

## Taxonomic studies in *Stipa* (Poaceae) in Australia

J.W. Vickery†, S.W.L. Jacobs and J. Everett

### Abstract

Vickery, J.W., Jacobs, S.W.L. and Everett, J. (National Herbarium of New South Wales, Royal Botanic Gardens, Sydney, Australia 2000) 1986. Taxonomic studies in *Stipa* (Poaceae) in Australia. *Telopea* 3(1): 1–132.—In a revision of *Stipa* in Australia sixty-one native species with five subspecies, and five introduced species are recognized and described. *Stipa nullarborensis*, *S. lanata*, *S. wakoolica*, *S. centralis*, *S. dongicola*, *S. feresetacea*, *S. velutina*, *S. aquarii*, *S. pilata*, *S. blakei* and *S. echinata* are described as new with a new combination made for *S. scabra* subsp. *falcata*.

### Introduction

Bentham (1878) made the first attempt to revise the Australian species of *Stipa*, treating some 15 species. Hughes (1921) revised the Australian species from specimens held at Kew, increasing the number of species to 40. The following year she published the results of her examination of material held in the U.S. National Herbarium, clarifying some nomenclatural problems and describing two further species.

Since 1922 most studies have been on a regional basis or occasional taxa published in isolation, the best example of these being Townrow's (1978) recent study of Tasmanian *Stipa*. As a result of these and other publications, and the introduction of some species from other countries, the number of Australian species described had risen to 50 before the commencement of the present study by the late Dr Joyce Vickery. Vickery (1980) published four species, and Everett and Jacobs (1983) three species to date as part of this study. This treatment describes a further 11 species and reduces two others to subspecies, recognizing 66 species and five subspecies.

Although we are satisfied that the Australian species are congeneric with *Stipa*, there are, as yet, no adequate studies examining the relationships within *Stipa* on a worldwide basis. One of us (JE) is undertaking such a study, but progress to date is insufficient for any comments on relationships.

### Organisation of the Text

The species are arranged alphabetically. The systematic relationships of the Australian species and their affinities with non-Australian species still require further study. Our present thoughts on the relationships of the Australian species are presented in the 'natural' Key 1, which suffers from being a one-dimensional presentation. Although the composition of the groups is useful information, the arrangement within the groups and the arrangement of the groups is not necessarily significant. At present we include some species in two groups.

---

†Died 29 May 1979

Key 2 is in a tabular format and is more or less equivalent to a 'multiple-access' key.

The descriptions are mostly organized conventionally and where there are two or more alternative states (e.g. glabrous or hairy) the more common state is mentioned first.

An index to the major place of mention of extant names, synonyms, uncertain and excluded taxa follows the descriptions.

The list of specimens cited represents only a selection of specimens examined, especially for the more widespread species. A further list is available from the Library, Royal Botanic Gardens, Sydney, 2000. Even this additional list, however, does not include all the specimens examined. Standard abbreviations are used for the herbaria with the addition of ACB (Herbarium of A.C. Beauglehole), JEST (Herbarium of J.E.S. Townrow) and Corrick herb. (Herbarium of M.J. Corrick).

### Evaluation of Characters

**Life cycle:** all Australian species of *Stipa* are facultative perennials. Minute plants producing one spikelet can be found during extremely dry seasons.

**Rootstock and shoots:** most species are caespitose, but some are wiry and scrambling in habit; others have thickened culms, produce numerous branches at the nodes and are reminiscent of small bamboos. In Australia there are rhizomatous species but no truly stoloniferous species.

New culms may be either intravaginal or extravaginal. The distinction is not always consistent within a species, but the general appearance it gives to the base can be a useful character.

**Culm:** the culms are basically circular in cross-section. The internodes are hollow. The nodes are frequently swollen and often coloured differently from the internodes. The number of nodes is a useful character in a few cases.

**Leaves:** the sheaths, blades and ligules of the leaves are variable within the one plant depending on whether the leaf is an innovation-leaf or a culm-leaf, and if a culm-leaf then on its position relative to the inflorescence. Unless otherwise stated all descriptions of these characters are based on the second culm-leaf below the inflorescence, i.e. the leaf directly below the flag.

**Sheaths:** the sheaths are open and glabrous, scabrous or hairy. Long-hairy sheaths can be a distinguishing character. In some species the sheaths become loose with age. The top of the sheath can merge with the ligule forming a complex structure consisting of both ligule and sheath lobes ( $\equiv$  auricles?). Although there is some doubt as to when these lobes can be regarded as auricles, we have used the latter term throughout.

**Ligule:** the ligule and auricles are useful characters. The combined structure is frequently asymmetric. The auricles may be thickened or have a thickened base with membranous margins and, when present, the membranous margins are often continuous with the ligule. The ligule is membranous but may be reduced to a thickened ridge.

**Blades:** the blades may be flat, rolled or folded. Most species have linear leaves but some species have leaves that are only about 5 times as long as broad, although the shape is influenced greatly by environmental factors. *S. stipoides*,

*S. echinata* and *S. pilata* have pungent-pointed leaves. Some species have more or less rigid leaves but most leaves are more or less lax.

Townrow (1978) emphasized the adaxial leaf surface ornamentation ('ALSO' sensu Townrow) as a diagnostic character in her work on Tasmanian species of *Stipa*. This approach appears to be worth developing but requires refining to make it useful on an Australia-wide basis. In particular it will be important to distinguish the macrohairs and siliceous outgrowths, which are known to vary with habitat, from the significant epidermal features. In Tasmania this distinction would possibly be of little consequence but it is significant when the whole area of Australia is considered. The ornamentation characters seem also to have been partly responsible for some differences between our taxonomic conclusions and those of Townrow.

We have not yet critically examined leaf anatomy or epidermal features for the genus. Such a study would be useful for examining the subgeneric relationships within Australia and the relationships of Australian *Stipa* to those in the rest of the world.

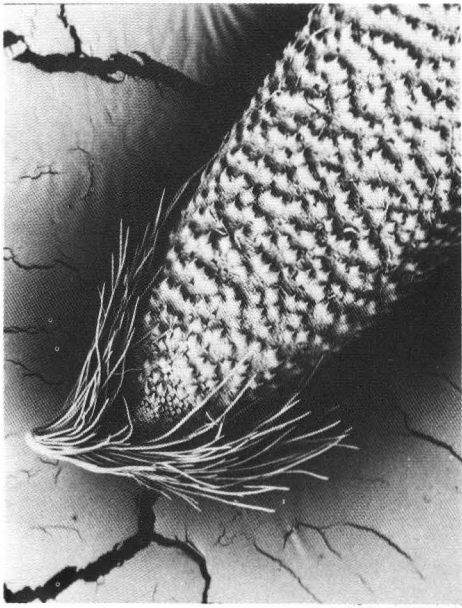
**Inflorescence:** the inflorescence is basically a panicle, in the sense of being open and much branched. Some species, e.g. *S. muelleri*, have inflorescences reduced to 1 or few spikelets whereas others, e.g. *S. verticillata*, have large, much-branched inflorescences. Most species fall between these two extremes but the extreme inflorescence types are useful diagnostic characters, as to a lesser extent is the size of the inflorescence.

The inflorescences appear to be terminal but it is not uncommon to find a second inflorescence produced from either the first or second node immediately below the terminal inflorescence. This inflorescence is produced intravaginally and in most cases is not easy to distinguish from the terminal inflorescence. The occurrence of a 'second inflorescence' appears to be more common during periods of stress and does not appear to be of much value as a taxonomic character.

