botanic Garden, West Perth 6005, Western Australia.*
[2]*School of Plant Biology, Faculty of Natural and Agricultural Sciences, The University of Western Australia, Crawley, 6009, Western Australia.*
[3]*C/- Western Australian Herbarium, Department of Environment and Conservation, Locked Bag 104, Bentley Delivery Centre, 6983, Western Australia.*
Author for correspondence: russell.barrett@bgpa.wa.gov.au.

Abstract

Two new species of *Triodia* R.Br. are described from the east Kimberley region of Western Australia; ***Triodia barbata*** R.L.Barrett & M.D.Barrett and ***T. cremnophila*** R.L.Barrett & M.D.Barrett. Both species are restricted to a small area in the Ragged Range, to the south west of Lake Argyle where they are associated with cliff lines and fire-excluding rock outcrops. Amendments to the *Flora of Australia* key are provided to allow identification of these new species. A note is provided on the location of isotype specimens of *Triodia fissura*.

Introduction

Since the most recent revision of *Triodia* R.Br. (including *Plechtrachne* Henr.) by Lazarides (1997) and the *Flora of Australia* treatment (Lazarides et al. 2005), only a single species of *Triodia* has been described, the recently named *T. caelestialis* G.Armstr. from the West Kimberley (Armstrong 2009). With increased collection of *Triodia* specimens in north-western Australia over the last decade, however, it has become apparent that some of the species concepts in the above treatments are difficult to consistently apply and some morphologically variable species would benefit from further detailed field studies and systematic revision (M.D. & R.L. Barrett pers. obs., P.J. Davidson, M.E. Trudgen & S.J. van Leeuwen pers. comm.), as already noted for *T. basedowii* by Lazarides et al. (2005). In addition, six species are currently listed in Western Australia using informal phrase names on FloraBase (Western Australian Herbarium 1998+). This paper describes a further two morphologically distinctive species from the eastern Kimberley region.

Fieldwork, associated with ecological surveys of the southern portion of the Ragged Range for a proposed iron ore mine in 2004, 2005 and 2010, located a number of plant taxa not previously represented in the Western Australian Herbarium. One of these, *Corymbia cadophora* subsp. *polychroma* R.L.Barrett has recently been described

 ISSN0312-9764

(Barrett 2007). Two *Triodia* species discovered at the same time are named here in order to facilitate survey efforts and assessment of their conservation status.

Plant assemblages on vertical sandstone surfaces in the east Kimberley are considered to represent a Priority One Ecological Community in Western Australia (Species and Communities Branch 2009). These cliffs and sparsely vegetated rocky slopes provide habitat for a number of conservation priority listed or poorly known plant species for Western Australia: *Adiantum capillus-veneris* L., *Doodia caudata* (Cav.) R.Br., *Eucalyptus ordiana* Dunlop & Done, *Ficus lilliputiana* D.J.Dixon, *Jacquemontia* sp. Keep River (J.L. Egan 5015), *Lindernia cleistandra* W.R.Barker (*s. str.*), *Lindernia eremophiloides* W.R.Barker, *Pityrodia obliqua* W.V.Fitzg., *Taenitis pinnata* (J.Sm.) Holttum, *Triodia bunglensis* S.W.L. Jacobs, *T. fitzgeraldii* N.T.Burb., *T. fissura* R.L.Barrett, G.B.Wells & K.W.Dixon, *T. racemigera* C.A.Gardner, as well as the two *Triodia* species described in this paper. Caves on these cliff faces are also known to provide habitat for *Rhinonicteris aurantius* (Gray), the Vulnerable listed Orange Leaf-nosed Bat (M. Ladyman pers. comm.). The two species described here essentially co-occur, together with a third *Triodia* species *T. racemigera*, however the three species occupy different micro-habitats, so rarely grow intermixed. *Triodia fissura* was recently described from a similar cliff habitat in the east Kimberley (Barrett et al. 2005).

Taxonomic treatment

Triodia barbata R.L.Barrett & M.D.Barrett, ***sp. nov.***

Ab aliis congeneris plantis non resinosis, foliorum vaginis villosis, panicula laxa, 8–15 cm lata, spiculis 3.5–4.5 mm longis, glumis minute scabrosis, lemmate trilobata, lobis aequilongis, distinguenda.

