

Machaerina ascendens (Cyperaceae), a rare new species from the far south-west of Western Australia, and a new combination for *Schoenus abbreviatus* Nees

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Abstract

We here describe *Machaerina ascendens* R.L.Barrett & K.L.Wilson as a new species from swamps within forests in the far south-west of Western Australia. The new species is readily identifiable by its scrambling habit and compressed, multi-noded culms, features which separate it from all other Australian species. The clearly distichous glumes, few hypogynous scales fused at the base into a ring and prominently stipitate nutlets are also unusual features in *Machaerina* Vahl. *Machaerina ascendens* is highly range-restricted by its specific habitat and appears to qualify for listing as Endangered. Study of all names applicable to the current concept of *Machaerina* revealed an earlier name for the eastern Australian species *Machaerina nuda* (Steud.) J.Kern, and a new combination is provided here for *Schoenus abbreviatus* Nees as *Machaerina abbreviata* (Nees) R.L.Barrett & K.L.Wilson.

Keywords: Cyperaceae; Australia; Systematics; Taxonomy; Rare species

Introduction

Machaerina Vahl is a genus of at least 55 named species (Larridon *et al.* 2021). The genus is now placed in Tribe Schoeneae, subtribe Lepidospermatinae R.L.Barrett, along with *Lepidosperma* Labill., *Neesenbeckia* Levyns and *Netrostylis* R.L.Barrett, J.J.Bruhl & K.L.Wilson (see Levyns 1947; Barrett & Wilson 2012; Barrett *et al.* 2021a; Larridon *et al.* 2021). The genera *Baumea* Gaudich., *Vincentia* Gaudich., and *Chapelliera* Nees are here included in *Machaerina* based on a combination of morphological characters and phylogenetic data (Bruhl 1995; Strong 1997; Muasya *et al.* 2009; Barrett & Wilson 2012; Bruhl *et al.* 2012; Viljoen *et al.* 2013; Wilson 2015; Browning & Goetghebeur 2017; Larridon *et al.* 2018a, 2018 b, 2021). This re-circumscription coincides with a number of generic realignments in tribe Schoeneae in order to create monophyletic genera (Zhang *et al.* 2007; Bruhl *et al.* 2012; Slingsby *et al.* 2014; Musili *et al.* 2016; Barrett *et al.* 2017; 2019; 2020, 2021a, 2021b, 2021c; Elliott & Muasya 2017, 2019, 2020; Elliott *et al.* 2019; 2021; Semmouri *et al.* 2019; Larridon *et al.* 2021).

A previously unnamed species from the far south-west of Western Australia is here described as *Machaerina ascendens* R.L.Barrett & K.L.Wilson. The species was given a phrase name at PERTH in 2002 by M. Hislop, who recognised its affinities, as *Baumea* sp. Blackwood (R. Davis 7681). This name was later updated to *Machaerina*

sp. Blackwood (R. Davis 7681) (Western Australian herbarium 1998–) to reflect more recent generic concepts (see Larridon *et al.* 2021). The new species is distinctive for its scrambling habit, compressed, multi-noded culms, clearly distichous glumes, with few hypogynous scales fused at the base into a ring, and prominently stipitate nutlets.

A previously overlooked name, *Schoenus abbreviatus* Nees is recognised as an earlier name for *Machaerina nuda* (Steud.) J.Kern, and a new combination is provided here as *Machaerina abbreviata* (Nees) R.L.Barrett & K.L.Wilson.

Methods

The description of *Machaerina ascendens* is based on field studies by both authors and on examination of specimens held at NSW and PERTH. The format of the description is modified from Wilson (1980). Cited specimens have been seen by one or both authors apart from those indicated as being seen only as images.

Taxonomy

Machaerina ascendens R.L.Barrett & K.L.Wilson, *sp. nov.*

Type: Western Australia: [precise locality withheld] S of Blackwood River, 27 Oct. 2008, R.L.Barrett & K.L.Wilson RLB 5333 (holo: PERTH 09457526; iso: CANB, K, MEL, NE, NSW, PERTH 09457569, US).