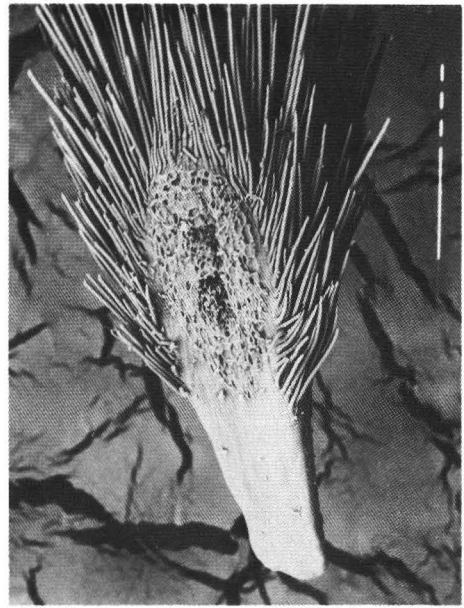
**Spikelets:** the spikelets are 1-flowered and in none of the specimens we examined was there any evidence of a rachilla extension. (One specimen of *S. bigeniculata* (NSW 117419) has 2-flowered spikelets.) The spikelets can appear laterally flattened due to the often-keeled glumes, even though the floret is virtually cylindrical.

**Glumes:** the glumes are unequal or subequal. The number of nerves varies from 1 to 7 and, within certain limits, can be useful as a diagnostic character. Glume length is a very useful key character. The glume tips are important in affecting the general appearance of the spikelets. In some species the glume tips are quite membranous and easily torn; when examining such species, care is necessary to ensure that undamaged glumes are examined for both appearance and measurements.

The mid-nerve extends from the base to the tip. The lateral nerves usually occur in pairs, with one of each pair on either side of the midrib. The lateral nerves continue for varying distances along the glume from the base and this distance can be a distinguishing character. We have expressed this as the percentage of the glume length with a particular number of nerves, e.g. 'the lower 50% 5-nerved, the next 25% 3-nerved', means that the two outermost nerves extend halfway, the next pair extending to three quarters the length of the glume, the midvein continuing to the tip.



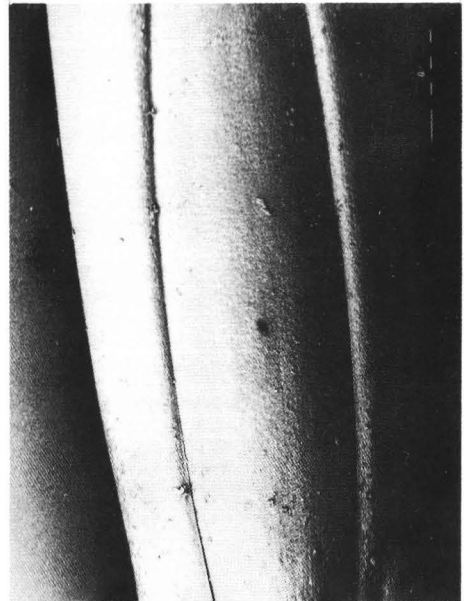
a.



b.



c.



d.

**Fig. 1** a. *S. ramosissima* showing the short, blunt callus and the lemma surface covered with short tubercles. Approx.  $\times 35$ . b. The callus of *S. oligostachya* showing the drawn-out tip, the vascular strand for the floret and the antrorse hairs. Lower marker bar 100  $\mu\text{m}$ , approx.  $\times 90$ . c. The long callus of *S. aphylla* showing the base of the lemma, the strong, antrorse hairs and the glabrous, pungent tip. Lower marker bar = 100  $\mu\text{m}$ , approx.  $\times 35$ . d. The exposed smooth palea, and the smooth lemma, with the margins not meeting, of *S. lanata*. Lower marker bar = 100  $\mu\text{m}$ , approx.  $\times 35$ .



**Floret:** the floret (diaspore) includes the callus, lemma, palea and awn. In *Stipa* the term 'lemma' is frequently used instead of 'floret'. This usage is not uncommon in grass terminology but it is necessary to remember, perhaps more so in *Stipa*, that the callus, in particular, consists mainly of rhachilla tissue. Most measurements of 'lemmas' in descriptions by other authors refer to floret length but usually exclude the awn.

**Callus:** the callus is a prominent feature of the *Stipa* floret. It is mainly rhachilla but externally grades imperceptibly into the base of the lemma. The callus has an oblique disarticulation zone (Fig. 1a, b, c) which results in a pungent point at the base of the floret. In some species the callus is *comparatively* short, less obliquely attached, and consequently less pungent (Fig. 1a).

The hairs on the callus are antrorse, fairly stiff and usually dense. It is these hairs that seem to prevent the callus from being readily dislodged from soil, wool, skin, clothes, etc., allowing the diaspore to work its way gradually downwards or inwards. Usually there is a clear distinction between the callus hairs and the lemma hairs but, as the callus hairs are antrorse, this demarcation appears above the callus/lemma junction.

**Lemma:** lemma size, shape, vestiture, surface and awn features are the more important diagnostic characters. The apex of the lemma may be extended into two or, more rarely, one membranous lobe(s) above the insertion of the awn (Fig. 2a, b, c).

The lemma surface varies from quite smooth to having at least some areas almost crystalline or granular in appearance (e.g. *S. rudis* complex). Hairs may be almost absent (e.g. *S. lanata* (Fig. 1d)) to quite uniformly dense (e.g. *S. petraea*). The hairs may be distributed in a consistent pattern (e.g. *S. eremophila*, *S. rudis* group) (Fig. 3). Frequently longer hairs are produced near the apex of the lemma in two lateral tufts or in a more or less complete ring around the base of the awn. The 'ring' of hairs is known as a coma (Fig. 4a, b, 6a) and its presence, length, and completeness are very useful characters. In four of the five introduced species there is a membranous cup-like growth produced in this same position (Fig. 4c, 6c). This growth is known as a corona and, while it is common in non-Australian species of *Stipa*, it does not occur in any Australian native species.

**Awn:** the awn is a prominent feature of *Stipa* diaspores. Even though there is an apparent disarticulation zone at the lemma/column junction, the awn is usually persistent. However, diaspores found embedded in soil or animal skins, etc., usually do not have the awn still attached and the break is at the disarticulation zone.

The awn is divided into the column and bristle. The column is the basal portion, which usually twists on drying or at maturity, and may be once or twice bent. By convention the column is defined as extending to either the second bend or to the top of the closely twisted portion if only one bend is present (Fig. 6a, b).

The column length and width are useful characters as are the length and pattern of hairs. The hairs range from quite long (villous or plumose, Fig. 5a) to short (scabrous, Fig. 5b), and from being present only on one side (appearing to spiral as the column twists, Fig. 5a, 6d) to present all around (Fig. 5c).