Type: E of Pompeys Pillar, southern Ragged Range [precise locality withheld for conservation purposes], east Kimberley, Western Australia, 4 Feb 2010, *R.L.Barrett 6607* (holo: PERTH 08239711; iso: BRI, CANB, DNA, K, MEL, NSW).

Perennial, non-resinous; tussocks 0.8–1.5 m in diameter, 0.5–0.8 m high; flowering culms to 0.8–1.2 m above tussocks; plants not stoloniferous, not producing aerial roots. *Culms* minutely scaberulous. *Leaf sheaths* to 4 mm wide, densely pilose hairy, with hairs to 4 mm long, smooth or slightly scabrid, many-nerved; orifice ciliate on scarcely distinct auricles, with hairs to 2.5 mm long; ligule blunt, 0.1 mm long with a densely ciliate margin, the hairs to 0.6 mm long. *Blades* 25–60 cm long, 1.8–2.6 mm wide when flat or 0.7–1.1 mm wide folded, moderately rigid, stomatal groves equally spaced over the abaxial surface, glabrous except for long, pilose hairs on pseudopetiole, margins smooth, erect to recurved, with a pseudopetiole 12–18 mm long. *Panicle* 22–55 cm long, 8–15 cm wide, narrowly ovate, open, primary branches in alternate clusters, 10–13 cm long with few short secondary branches to 3.5 cm long, panicle axis ribbed, finely and densely scabrid, primary nodes with short-hispid tufts of hairs in the axils, pedicels 0.8–5.5 mm long gradually decreasing in size toward the panicle apex. *Spikelets* 3.5–4.5 mm long, 2.5–4 mm wide, composed of 4-6 closely-held florets, broadly elliptic, rachilla internodes c. 0.25 mm long, ±slender. *Glumes* 2.7–3.5 mm long, subequal, c. ⅔ as long as spikelet, scarious or cartilaginous, ovate, entire, obtuse, mucronulate (mucro 0.2–0.4 mm long), 3-nerved, minutely scabrous. *Lemma* cartilaginous to indurated, not bitextured, ovate, 3-lobed, lobes subulate, of (sub)equal length, 9-nerved with 3 groups of 3 nerves, each group running into a

lobe, long-hirsute in basal ½–⅔ , the hair apices reaching to ⅘ of the lemma body length or to the base of the lobes, lobes shortly scabrid; basal lemma 3.2–4.0 mm long (including lobes), the body 2.3–2.6 mm long, 3-lobed for c. ¼ of length, the lobes 0.9–1.2 mm long; distal lemmas decreasing in size, and lobes shorter, to 0.3 mm long (c. 1/6 of total length) in apical lemma; callus 0.2 mm long, blunt, densely bearded with hairs to 1.3 mm long. *Palea* c. 3.0 mm long, exceeding the body of the lemma, almost reaching apex of lobes, membranous, not bitextured, lanceolate, obtuse to acute, body glabrous at base, sparsely shortly hairy in central part, densely shortly hairy in apical ; prominently 2-keeled, the keel thickened, wingless or scarcely winged, ciliate; flaps c. 0.15 mm wide at base, narrowed upward, membranous. *Anthers c.* 1.7 long, 0.2 mm wide. *Caryopsis* not seen. Figs 1a,b & 2.

Phenology: flowers and fruits recorded for Jan–Feb, probably Dec–Mar.

Distribution and habitat: currently known only from the type locality in the Ragged Range in the NE Kimberley over a distance of 300 m. Two small sub-populations are known (separated only by bare rock) on the edge of a large ironstone and sandstone cliff line where it grows on the top of near-vertical and steep rock faces, growing in fissures in the rock in fire excluding sites.

Conservation status: there are estimated to be about 300 plants in the only known population. There are probably additional populations in the area, however the very rugged terrain and cliff habitat makes ground surveys difficult and with numerous *Triodia* species in this area, *T. barbata* cannot be reliably recognised from a helicopter. The two sub-populations are close to a proposed iron ore mine. Department of Environment and Conservation (DEC) Conservation Codes for Western Australian Flora Priority One.