Baumea sp. Blackwood (R. Davis 7681), Western Australian Herbarium (1998–) *FloraBase: the Western Australian Flora*. <https://florabase.dpaw.wa.gov.au/> (accessed Dec. 2016)

Machaerina sp. Blackwood (R. Davis 7681), Western Australian Herbarium (1998–) *FloraBase: the Western Australian Flora*. <https://florabase.dpaw.wa.gov.au/> (accessed Feb. 2022)

Scrambling or sprawling perennial forming dense clumps sprawling through shrubs (supported by surrounding vegetation), rhizome ± absent, roots short, fibrous. Culms erect to spreading, green or yellow-green, strongly compressed, biconvex, margins finely retrorse-scabrous, 5- to many-noded, 90–180 cm tall, 2.0–6.5 mm wide. Leaves cauline, equitant, compressed, biconvex, 22–45 cm long, 3–7.2 mm wide, somewhat soft- to tough-textured, margins finely retrorse-scabrous, shorter than culms and inflorescence; sheaths green or yellowish; lowest leaves sometimes reduced to sheaths. Inflorescence bracts green, or yellowish at the base, flat, basal bract much longer than lowest branch of inflorescence, bracts reducing in size along the inflorescence, 3–28 cm long. Inflorescence loosely paniculiform, (8.5–)21–40 cm long, with 2–6 branchlets, branches erect, finely sulcate, margins finely retrorse-scabrous; rachis elongated between lowest and upper branches, sulcate, scabrous on margins, 5–12 cm long; basal branchlet 7–15 cm long, with 3–11 loosely clustered to spreading spikelets. Spikelets 9–12 mm long, solitary or loosely clustered, with 1 or 2 fertile flowers in the upper glumes (lower flower when present functionally male), glumes distichous, usually prominently spreading at maturity, persistent. Glumes (4) 6, linear-lanceolate, long-acuminate, 7.6–9.5 mm long, green along the keel with red-brown margins, with (1 or) 3 prominent nerves. Stamens 3; filaments (3.5–)6.1–8.2 mm long, anthers 3.9–4.9 mm long, and an apical appendage 0.8–1.1 mm long. Style 3-fid, base 3.3–4.4 mm long, glabrous, somewhat compressed to slightly angular towards the base, branches 3.5–5.3 mm long, finely papillose. Hypogynous scales present, fused in a ring at the base with 1–3 short ± triangular scales protruding from the ring up to 0.3 mm long. Nutlet prominently stipitate, ovoid to ellipsoid, pale brown to mid-brown, glabrous, 2.4–2.8 mm long, 1.6–1.8 mm wide, strongly 3-costate, sides convex between the costae; stipitate base 0.8–1.2 mm long, ± cylindrical; style-base fused to nutlet apex distinct, ± shortly pyramidal, slightly paler in colour, 0.4–0.5 mm long. (Fig. 1)

Diagnostic characters: Readily distinguished by its scrambling habit and compressed, multi-noded culms, features which separate it from all other Australian species. The clearly distichous glumes, few hypogynous scales fused at the base forming a ring, and prominently stipitate nutlets are also unusual features in *Machaerina*.

Other specimens examined: WESTERN AUSTRALIA [precise localities withheld for conservation reasons]: [N of Karridale], 23 Sept. 1992, A.R.Annels ARA 2488 (PERTH); [NE of Nillup], 16 Nov. 1992, A.R.Annels ARA 2990 (PERTH); [NE of Nillup], 26 Aug. 1996, A.R.Annels, R.Hearn & T.D.Macfarlane ARA 5761 (PERTH); [near Blackwood River], 9 Mar. 2006, T.Brown BNC 901 (PERTH); [NE of Nillup], 21 Oct. 1998, R.Davis 7681 (PERTH); [near Gingilup Swamp], 31 Jan. 1997, C.Day & D.Bright B 120.12 (PERTH); [near] Rosa Brook, 27 Aug. 2007, M.Morley 141 (PERTH); [near] Nillup, 30 Oct. 1948, R.D.Royce 3020 (PERTH 02333007); [NE of Nillup], 20 Nov. 2001, C.Tauss 1-116; 1-117; 1-118 (PERTH); [NE of Nillup], 20 Nov. 2001, C.Tauss 1-122 (PERTH); SE of Margaret River, 1 Sept. 1992, G.Wardell-Johnson GWJ4 (PERTH 02657597); [NE of Nillup], 18 Nov. 1994, K.L.Wilson & K.Frank 8945 (NSW).