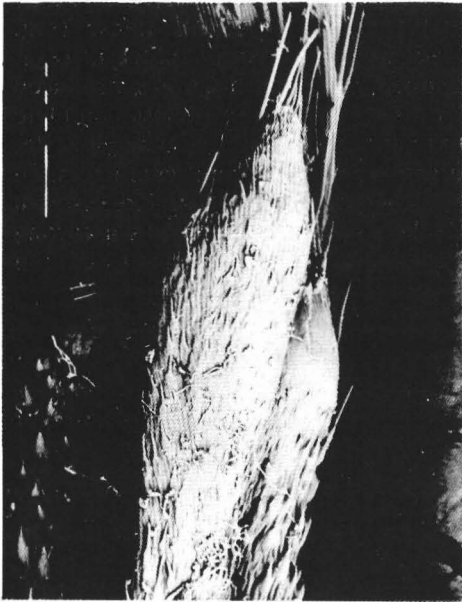
The bristle has a characteristic sickle-shape (Fig. 6b) in the group informally known as the Falcateae (approximately equivalent to the Falcateae of Hughes,



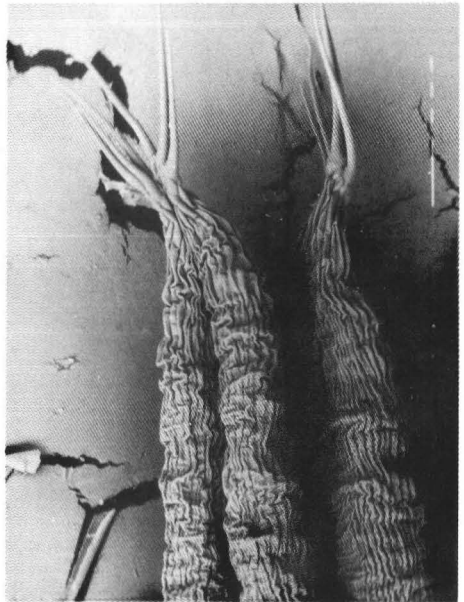
a.



b.



c.

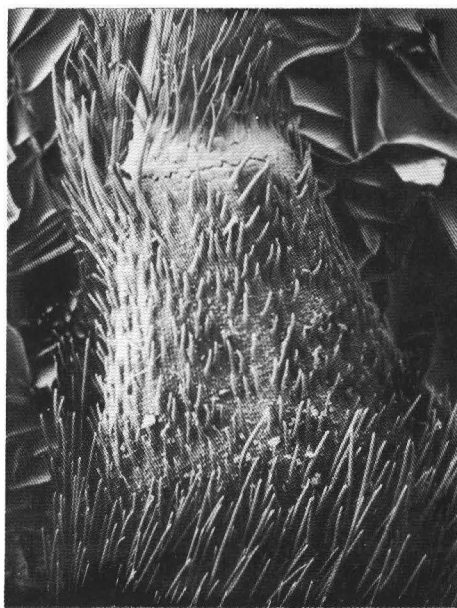


d.

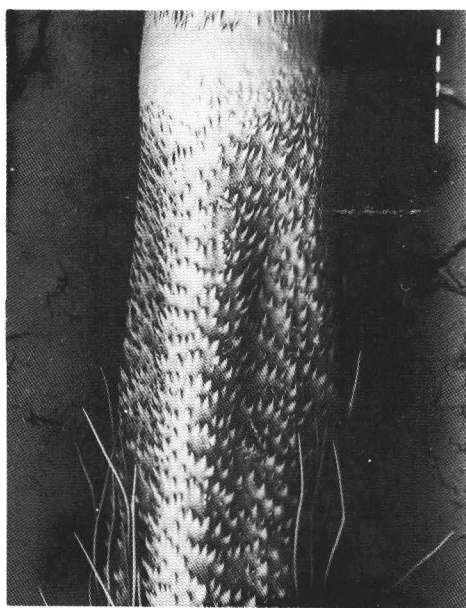
**Fig. 2** a. The two long, hairy lobes at the apex of the lemma of *S. stipoides*. Lower marker bar = 100  $\mu$ , approx.  $\times 20$ . b. The minute lemma lobe of *S. tuckeri*. Approx.  $\times 80$ . c. The lemma lobe of *S. oligostachya*. Lower marker bar = 100  $\mu$ , approx.  $\times 65$ . d. The penicillate anthers of *S. petraea*. Lower marker bar = 100  $\mu$ , approx.  $\times 60$ .



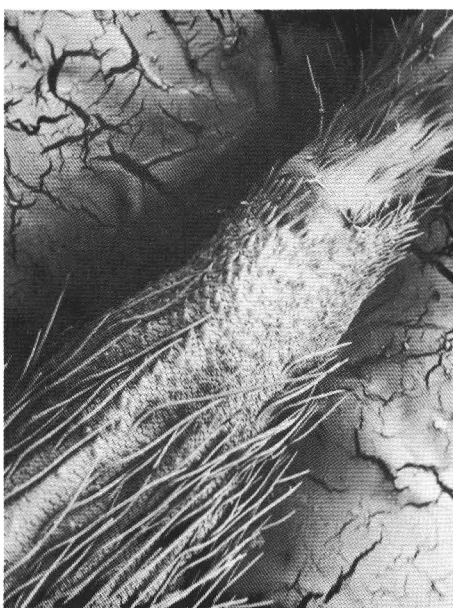
a.



b.

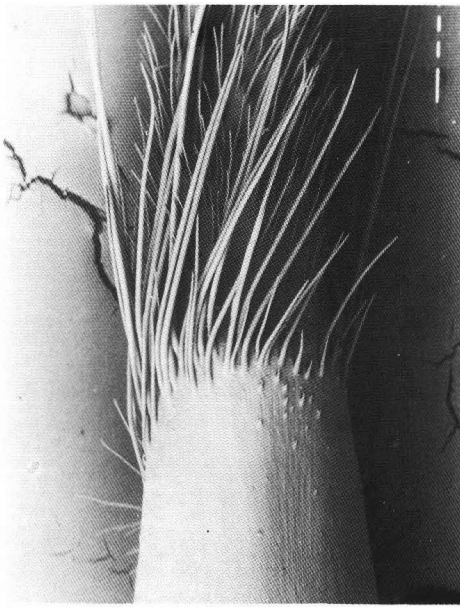


c.

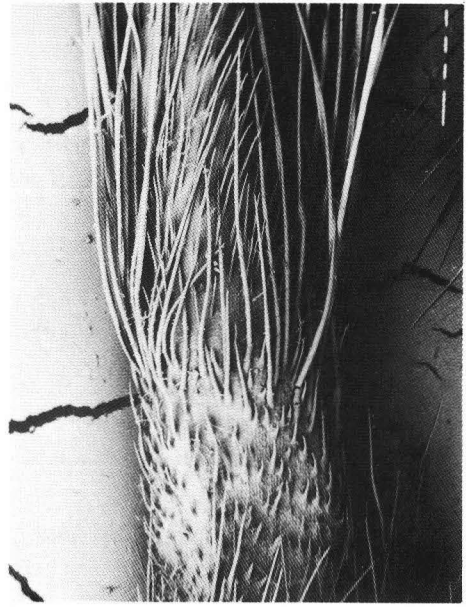


d.