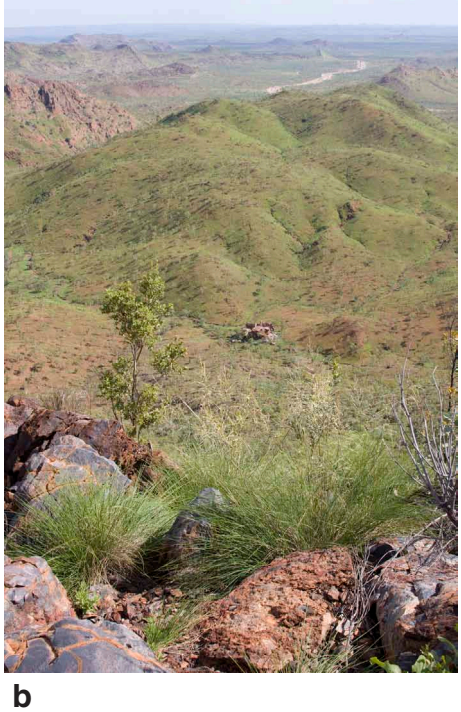
Other specimens examined: Western Australia: near type locality, 31 Jan 2005, *R.L. Barrett 5971*; (BM, CANB, NSW, PERTH); near type locality, 5 Feb 2010, *M. Ladyman s.n.* (AD, PERTH).

Etymology: as this taxon has profusely hairy leaf sheaths, bearded inflorescence nodes and hirsute lemmas, it is named from the Latin *barbatus* (bearded) in memory of Surrey W.L. Jacobs (NSW), taxonomist and colleague, who contributed much to our understanding of the genus, from his Ph.D. thesis (Jacobs 1974), to his more recent taxonomic and floristic publications on *Triodia* and Triodieae (Jacobs 1992a–f, 2004; Jacobs et al. 2008).

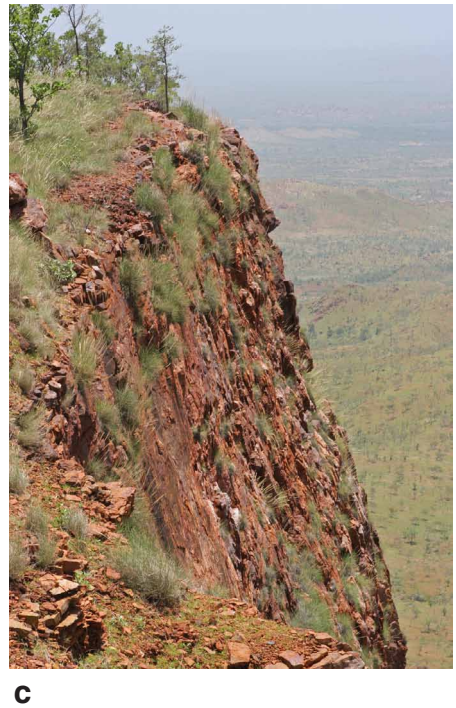
Notes: morphologically closest to *T. roscida*, sharing the evenly distributed abaxial stomatal grooves, small number of florets (3–5 in *T. roscida* vs. 4–6 in *T. barbata*), and distinctly 3-nerved, mucronulate glumes. *T. barbata* differs from *T. roscida* in having longer panicle branches (up to 4(7) cm long in *T. roscida* vs. 10–13 cm in *T. barbata*), having shorter lemmas (basal lemma 6–8 mm long including lobes in *T. roscida* vs. 3.2–4.0 mm long in *T. barbata*), and having more extensively hairy lemmas than *T. roscida*.

In Lazarides et al. (2005), *Triodia barbata* would key to Group 4: Basedowii group. Within the Basedowii group (sensu Lazarides et al. 2005), *T. barbata* differs from *T. basedowii* and *T. lanigera* in having distinctly 3-nerved glumes (vs. 7+-nerved in the latter two species). *Triodia barbata* differs from *T. brizoides* in having longer panicle branches (10–13 cm long vs up to 4 cm long in *T. brizoides*), usually having fewer florets (4–6 vs 4–18 in *T. brizoides*), and the lemmas being more hairy. *Triodia barbata* differs from *T. intermedia* in having obsolete palea wings (strongly protruding and clearly visible in situ in *T. intermedia*), more hairy lemmas (hairy only near midnerve and

a



b



c

Fig. 1. Habitats at type locations. **a & b,** *Triodia barbata* (a, mid-slope only); **c,** *T. cremnophila* (cliff face only).