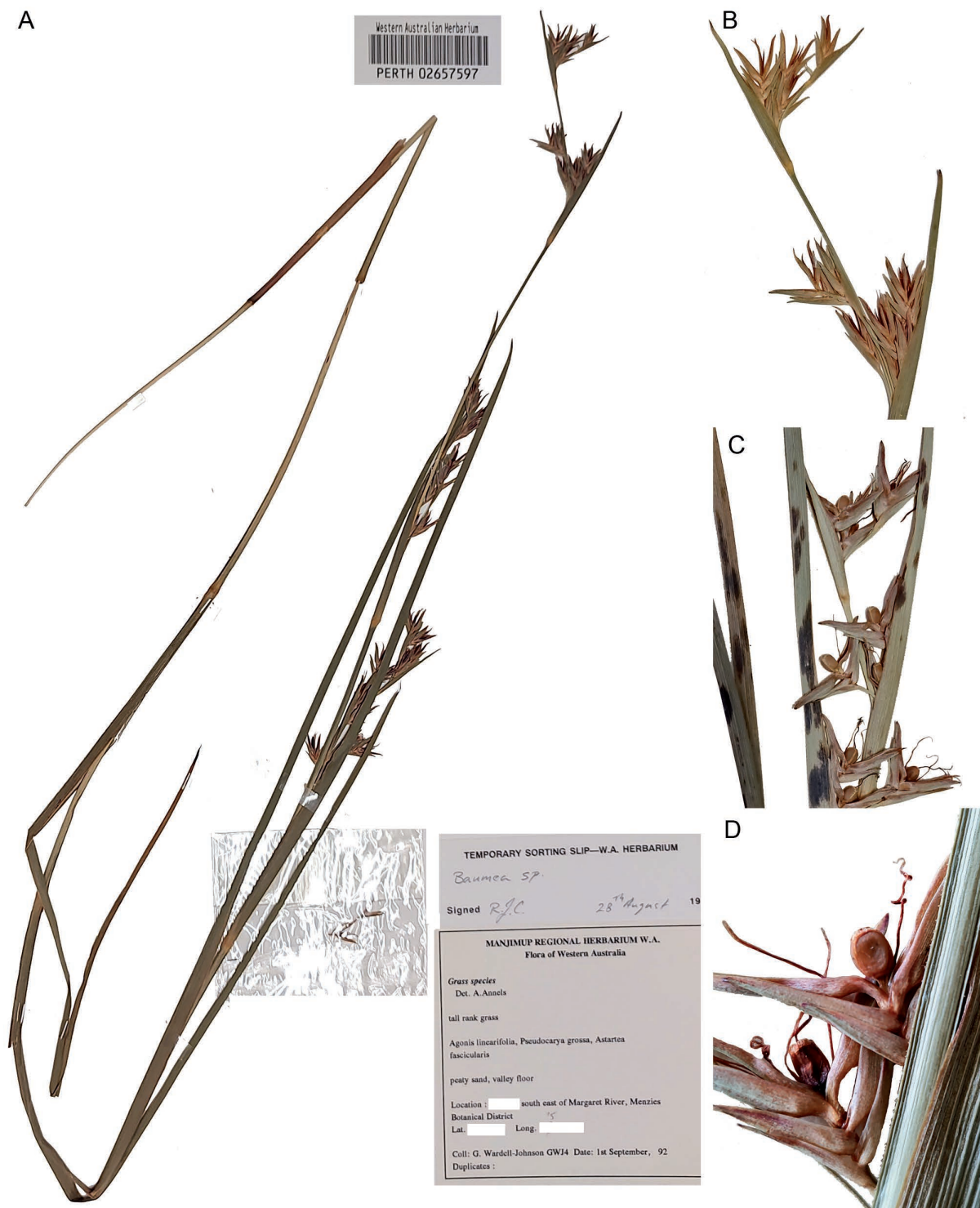


Fig. 1. *Machaerina ascendens*. A. Herbarium sheet. B. Inflorescence. C. Infructescence. D. Fruiting spikelets. Vouchers: A, B: G. Wardell-Johnson GWD14; C, D: R.D.Royce 3020 (both PERTH). Photographs by R.L.Barrett.

Distribution: Occurs in the Blackwood River area in the Warren Bioregion in south-west of Western Australia where it is considered to be endemic. Most populations occur in swamps associated with the Blackwood River, with two outlying populations associated with Rosa Brook and Gingilup Swamps.