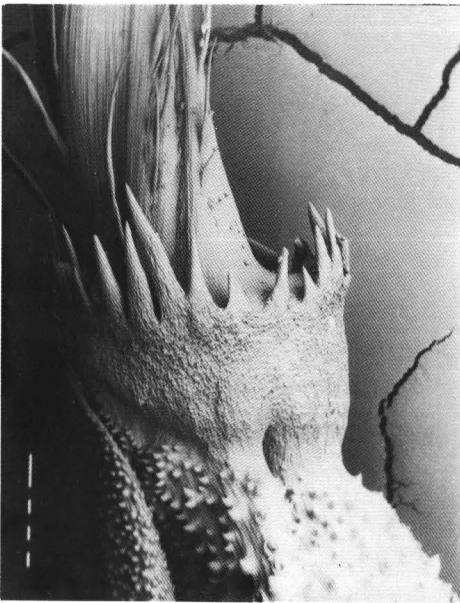
**Fig. 3** a. The lemma of *S. nullanulla* showing the neck region with very few hairs, the line of hairs down the lemma margins, and a coma. Approx.  $\times 40$ . b. The neck area of the lemma of *S. eremophila* showing the well-defined patch of short hairs. Approx.  $\times 25$ . c. The neck area of the lemma of *S. pubescens* with a large area covered with short antrorse tubercles. Lower marker bar = 100  $\mu$ , approx.  $\times 30$ . d. The neck area of *S. puberula* with an ill-defined zone of shorter hairs, longer hairs below, and a short lobe at the apex. Approx.  $\times 180$ .



a.



b.



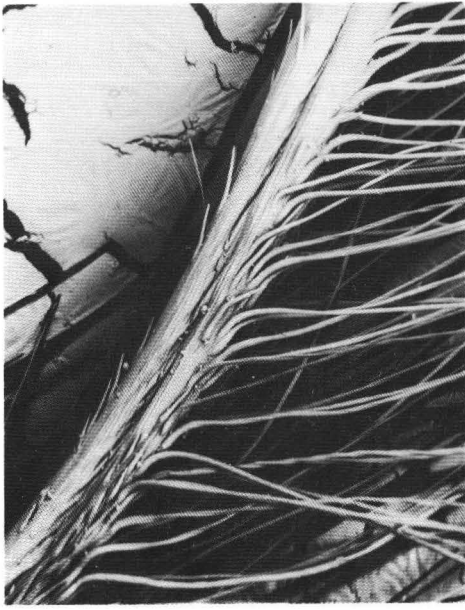
c.



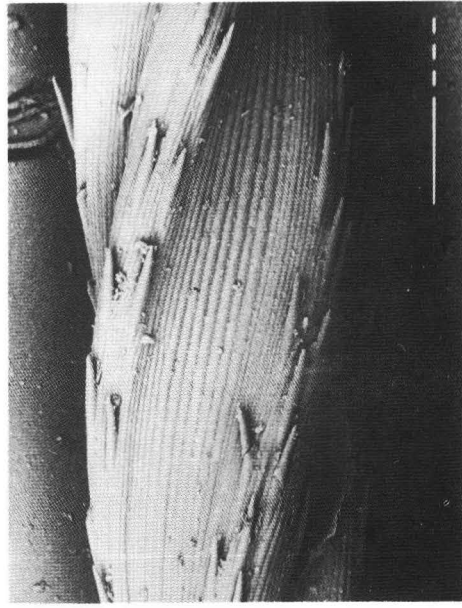
d.

**Fig. 4 a.** The coma of *S. lanata*. Lower marker bar = 100  $\mu$ m, approx.  $\times 30$ . **b.** The coma, column base, and neck of *S. metatoris*. Lower marker bar = 100  $\mu$ m, approx.  $\times 30$ . **c.** The corona at the apex of the lemma of *S. neesiana*. Upper marker bar = 100  $\mu$ m, approx.  $\times 30$ . **d.** The lemma of *S. setacea* showing the adaxial groove on the floret formed by the inrolled margins of the lemma exposing a small section of the palea (not visible in this print). Lower marker bar = 100  $\mu$ m, approx.  $\times 30$ .





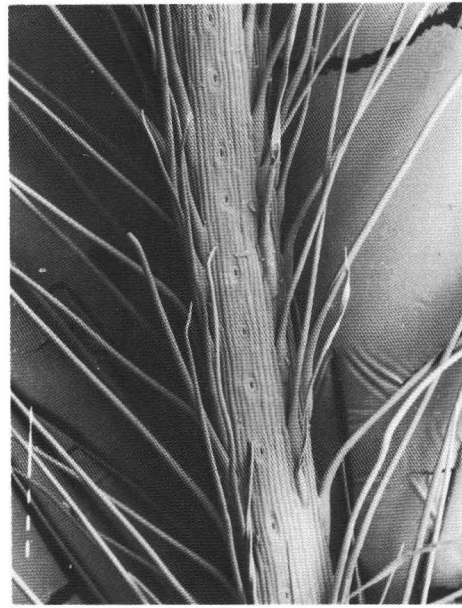
a.



b.



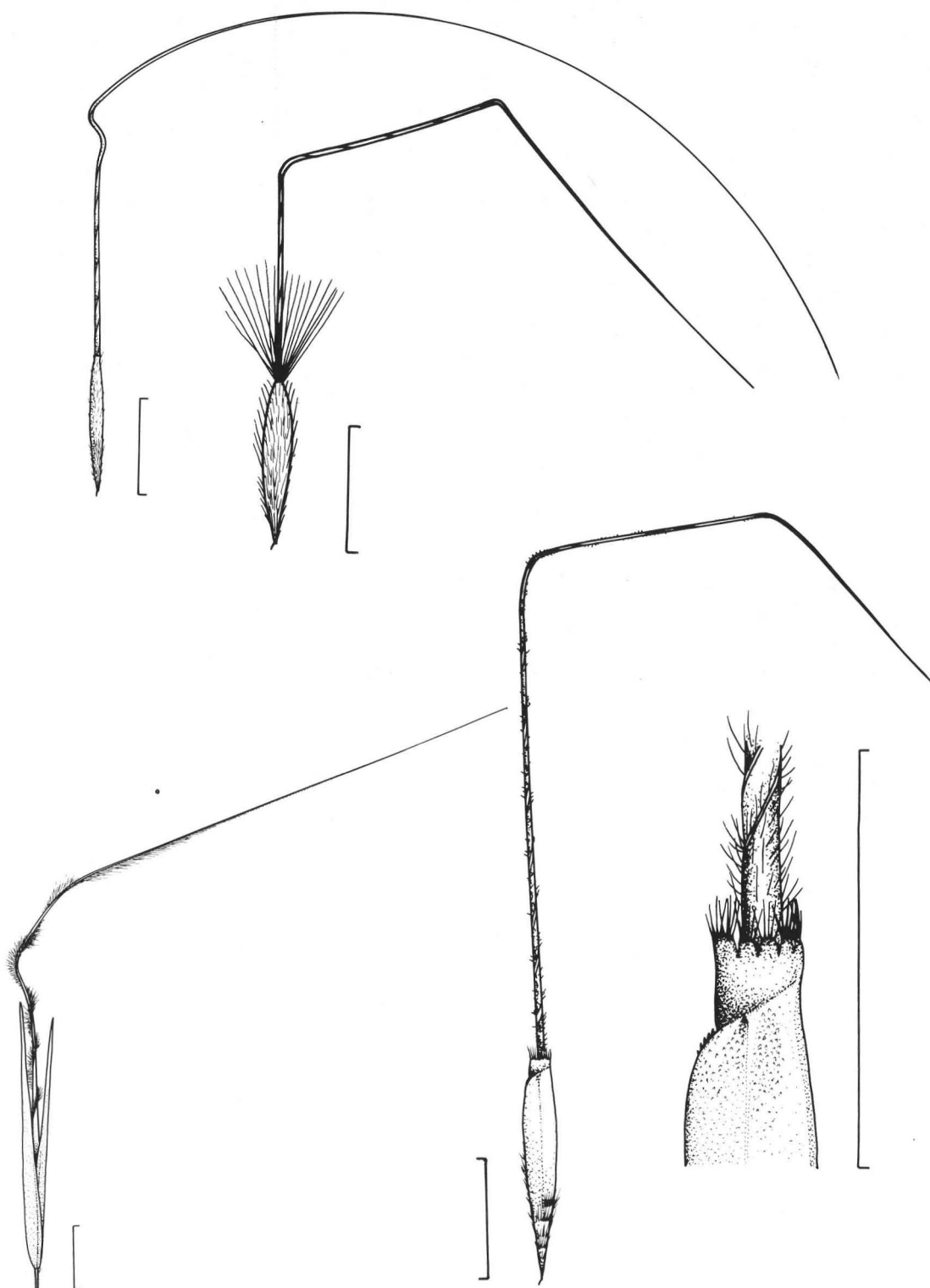
c.



d.