Fig. 2. *Triodia barbata*. **a,** habit; **b,** leaf sheath; **c,** inflorescence; **d,** spikelets. (a & c from *Barrett 6607*; b & d from *Barrett 5971*).

basal margins in *T. intermedia*), and longer panicle branches (to 2(3.5) cm long in *T. intermedia*). *Triodia barbata* differs from *T. inutilis* in having fewer florets (7–15 in *T. inutilis*), palea keel wings narrow (with prominent palea wings visible in situ in *T. inutilis*), and hairs on sheath straight and not tangled (woolly-tangled in *T. inutilis*). Differs from *T. wiseana* in the lemma being considerably more hirsute (hairs present only along lower midnerve and margins in *T. wiseana*), palea not bitextured (abruptly bitextured in *T. wiseana*), and shorter lemmas (basal lemma 4–7.5 mm long in *T. wiseana*).

In order to minimise change to the *Flora of Australia* key, a new couplet, 4A, is required after couplet 4 in the Group 4 (Basedowii group) key (p. 221), to include *T. barbata*.

4A Plants non-resinous; leaf sheath villose on surface; lemma hair apices reaching at least 4/5 length of lemma body; lemma 3.2–3.6 mm long; spikelets with 4–6 florets ..... ***T. barbata***

4A: Plants resinous; leaf sheath surfaces glabrous; lemma hairs not as above; lemma 4–7.5 mm long; spikelets with 4–16 florets. ..... (5)

Burbidge (1946a,b), Jacobs (1971) and Mant (1998) showed that *Triodia* leaf anatomy can be coarsely classified into two types, one with stomatal grooves evenly distributed over the abaxial surface of the blade (ambito-abaxial stomata; 'hard' spinifexes), the other with the nerves on the abaxial surfaces concentrated in a median band (centro-abaxial stomata; 'soft' spinifexes). The terms 'hard' and 'soft' are derived from common usage refering to general leaf stiffness and palatability, however microscopic examination and sectioning is usually required for accurate classification into the two anatomical types, in particular to distinguish true stomatal grooves from surface ridges lacking associated stomata. Sectioning and surface examination showed that *Triodia barbata* has true stomatal grooves evenly spread over the abaxial surface of the blades, consistent with the 'hard'-type anatomy.

Triodia cremnophila R.L.Barrett & M.D.Barrett, ***sp. nov.***

Ab aliis congeneris plantis non resinosis, foliis pseudopetiolatis, inflorescentia erecta, spiculis 4.0–6.1 mm longis, lemmate trilobata lobo medio 2.2–3.0 mm longo, lobis lateralibus 1.6–2.0 mm longis distinguenda.

Type: E of Pompeys Pillar, southern Ragged Range [precise locality withheld for conservation purposes], east Kimberley, Western Australia, 4 Feb 2010, *R.L.Barrett 6600* (holo: PERTH 08239770, iso: BRI, CANB, DNA, K, MEL, NSW).

Perennial, non-resinous, forming tussocks 0.5–1 m in diameter, 0.4–0.6 m high, shortly stoloniferous; sometimes producing aerial roots; flowering culms 0.6–1.1 m high. *Culms* minutely scaberulous. *Leaf sheaths* to 3 mm wide, densely hirsute with hairs to 1.7 mm long, smooth, many-nerved; orifice distinctly auriculate, ciliate with hairs to 0.2 mm long; ligule blunt, 0.1 mm long with a densely ciliate margin, the hairs to 0.5 mm long. *Blades* 22–37 cm long, 0.8–1.1 mm wide, erect to reflexed, stiff, stomatal grooves equally spaced over the abaxial surface, glabrous, margins of blade smooth except minutely scabrid on margins of pseudopetiole, with a pseudopetiole 11–24 mm long. *Panicle* 27–38 cm long, 1.5–5 cm wide, lanceolate, loose, branches simple or sparingly divided, primary branches in alternate to sub-opposite clusters, to 10.5 cm long; secondary branches to 2.5 cm long, axis ribbed, finely and densely scabrid; pedicels 1.5–7.0 mm long. *Spikelets* close, 4.0–6.1 mm long (excluding awns), 2.2–4.3 mm wide, 4–5(–6)-flowered, cuneate, straw-yellow to reddish brown; rachilla internodes 0.8-0.9 mm long, slender. *Glumes* 2/3 to as long as spikelet (excluding awns),