Habitat: Grows in water or waterlogged soil towards the edge of swamps that are waterlogged and boggy for most or all of the year, in peaty, sandy, or clay soils. These swamps are unusual for their consistently high groundwater tables that are low in salinity and nutrients, constantly anoxic, and often highly acidic (Tauss 2004). Recorded in association with *Actinotus laxus*, *Astartea* sp., *Beaufortia sparsa*, *Boronia crenulata*, *Boronia molloyae*, *Boronia tenuior*, *Callistachys lanceolata*, *Centrolepis fascicularis*, *Chorizandra cymbaria*, *Empodisma gracillimum*, *Eutaxia exilis*, *Gonocarpus diffusus*, *Gymnoschoenus anceps*, *Hakea varia*, *Homalospermum*

firmum, *Hypolaena exsulca*, *Juncus pallidus*, *Juncus planifolius*, *Lepidosperma tetraquetrum*, *Lepidosperma* sp. Blackwood River (R.Davis 7696), *Leptocarpus coangustatus*, *Leptocarpus scariosus*, *Leptocarpus tenax*, *Leptomeria ellytes*, *Lobelia anceps*, *Loxocarya cinerea*, *Machaerina acuta*, *Machaerina riparia*, *Machaerina rubiginosa*, *Machaerina vaginalis*, *Melaleuca incana*, *Morelotia octandra*, *Patersonia occidentalis*, *Pseudolycopodiella serpentina*, *Pteridium esculentum*, *Reedia spathacea*, *Rhadinothamnus anceps*, *Sphenotoma capitatus*, *Sphaerolobium drummondii*, *Sphaerolobium hygrophilum*, *Sphaerolobium medium*, *Sporodanthus rivularis*, *Stylidium nymphaeum*, *Stylidium scandens*, *Stylidium thryonides*, *Taraxis grossa*, *Taxandria juniperina*, *Taxandria linearifolia*, *Taxandria parviceps*, *Triglochin* sp., *Utricularia tenella*, *Xyris indivisa* and *Xyris lacera*.

Phenology: Flowers recorded for August–October. Fruit recorded for October–November.

Conservation status: Likely to be endangered. Nine extant populations are known, most of which occur in an area about 10 km across near the Blackwood River, to the north-east of Nillup, with three disjunct populations between 15 and 25 km away. The area of occurrence is about 350 km² and the area of occupancy is about 20 ha (0.25 km²). An assessment of conservation status using IUCN (2002) criteria based on known distribution and threats suggests it should be listed as Endangered (B1a,b(iii),B2a,b(iii)).

Occurs in Blackwood River National Park, Bramley National Park and Gingilup Swamps Nature Reserve. The species occurs in habitats that are threatened by frequent fire as the swamps are formed along drainage lines surrounded by dry, fire-prone forest. The collection notes for *R.D.Royce 3020* record grazing by both cattle and kangaroos. Feral pigs are noted to be significantly impacting these habitats and may be directly threatening some populations (Tauss 2004). As consistently high water tables are a key part of these habitats, any localised groundwater extraction may have a significant effect on populations (Tauss 2004). Conservation Codes for Western Australian Flora: Threatened recommended, but this species should be assessed to determine if it qualifies for listing as Critically Endangered in Western Australia under IUCN criteria as it faces similar threats to the rare sedge *Reedia spathacea* F.Muell., which is known from 27 populations, co-occurring with *M. ascendens* in some of them, and is currently listed as Critically Endangered. *M. ascendens* is considered to have an even more restricted distribution and, as a far less robust species lacking a distinct rhizome, is probably at greater risk than *R. spathacea* from the same set of threats.

Machaerina ascendens is found in association with frogs in the genus *Geocrinia* Blake, so the habitats have been relatively well-studied (e.g. Wardell-Johnson & Roberts 1993). Two species, *Geocrinia alba* and *G. vitellina*, are listed as Critically Endangered.

Vernacular name: The vernacular name of Blackwood Twigrush is recommended.

Etymology: From the Latin *ascendens* (ascending or climbing) in reference to the unusual habit of the species, scrambling and climbing over surrounding vegetation.