**Fig. 5 a.** The column hairs of *S. hemipogon* with the long hairs arising on one side of the column. Approx.  $\times 90$ . **b.** The column of *S. macalpinei* with very short hairs in lines up the column. Lower marker bar = 100  $\mu\text{m}$ , approx.  $\times 90$ . **c.** The column of *S. densiflora* with long hairs all around the circumference. Lower marker bar = 100  $\mu\text{m}$ , approx.  $\times 30$ . **d.** The bristle of *S. plumigera* with the hairs arising in two bands over the fibres, and a row of stomates over the chlorenchyma. Upper marker bar = 100  $\mu\text{m}$ , approx.  $\times 60$ .





1921) and could perhaps be interpreted as the last twist in the awn. This sickle-shape is more difficult to detect in pressed specimens than in the fresh state. In other species the bristle is more or less straight. Although mostly triangular in transection, the bristle may be laterally flattened; *S. platychaeta* is the extreme example here.

The hairs on the bristle are usually similar to, but shorter than, those of the column, the notable exception in Australia being the long hairs on the bristle of *S. plumigera* (Fig. 5d).

The anatomy of the awn is different from that in most other grasses (Duval-Jouve 1871; Zimmerman 1881; Murbach 1900) and, although there have been attempts to explain the twisting and untwisting motion, more work could be usefully done on the subject. The awn in transection consists mainly of thickened cells (fibres) with two lateral pockets of chlorenchyma. The chlorenchyma breaks down with age and, apparently, the awn does not twist until this breaking-down process has been initiated.

**Palea:** the palea varies from about one quarter the length of the lemma to being subequal. Although the relative length of the palea is a useful diagnostic character it is awkward to observe.

**Cleistogamy:** spikelets are either chasmogamous or cleistogamous. In the Australian species there are no externally visible differences between the two, but the cleistogamous spikelets usually have shorter stamens. Both types may be found scattered throughout a panicle and the relative proportion of each may vary quite considerably within a particular taxon, presumably indicating a strong environmental influence on the expression of either state. The expression of cleistogamy or chasmogamy is clearly a subject worthy of further study on a population basis.

**Stamens:** there are three stamens per floret and the main character of use is whether the stamens are penicillate or not (Fig. 2d).

**Lodicules:** lodicule number is usually quoted as three in the literature and this is true for most species, the major exception being those of the Falcateae which mostly have two lodicules. When the third (the adaxial or paleal) is present its size may vary, from minute to almost equalling the palea, between spikelets in the same panicle. Normally it is either less well developed than, or similar to, the two abaxial lodicules. All are membranous, glabrous and entire; their shapes vary from lanceolate to spatulate or almost long-cuneate.

**Ovary:** the only ovary characters recorded are those of the caryopsis and, where possible, include the length of the mature caryopsis and the relative length of both the hilum and the embryo.

**Fig. 6** (Reproduced from Wheeler, Jacobs & Norton (1982), *Grasses of New South Wales*, with permission of University of New England Press). **a.** The floret of *S. blackii* showing the long coma and a bigeniculate awn. **b.** The floret of *S. nodosa* showing the hairy lemma and falcate awn typical of the group 'Falcateae'. **c.** The floret and lemma apex of *S. neesiana* showing the corona and bigeniculate awn. **d.** A spikelet of *S. mollis* showing the long glumes and the awn with hairs along one side. Bar = 5 mm.

## References

- Bentham, G. (1878). 'Flora Australiensis'. Vol. 7: 564-571 (Lovell, Reeve & Co.: London).
- Duval-Jouve, J. (1871). Etude anatomique de l'arête des Graminées. *Mém. Sect. Sci. Acad. Sci. Montpellier* 8: 33-78.
- Everett, J. & Jacobs, S.W.L. (1983). Studies in Australian *Stipa* (Poaceae). *Telopea* 2(4): 391-400.
- Hughes, D.K. (1921). A revision of the Australian species of *Stipa*. *Kew Bull.* 1921: 1-30.
- Hughes, D.K. (1922). Further notes on the Australian species of *Stipa*. *Kew Bull.* 1922: 15-22.
- Murbach, L. (1900). Note on the mechanics of the seed-burying awns of *Stipa avenacea*. *Bot. Gaz.* 30 (2): 113-117.
- Townrow, J.E.S. (1978). The genus *Stipa* L. in Tasmania. Part 3—Revised taxonomy. *Pap. & Proc. Roy. Soc. Tasmania* 112: 227-287.
- Vickery, J.W. (1980). Four new species of *Stipa* (Poaceae). *Telopea* 2(1): 11-15.
- Wheeler, D.J., Jacobs, S.W.L. & Norton, B.E. (1982). 'Grasses of New South Wales'. (University of New England Press: Armidale.)
- Zimmerman, A. (1881). Ueber mechanische Einrichtungen zur Verbreitung der Samen und Früchte mit besonderer Berücksichtigung der Torsionserscheinungen. *Jahrb. Wissenschaftliche Botanik* 7: 542-577.

**Excluded species and names yet to be typified**

*Stipa appendiculata* Mez, Feddes Repert. Spec. Nov. Regni Veg. 19: 204 (1921). HOLOTYPE cited as 'Australien, ohne Angabe des Standorts und Sammlers (herb. Berl.)'. The specimen is not extant at B (nor in the Willdenow herbarium) and without evidence of either locality or collector we have not been able to trace this name.

*Stipa dielsii* Mez, Feddes Repert. Spec. Nov. Regni Veg. 17: 209 (1921). HOLOTYPE cited as 'Western Australia: Oldfield (Diels)'. The holotype was in B and is not extant there nor in the Willdenow herbarium. We have been unable as yet to find any specimen that could reasonably be regarded as a duplicate of the Type. The description is inadequate to determine the species being described, but could apply to *S. flavescens*.

*Stipa micrantha* Cav., Icon. 5: 42, fig. 467 (1799). HOLOTYPE: 'Habitat in Nova-Hollandia' (MA, not seen).

= *Dichelachne micrantha* (Cav.) Domin; see Veldkamp, Blumea 22: 9 (1974).

*Stipa pubescens* var. *tenuior* Reader, Victorian Naturalist 17: 156 (1901). HOLOTYPE cited as 'November, 1898. Desert, Lowan'. There are several specimens in MEL with this general locality information but none bears this name and we could find no other specimen in MEL bearing this name. The specimens belong to several different species of *Stipa* and the description is too inadequate to give any clues.