3.4–5.1 mm long, unequal, upper glume c. 0.8 mm longer than lower glume and reaching to apex of spikelet (excluding awns), lower glume reaching c. ⅔ of spikelet length, cartilaginous, lanceolate, acuminate, mucronulate, entire, 1-nerved, minutely scabrous; upper and lower glumes distinctly separated by an internode c. 0.4 mm long. *Lemma*: indurated, 3-lobed, 3-awned, 3-nerved, the central nerve weakly keeled, with spreading hairs in basal half, glabrous above, margins scabrous; basal lemma body 2.6–2.9 mm long; midlobe (including awn) 2.3–3.0 mm long; lateral lobes (including awn) 1.6–2.0 mm long, lobes ±flat in section near base, straight; callus 0.2 mm long, blunt, bearded with hairs to 1.0 mm long. *Palea* c. 3.0 mm long, slightly exceeding lemma body, membranous, not bitextured, lanceolate, apex shortly bicuspidate, with a ±truncate, ciliate-erose apex between the short mucros, body with spreading to appressed hairs in lower half, glabrous above, margins finely ciliate, keels thickened, wingless or scarcely winged; flaps c. 0.15 mm wide, narrowed upward, membranous. *Anthers* not seen. *Caryopsis* not seen. Figs 1c & 3.

Phenology: flowers and fruits recorded for Jan–Feb, probably Dec–Mar.

Distribution and habitat: currently known only from the vicinity of the type locality in the Ragged Range in the NE Kimberley over a distance of some 8 km. Occurs on near-vertical and steep quartz-sandstone rock faces, growing in narrow fissures in the rock, occasionally extending a short distance (5–10 m) over the top of the cliff in fire excluding sites.

Conservation status: aerial surveys from a helicopter have located several thousand plants along 8 km of semi-continuous cliff lines on the SW side of the Ragged Range overlooking the Great Northern Highway, to the west of the Argyle Diamond Mine. The distribution extends east to the current Argyle Diamond Mine pit that has possibly claimed some of the habitat for this species. An iron ore mine is proposed in the vicinity of the centre of the known distribution of this species. No comprehensive surveys for this species have been conducted in the wider east Kimberley, however the nearest large cliffs are disjunct, 10–30 km distant, and this species is potentially restricted to cliffs in the Ragged Range. Department of Environment and Conservation (DEC) Conservation Codes for Western Australian Flora Priority One.

Other specimens examined: Western Australia: near type locality, 30 Jan 2005, *R.L. Barrett 5968* (AD, BM, CNS, PERTH); 31 Jan 2005, *C.Slee* per *R.L. Barrett 5969* (CANB, PERTH); 31 Jan 2005, *R.L. Barrett 5970* (BRI, CANB, DNA, K, NSW, PERTH); 5 Feb 2010, *R.L. Barrett* 6609 (DNA, MEL, NSW, PERTH); 5 Feb 2010, *M. Ladyman s.n.* (PERTH).

Etymology: derived from the Greek words *kremnos* and *phileo* meaning a lover of steep places or cliffs (Brown 1956) in reference to this taxon being restricted to vertical cliff faces.

Notes: no obviously close relatives are known. The lemma awns are shorter and of different appearance to awns of species in the Schinzii and Danthonioides groups (sensu Lazarides et al. 2005), and are probably not homologous with them. The combination of lemma awns and tropical distribution invites confusion with members of the Schinzii group, e.g. *T. bynoei* and *T. bunglensis* (S.W.L.Jacobs) Lazarides. However, all Schinzii group species (except *T. aeria* discussed below) are immediately separated by having stomatal grooves on the abaxial surface of the leaf blade restricted to the central part (centro-abaxial stomata, 'soft'-type anatomy; see discussion under *T. barbata*). Most species in the Schinzii group also have resinous leaves lacking a pseudopetiole (leaves non-resinous and pseudopetiolate in *T. cremnophila*).

Fig. 3. *Triodia cremnophila*. **a,** habit; **b,** leaf sheath; **c,** inflorescence; **d,** spikelets. (a, c & d from *Barrett 6600*; b from *Barrett 5970*).