Affinities: There are no morphologically similar species in Australia. Unpublished molecular phylogenetic data (based on only partial sampling of the genus) places this species as sister to *Machaerina angustifolia* (Gaudich.) T.Koyama from Hawaii (Bruhl *et al.* 2012). *Machaerina angustifolia* differs in having nodeless erect culms arranged in a tussock (common in many *Machaerina* spp.), broader leaves (to c. 25 mm wide), longer inflorescences (30–50 cm long), perianth apparently absent, and not or slightly stipitate nutlets (Koyama 1999).

Notes: The habit of *Machaerina ascendens* is shorter and more compact when found growing in open locations, with most plants being lax and sprawling over surrounding vegetation. The lax habit and somewhat unusual floral features led to early speculation that this species may belong to the genus *Scleria* P.J.Bergius, having superficial similarities to sprawling and climbing species from Central and South America such as *Scleria bracteata* Cav. (Core 1936). While collections of this species were already held at PERTH, Wheeler and Graham (2002) did not treat this taxon as there was uncertainty over its generic placement.

Machaerina abbreviata (Nees) R.L.Barrett & K.L.Wilson, *comb. nov.*

Basionym: *Schoenus abbreviatus* Nees, *Fl. oder Allg. Bot. Zeit.* 11: 292 (1828).

Lectotype (here designated): New South Wales: Sydney District, 1823, *F.W.Sieber Agrost. No. 19* (P 00585281).

Isolectotypes: G 00195262, G 00195263, G 00195264, H 1224937 (image), L 0042667 (image), L 0042668 (image), MEL 2292591, MEL 2297528, W 1889-0265769 (image).

Schoenus nudus Steud., *Syn. Pl. Glumac.* 2: 165 (1855). *Cladium nudum* (Steud.) Boeckeler, *Linnaea* 38: 236 (1874). *Mariscus nudus* (Steud.) Kuntze, *Revis. Gen. Pl.* 2: 755 (1891). *Machaerina nuda* (Steud.) J.Kern, *Acta Bot. Neerl.* 8: 266 (1959). *Baumea nuda* (Steud.) S.T.Blake, *Contrib. Queensl. Herb.* 8: 28 (1969).

Type: New South Wales: Sydney District, 1823, F.W.Sieber *Agrost. No. 19* (*holo:* P 00585281; *iso:* G 00195262, G 00195263, G 00195264, H 1224937 (image), L 0042667 (image), L 0042668 (image), MEL 2292591, MEL 2297528, W 1889-0265769 (image)).

Typification: While Nees (1828) cited only the collection *Sieber Agrost. No. 19* when describing *Schoenus abbreviatus*, it is not clear which material of that number was available to him – none of the sheets that we have seen has been annotated by him. We designate the sheet at P as lectotype as this is also the holotype of *Schoenus nudus*. We accept the P specimen as a holotype of *Schoenus nudus* as it is the only sheet of this species annotated ‘Herbarium Steudel’ and as far as we can determine, the only sheet examined by Steudel in preparing the description.

Notes: In naming *Schoenus nudus*, Steudel (1855) appears to have overlooked that Nees (1828) had used the same Sieber collection when describing *Schoenus abbreviatus*, which is therefore the earlier name for the taxon. The publication of Nees (1828) lists taxa by Sieber’s *Agrostotheca* numbers, which are readily misinterpreted as species order numbers specific to the publication, rather than a reference to a specific *Agrostotheca* collection by Sieber. The existence and application of the name *Schoenus abbreviatus* has been ignored by later botanists, despite *Sieber Agrost. No. 19* being cited in the protologue. It was only when material at MEL (MEL 2297528) was examined in 2019, with the name *Schoenus abbreviatus* on the sheet, that we realised that the application of Nees’ name had been overlooked. Only the specimen at H has previously been annotated as being a type for both *Schoenus* names, but that annotation was recent, in 2011.

This species is similar in appearance to *M. gunnii*, but the plant is generally smaller, so the epithet ‘*abbreviatus*’ is appropriate. The leaves greatly exceed the culms (*vs* not or only slightly exceeding them in *M. gunnii*), the culms are more slender (0.5 *vs* 0.7–1.5 mm diam.), lax and smooth (*vs* erect and often scaberulous), and the nutlets are only 2.0–2.3 (*vs* 2.5–3.5) mm long (see Wilson 1993 for a full description).

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