*Stipa striata* Link, Hort. Berol. 1: 98 (1827). HOLOTYPE cited as 'Hab. in Australia?'. The Type was in B and is not extant there nor in the Willdenow herbarium. The lack of collector information, reliable locality and adequate description makes this taxon indeterminable.

### *Stipa* L., Sp. Pl.: 78 (1753)

Caespitose or spreading, often rhizomatous perennials (rarely annuals). Leaves and branches either basal or cauline. Spikelets all alike, 1-flowered with the rhachilla not produced beyond the floret, hermaphrodite. Glumes persistent, hyaline to chartaceous, narrow, more or less keeled, to several cm long, usually acute or acuminate, less commonly mucicous or mucronate, 1–5 (–7)-nerved, equal or unequal, usually longer than the floret (excluding awn). Floret articulate above the glumes, many times longer than broad, cylindrical, fusiform, pyriform or turbinate, rarely slightly gibbous, with a long, oblique, bearded, usually pungent-pointed (or rarely short and obtuse) callus. Lemma coriaceous, indurated, with convolute or involute margins usually enclosing the palea and flower, 3–5 (–7)-nerved, tapering at the tip and often, though only minutely, 1- or 2-lobed, awned from the tip or between the lobes. Awn flexuose or once or twice geniculate, with a twisted column (when mature) and a straight or curved bristle, variously glabrous to plumose. Palea membranous, hyaline or somewhat indurated, 2-nerved or nerveless, subequal to or shorter than the lemma. Lodicules 3 or 2, membranous, glabrous, lanceolate to spatulate, non-vascular. Stamens 3, frequently penicillate. Ovary glabrous; styles 2, free; stigmas plumose, tips exerted. Caryopsis fusiform-terete, tightly enclosed by the lemma and palea; the embryo about 20–35% the length of the grain; the hilum linear, nearly as long as the grain.

A large genus with probably over 300 species, mostly in temperate regions.

Type species: *Stipa pennata* L. HOLOTYPE: 'In Austria, Gallia' (LINN, 94.1!; possible duplicate S).

The genus contains many species that are useful fodder grasses, not so much for their intrinsic nutritive value as because they provide reasonably palatable fodder in arid regions.

*Stipa tenacissima*, 'Esparto Grass', of southern Europe has a strong fibre that is an important raw material for the manufacture of paper.

The diaspores are often troublesome on account of their pungent callus and twisted awn (which is hygroscopic and helps the diaspore act like a corkscrew), and may penetrate the hides, eyes and mouth-parts of livestock, causing considerable discomfort to the animals and reducing the value of their meat.

Some species are of decorative value.

Australian species of *Stipa* grow in virtually all non-aquatic habitats in the winter-dominated rainfall zones with a few species growing in higher altitude or arid areas of the summer-dominated rainfall zones. The genus is absent from monsoonal areas.

#### Key 1

1. Summit of the lemma forming a cylindrical corona 0.5–2.5 mm long around the base of the awn ..... Group A
- 1\*. Summit of the lemma without a corona ..... 2
2. Panicle pyramidal when mature and spreading, with whorled branches, the branches and pedicels plumose with fine hairs mostly 0.5 mm long or longer ..... Group C
- 2\*. Panicle linear-cylindrical to ovate-cylindrical, the branches and pedicels glabrous, scabrous or pubescent with most hairs less than 0.3 mm long ..... 3



3. Culms branched ..... GroupD
- 3\*. Culms not branched ..... 4
4. Panicle reduced to 1–3 spikelets. Culms spreading and decumbent; leaf blades rudimentary (1 mm long) or deciduous ..... GroupK(*S. muelleri*)
- 4\*. Panicle with more than 8 spikelets. Culms erect or geniculate at the base; leaf blades longer than 20 mm (deciduous in *S. aphylla*) ..... 5
5. Lemma with acute, hairy lobes 1.5–3 mm long at the apex ..... GroupG
- 5\*. Lemma with lobes absent or less than 0.8 mm long ..... 6
6. Awn falcate, the bristle curved ..... GroupL
- 6\*. Awn bigeniculate or almost straight, the bristle straight ..... 7
7. Lemma with a coma of hairs at the apex ..... 18
- 7\*. Coma absent ..... 8
8. Column of the awn scabrous or puberulous with hairs less than 0.3 mm long ..... 12
- 8\*. Column of the awn pubescent to plumose with hairs more than 0.3 mm long ..... 9
9. Lemma glabrous except on the nerves, surface crystalline-tuberculate ..... GroupH  
(*S. oligostachya*)
- 9\*. Lemma pubescent overall, surface smooth or granular ..... 10
10. Foliage densely and shortly velvety overall, appearing bluish ..... GroupI(*S. velutina*)
- 10\*. Foliage glabrous, scabrous or pubescent ..... 11
11. Panicle not exerted above the basal leaves, sparse with less than 30 spikelets ..... GroupI  
(*S. centralis*)
- 11\*. Panicle exerted well above the basal leaves, with more than 30 spikelets ..... GroupJ
12. Ligule less than 3 mm long ..... 15
- 12\*. Ligule more than 3 mm long ..... 13
13. Awn less than 45 mm long. Leaf sheaths and blades usually very narrow ..... GroupH  
(*S. setacea*)
- 13\*. Awn 60–200 mm long. Leaf sheaths broad or narrow, blades moderately broad ..... 14
14. Bristle of the awn flattened, wider at its base than the column, curved. Lemma brown, 6 mm long or less (excluding awn) ..... GroupD(*S. platychaeta*)
- 14\*. Bristle of the awn terete to triangular in transection, narrower at the base than the column, straight. Lemma white, 6.5 mm long or more (excluding awn) ..... GroupF
15. Lemma glabrous for varying lengths below the apex, surface often tuberculate, especially at apex. Nerves of the glumes heavily overlaid with sclerenchyma forming strong ridges ..... GroupK
- 15\*. Lemma pubescent overall, hairs occasionally sparser at the apex, surface smooth or granular. Glume nerves visible but not raised noticeably above the glume surface ..... 16
16. Foliage densely and shortly velvety overall, appearing bluish ..... GroupI(*S. velutina*)
- 16\*. Foliage glabrous, scabrous or pubescent ..... 17
17. Panicle not exerted above the basal leaves, sparse with less than 30 spikelets ..... GroupI  
(*S. centralis*)
- 17\*. Panicle exerted well above the basal leaves, with more than 30 spikelets ..... GroupD
18. Lemma glabrous or almost so, surface smooth and shining ..... GroupE
- 18\*. Lemma pubescent, surface granular ..... 19

19. Awn 12–18 mm long; floret narrowly cylindrical tapering to form a neck at the apex. Glumes broadly acute ..... Group B (*S. caudata*)
- 19\*. Awn 20 mm long or more; if awn as short as 20–25 mm then floret broadly turbinate to oblong-cylindrical with no neck, or glumes linear and truncate ..... 20
20. Glumes acuminate, very broad and inflated around the floret, sharply narrowing at the tip. Floret broadly turbinate to oblong-cylindrical; callus sturdy and strongly curved or hooked, relatively short (usually 10–30% the length of the floret); awn relatively short (usually 4.5–6.5 (–8) times the length of the floret). Panicle expanded, usually with long branches ..... Group H
- 20\*. Glumes acute or narrowly acuminate, not inflated around the floret, tapering gradually to the tip. Floret linear-cylindrical to narrowly turbinate; callus fine or sturdy, straight, only the proximal naked tip bent, relatively long (usually 25–40% the length of the floret); awn often relatively long (usually (5–) 6–13 times the length of the floret). Panicle contracted or expanded, usually with short branches ..... Group I