The only other Kimberley species sharing awned lemma lobes and stomatal rows distributed over the abaxial leaf surface (ambito-abaxial stomata) is *T. aeria* Lazarides (Mant 1998). *Triodia aeria* can be distinguished from *T. cremnophila* by having much shorter leaves 2–7(10) cm long (Lazarides et al. 2005), lemmas with recurved and spirally twisted awns 2–8 mm long (vs. straight and 1.6–3 mm long in *T. cremnophila*), and 3(–5)-nerved glumes which are 7–9 mm long (glumes 1-nerved and 3.4–5.1 mm long in *T. cremnophila*).

T. cremnophila is also superficially similar to *T. prona* in having non-resinous, pseudopetiolate leaves (Lazarides 1997), differing in having stomatal grooves over the entire abaxial leaf surface (absent from the lateral parts of the abaxial surface in *T. prona*), erect culms (procumbent in *T. prona*) and glumes smaller in *T. cremnophila* (3.4–5.1 mm long vs 7–9 mm long in *T. prona*).

In the Flora of Australia key (Lazarides et al. 2005), *Triodia cremnophila* would key to Group 8 (Danthonioides group). *Triodia cremnophila* differs from all species in the Danthonioides group by the significantly shorter glumes and lemma awns. All members of the Danthonioides group are restricted to south-western Australia, and are widely disjunct from the distribution of *T. cremnophila*.

Triodia cremnophila can be included in the keys of Lazarides et al. (2005) by adding the following couplet in the Group 8: Danthonioides group key (pg. 248) after the second lead of couplet 1:

2A Glumes 3.4–5.1 mm long; basal lemma with awns less than 5 mm long. Kimberley Region ..... ***T. cremnophila***

2A: Glumes 8 mm or more long; basal lemma with awns more than 10 mm long, except in *T. dielsii* (2.5–6 mm long). South-western Australia ..... (3)

Sectioning and surface examination showed that *T. cremnophila* has true stomatal grooves evenly spread over the abaxial surface of the blades, consistent with the 'hard'-type leaf anatomy.

Triodia cremnophila possesses lemma awns, a feature that would previously have placed it within *Plectracne* until Lazarides (1997) submerged *Plectracne* into *Triodia*, demonstating that the distinction was untenable. That view is further supported here, as *T. cremnophila* seems distantly related to the other tropical '*Plectracne*' species in the Schinzii Group (sensu Lazarides et al. 2005), differing especially in the type of leaf anatomy ('hard'-type in *T. cremnophila*, 'soft'-type in the Schinzii group, except *T. aeria* fide Mant 1998). Leaf anatomy is an important character in *Triodia* (Burbidge 1946a,b; Jacobs (1971), and appears to be more phylogenetically informative than lemma morphology (Mant 1998, Mant et al. 2000, Petersen et al. 2010). A few infra-generic groups in Lazarides et al. (2005) combine species that differ greatly in leaf anatomy (Mant 1998) in order to group species with similar lemma division and distribution. *T. cremnobata* further confuses the boundaries between the Schinzii and Danthonioides groups of Lazarides et al. (2005), suggesting that they may not be monophyletic, and that improvements to that system might be needed when further phylogenetic analyses are available.

Triodia fissura R.L.Barrett, G.B.Wells & K.W.Dixon, Fl. Australia 44B: 207, 458, fig. 32 (2005).

Notes: the distribution of duplicates of the type collection from PERTH was changed subsequent to the text being finalised in the *Flora of Australia* treatment, hence the location of isotypes cited there is incorrect. The correct locations of the isotype sheets are as follows: AD, BM, BRI, CANB, DNA, HO, K, MEL, NSW, NT, PERTH (2 sheets).

Acknowledgments

We would like to thank Ecologia Environment, Resource Mining Corporation Limited, Animal Plant Mineral and Kimberley Metals Group for making these collections possible, both financially and logistically. Mitchell Ladyman and Conrad Slee are particularly thanked for their collections and assistance in the field. We thank staff at the Western Australian Herbarium (PERTH) for making research facilities available and for processing specimens and Karen Wilson (NSW) for correcting the Latin diagnoses.

References

Armstrong G (2009) *Triodia caelestialis* (Triodieae: Chloridoideae: Poaceae), a new species from the central Kimberley, Western Australia. *Journal of the Royal Society of Western Australia* 91: 313–317.

Barrett RL (2007) *Corymbia cadophora* subsp. *polychroma* (Myrtaceae): a new subspecies from the east Kimberley region of Western Australia. *Nuytsia* 17: 31–36.

Barrett RL, Wells GB & Dixon KW (2005) *Triodia fissura*. Pp. 207–208, 458–459 in Mallett K (ed.) *Flora of Australia*, vol. 44B. *Poaceae 3*. (Australian Biological Resources Study: Canberra)

Brown RW (1956) *Composition of Scientific Words. A Manual of Methods and a Lexicon of Materials for the Practice of Logotechnics*. Revised edition. (Smithsonian Books: Washington)

Burbidge, N.T (1946a). Foliar anatomy and the delimitation of the genus *Triodia* R.Br. *Blumea* Suppl. III, 83–89.

Burbidge NT (1946b) Morphology and anatomy of the Western Australian species of *Triodia* R.Br. II. Internal anatomy of leaves. *Transactions of the Royal Society of South Australia* 70: 221–236.

Jacobs, SWL (1971). Systematic position of the genera *Triodia* R.Br. and *Plectrachne* Henr. (Gramineae). *Proceedings of the Linnean Society of New South Wales* 96(3), 175–185.

Jacobs SWL (1974) Ecological studies on the genera *Triodia* R. Br. and *Plechtrachne* Henr. in Australia. Thesis for the degree of Doctor of Philosophy. (University of Sydney: Sydney).

Jacobs SWL (1992a) Spinifex (*Triodia*, *Plectrachne*, *Symplectrodia* and *Monodia*: Poaceae) in Australia. Pp. 47–62 in Chapman GP (ed.) *Desertified grasslands: their Biology and Management*. (Linnean Society Symposium Series No. 13). (Academic Press: London)

Jacobs SWL (1992b) *Monodia*. P. 1192 in Wheeler JR (ed.) *Flora of the Kimberley Region*. (Conservation and Land Management: Perth)

Jacobs SWL (1992c) *Plectrachne*. Pp. 1206–1208 in Wheeler JR (ed.) *Flora of the Kimberley Region*. (Conservation and Land Management: Perth)

Jacobs SWL (1992d) *Triodia*. Pp. 1228–1236 in Wheeler JR (ed.) *Flora of the Kimberley Region*. (Conservation and Land Management: Perth)

Jacobs SWL (1992e) New species of *Triodia* and *Plechtrachne* (Poaceae) from the Kimberley. *Nuytsia* 8: 219–223.

Jacobs SWL (1992f) New taxa and a new combination in *Triodia* (Poaceae). *Telopea* 4: 653–659.

Jacobs SWL (2004) The tribe Triodieae (Chloridoideae: Gramineae). *Telopea* 10: 701–703.

Jacobs SWL, Whalley RDB & Wheeler DJB (2008) *Grasses of New South Wales* (4th edn). (University of New England: Armidale)

Lazarides M (1997) A revision of *Triodia* including *Plectrachne* (Poaceae, Eragrostideae, Triodiinae). *Australian Systematic Botany* 10: 381–489.

Lazarides M, Weiller CM & McCusker A (2005) *Triodia*. Pp. 203–256 in Mallett K (ed.) *Flora of Australia* Vol. 44B. *Poaceae 3*. (Australian Biological Resources Study: Canberra)

Mant J (1998) A phylogeny of *Triodia* R.Br. and related genera (Poaceae: Triodieae). Unpublished Honours Thesis, Australian National University, Canberra.

Mant JG, Bayer RJ, Crisp MD & Trueman JWH (2000) A phylogeny of Triodieae (Poaceae: Chloridoideae) based on the ITS region of nrDNA: Testing conflict between anatomical and inflorescence characters. Pp. 213–217 in Jacobs SWL and Everett J (eds.) *Grasses: Systematics and Evolution.* (CSIRO: Melbourne)

Petersen PM, Romaschenko K & Johnson G (2010). A classification of the Chloridoideae (Poaceae) based on multi-gene phylogenetic trees. *Molecular Phylogenetics and Evolution* 55: 580–598.

Species and Communities Branch (2009) Priority ecological communities for Western Australia. (Department of Environment and Conservation: Kensington) http://www.dec.wa.gov.au/component/option,com_docman/task,doc_details/Itemid,/gid,2835/ (Accessed 11 Feb 2010).

Western Australian Herbarium (1998+) FloraBase – The Western Australian flora. Department of Environment and Conservation. http://florabase.dec.wa.gov.au/ (Accessed 2 April 2010).

Manuscript received 17 June 2010, accepted 02 November 2010