**Group A:** Lemma with a corona. Palea less than half the lemma length.  
Introduced from South America.

1. Floret about 4 mm long, awn 35–40 mm long, column minutely scabrous with hairs less than 0.05 mm long ..... *S. hyalina*\*
- 1\*. Floret 5.5–10 mm long, awn 45–85 mm long, column scabrous or pubescent with hairs usually more than 0.2 mm long ..... 2
2. Corona 1.5–2.5 mm long with a firm basal part 0.5–1 mm long, upper part ciliate with thick hairs 1–1.5 mm long ..... *S. leucotricha*\*
- 2\*. Corona 0.5–1.5 mm long, with a firm basal part 0.5–1 mm long, upper part of spines 0.1–0.5 mm long ..... 3
3. Lower glume 8–10 mm long. Floret 5.5–6 mm long, coronal spines about 0.1 mm long ..... *S. megapotamia*\*
- 3\*. Lower glume 14–18 mm long. Floret 6–10 mm long, coronal spines about 0.5 mm long ..... *S. neesiana*\*

**Group B:** Cleistogenes present in the basal sheaths. Introduced from South America.

- One species ..... *S. caudata*\*

**Group C:** Panicle pyramidal with whorled branches. Palea less than half the lemma length.

1. Branches of the panicle plumose with hairs 1.5–2 mm long. Culms glabrous. Glumes pilose on the nerves, scabrous between the nerves ..... *S. elegantissima*
- 1\*. Branches of the panicle plumose with hairs about 0.5 mm long. Culms pubescent around the nodes. Glumes scabrous overall ..... *S. tuckeri*

**Group D:** Culms usually branched. Leaves with long ligules. Panicle large, sparse and spreading.

1. Callus 0.5 mm long or less, blunt. Palea 60% the length of the lemma or less ..... 4
- 1\*. Callus 0.5 mm long or more, sharp. Palea more than 60% the length of the lemma ..... 2
2. Lower glume 4–5.5 mm long. Floret 3–4 mm long ..... *S. nullarborensis*
- 2\*. Lower glume 6–15 mm long. Floret 4.5–6.5 mm long ..... 3
3. Bristle quite flattened, distinctly wider at its base than the column, strongly curved.  
Column scabrous ..... *S. platychaeta*
- 3\*. Bristle round-triangular in transection, as wide as or narrower at the base than the  
column, straight. Column pubescent ..... *S. acrociliata*
4. Culms sturdy, simply branched at the nodes. Lower glume more than 5 mm long ..... *S. breviglumis*
- 4\*. Culms cane-like with whorled branches at the nodes. Lower glume 5 mm long or less ..... 5
5. Lemma glabrous, 1.8–2.5 mm long ..... *S. ramosissima*
- 5\*. Lemma scattered with short white hairs, 2.7–4 mm long ..... *S. verticillata*

**Group E:** Lemma glabrous or almost so, the surface shining.

1. Lower glumes 19–26 mm long. Ligule 0.4–1.5 mm long ..... *S. lanata*
- 1\*. Lower glumes less than 18 mm long. At least some ligules more than 2 mm long ..... 2
2. Lower glume 14–18 mm long. Awn (8–) 9–12.5 cm long ..... *S. vickeryana*
- 2\*. Lower glume 9–11 mm long. Awn 5–7 cm long ..... *S. nullanulla*

**Group F:** Apparently annuals with very broad leaves. Lemma white with a long, almost straight awn.

1. Leaf sheaths covered with transparent, flattened and flexuose hairs although these  
sometimes visible only on lower sheaths ..... *S. macalpinei*
- 1\*. Leaf sheaths glabrous or minutely scaberulous ..... *S. compressa*

**Group G:** Lemma with long, acute lobes at the apex.

1. Panicle reduced to 1–3 spikelets. Culms spreading and decumbent ..... *S. muelleri*
- 1\*. Panicle with more than 8 spikelets. Culms caespitose and erect ..... 2
2. Ligule 0.1–1 mm long, truncate. Mature lemma with fulvous hairs ..... *S. petraea*
- 2\*. Ligule 2.5–10 mm long, obtuse. Mature lemma with white to slightly yellow hairs ..... 3
3. Lower glume 10–12 mm long. Floret 6.5–8 mm long; awn long with respect to floret,  
3–6 mm long. Panicle usually slightly expanded, 3.5–8.5 cm wide (excluding awns),  
sparse and open with longest branches 8–10 cm long ..... *S. juncifolia*
- 3\*. Lower glume (12–) 14–20 mm long. Floret 8–13 mm long; awn very short with  
respect to floret length, 2–4 mm long. Panicle contracted, 1–3.5 cm wide (excluding  
awns), condensed with longest branches up to 5 cm long ..... *S. stipoides*

**Group H:** Glumes very broad and inflated around the floret. Lemma with a coma and a short, strongly hooked callus. Panicle expanded with long branches.

1. Lemma glabrous except on the nerves, surface crystalline-tuberculate ..... *S. oligostachya*
- 1\*. Lemma with hairs overall, surface granular ..... 2
2. Ligule 2–8 mm long, usually more than 3.5 mm long. Palea with a deep adaxial central groove ..... 8
- 2\*. Ligule 2 mm long or less. Palea convex on the adaxial surface or only very slightly depressed between the nerves ..... 3
3. Coma 2–3 (–5) mm long. Foliage of the lower leaves pubescent or hirsute ..... *S. blackii*
- 3\*. Coma 2 mm long or less; if 2 mm then foliage of the lower leaves scabrous or glabrous, not noticeably pubescent ..... 4
4. Column of the awn long-pubescent with most hairs 0.5–1.5 mm long; awn 30–40 mm long. Nullarbor Plain ..... *S. dongicola*
- 4\*. Column of the awn scabrous or pubescent with hairs less than 0.5 mm long; if pubescent then awn more than 45 mm long ..... 5
5. Column of the awn pubescent with spreading hairs 0.25–0.5 mm long. Coma 0.5–1 mm long. Auricles with tufts of hairs 1 mm long ..... *S. curticoma*
- 5\*. Column of the awn scabrous with hairs less than 0.2 mm long. Coma 0.4–2 mm long; if less than 1.3 mm long then auricles glabrous ..... 6
6. Mature floret fusiform; callus 0.4–1 (–1.5) mm long, very short with respect to the floret ((5.8–) 6.5–8 mm long). Ligule 0.8–1.5 mm long ..... *S. aristiglumis*
- 6\*. Mature floret oblong-cylindrical; callus 1–2.5 mm long, long with respect to the floret (4.5–8.5 (–9.5) mm long). Ligule 0.3–0.5 mm long (not including auricles) ..... 7
7. Coma 0.8–1.3 mm long. Floret 4.5–6 mm long (excluding awn), gibbous with an eccentric awn; awn 25–35 (–50) mm long ..... *S. gibbosa*
- 7\*. Coma (1.2–) 1.4–2 mm long. Floret 6–8.5 (–9.5) mm long (excluding awn); awn centric, 30–60 mm long ..... *S. bigeniculata*
8. Floret 3–4.5 mm long, awn 12–18 mm long ..... *S. feresetacea*
- 8\*. Floret 5.5–7 mm long, awn 25–40 mm long ..... *S. setacea*

**Group I:** Glumes narrow, close around the floret. Lemma with a coma and a long, fine and straight callus. Panicle often contracted, with short branches.

1. Floret with a dense and obvious coma 2–3.5 mm long ..... 12
- 1\*. Floret with a coma 1.5 mm long or less, often obscure ..... 2
2. Leaves rigidly erect and pungent-pointed. Awn 90–110 mm long, the column 30–35 mm long ..... *S. echinata*
- 2\*. Leaves erect or flexuose, acute-tipped but not pungent. Awn 23–90 (–110) mm long, the column usually less than 30 mm long (but longer in *S. eremophila*) ..... 3

3. Entire awn plumose (including the bristle) with hairs 0.5–1 mm long ..... *S. plumigera*
- 3\*. Column of the awn scabrous, pubescent or villous, bristle scabrous or shortly pubescent with hairs less than 0.3 mm long ..... 4
4. Hairs on the lemma continued evenly to the apex, white or slightly fulvous at maturity. Floret linear-cylindrical to narrow-turbinate with no neck ..... 6
- 4\*. Hairs on the top 1–2 mm of the lemma abruptly shorter by about half than those on the lower part of the lemma, fulvous early in development. Floret broad turbinate to broad oblong-cylindrical with a neck ..... 5
5. Lower glume 8–12 mm long. Column of the awn scabrous with hairs 0.05–0.1 mm long ..... *S. puberula*
- 5\*. Lower glume 15–25 mm long. Column of the awn pubescent with hairs 0.2–0.4 mm long ..... *S. eremophila*
6. Foliage bluish, densely and shortly velvety overall ..... *S. velutina*
- 6\*. Foliage green, scabrous, pubescent or hirsute, the individual hairs discretely seen ..... 7
7. Panicle not exerted above the basal leaves ..... *S. centralis*
- 7\*. Panicle exerted well above the basal leaves ..... 8
8. Lower glume 15–23 mm long. Column of the awn villous with hairs 0.5–1 mm long. Leaf sheaths usually hirsute or pubescent especially near the base. Panicle 20–35 cm long ..... *S. stuposa*
- 8\*. Lower glume 17 mm long or less. Column of the awn scabrous, pubescent or villous; if villous then leaf sheaths scabrous or minutely puberulous and panicle up to 12 cm long ..... 9
9. Culms slender, up to 1 mm wide near the base. Panicle 6–18 mm long, sparse. Ligule 0.3–3 mm long, the abaxial surface glabrous or minutely puberulous ..... 11
- 9\*. Culms sturdy, (1.5–) 3–4 mm wide near the base. Panicle 15–40 mm long, dense. Ligule 0.3–0.7 mm long, the abaxial surface sericeous ..... 10
10. Lower glume 8.5–10 mm long. Callus 0.5–1.2 mm long. Awn 25–40 mm long ..... *S. multispiculis*
- 10\*. Lower glume 9–14 (–16) mm long. Callus 1.6–3 mm long. Awn (35–) 40–65 mm long ..... *S. flavescens*
11. Lower glume 8–10 mm long. Leaves pubescent, fine and flexuose ..... *S. exilis*
- 11\*. Lower glume 12–17 mm long. Leaves almost glabrous, sturdy and erect ..... *S. mundula*
12. Column of the awn villous with hairs 0.5–1 mm long ..... *S. stuposa*
- 12\*. Column of the awn scabrous or pubescent with hairs 0.3 mm long or less ..... 13
13. Coma spreading, formed from the spreading upper hairs of the lemma overlapping the base of the awn and hiding the awn/lemma junction. Awn 23–38 mm long, the column 7–12 mm long ..... *S. crinita*
- 13\*. Coma appressed, formed by hairs at the awn/lemma junction, the junction discernible. Awn 35–65 mm long, the column 15–25 mm long ..... 14
14. Lower glume 11–15 mm long. Lemma 5.5–6.5 mm long ..... *S. wakoolica*
- 14\*. Lower glume 16–20 mm long. Lemma 7–8.2 mm long ..... *S. metatoris*



**Group J:** Column of the awn plumose or long-pubescent. Lemma usually without a coma.

1. Distinct coma 1–3 mm long present at the apex of the lemma in addition to the hairs on the column ..... *S. stuposa*
- 1\*. No coma present ..... 2
2. Column hairs 0.3–1 mm long, spreading, evenly distributed around the column and therefore not appearing to spiral ..... 4
- 2\*. Column hairs 1–4 mm long, slightly appressed, distributed mainly along the ribs and thereby appearing to spiral with the spiralling column ..... 3
- 3<sup>i</sup>. Upper glume 9–10 mm long, floret 3.5–5 mm long. Central Australian Ranges ..... *S. aquarii*
- 3<sup>ii</sup>. Upper glume 10–15 mm long, floret 5–7 mm long ..... *S. hemipogon*
- 3<sup>iii</sup>. Upper glume 15–20 mm long, floret 7.5–8.5 mm long ..... *S. mollis*
4. Glumes glabrous except on the nerves. Awn 70–90 mm long. Leaves scabrous or glabrous ..... *S. semibarbata*
- 4\*. Glumes pubescent. Awn less than 60 mm long. Leaves hirsute ..... 5
5. Floret 8–9 mm long, awn 50–70 mm long ..... *S. campylachne*
- 5\*. Floret 5.5–7 mm long, awn 35–45 mm long ..... *S. densiflora*

**Group K:** Lemma glabrous for varying lengths below the apex, the surface rough. Glumes strongly ridged.

1. Lemma glabrous except on the nerves, strongly crystalline-tuberculate overall, pale until advanced in maturity ..... *S. oligostachya*
- 1\*. Lemma with hairs not restricted to the nerves, tuberculate mainly towards the apex, light brown early in maturity ..... 2
2. Culms spreading and decumbent. Leaf blades 1 mm long or deciduous. Panicle reduced to 1–3 spikelets ..... *S. muelleri*
- 2\*. Culms caespitose and erect or geniculate. Leaf blades more than 20 mm long (deciduous in *S. aphylla*). Panicle of more than 8 spikelets ..... 3
3. Spikelets 8–12 per panicle. Column of the awn 55–70 mm long. Subalpine grass ..... *S. nivicola*
- 3\*. Spikelets more than 12 per panicle. Column of the awn less than 55 mm long ..... 4
4. Almost all blades deciduous before flowering. Glumes tapering to a fine acuminate or dentate tip ..... *S. aphylla*
- 4\*. Blades not deciduous. Glumes truncate, broadly acute or obtuse ..... 5
5. Lower glume 15 mm long or less ..... *S. rudis*
- 5\*. Lower glume 17 mm long or more ..... 6
6. Ligule truncate, 0.4–1 mm long. Glumes truncate. Lemma surface strongly tuberculate at the apex. Palea 50–70% the length of the lemma, obtuse ..... *S. pubescens*
- 6\*. Ligule obtuse, 1–3 mm long. Glume tips broadly obtuse and membranous. Lemma surface granular. Palea equal in length to the lemma, acute ..... *S. pubinodis*

**Group L: Awn falcate. Lemma narrow and needle-like.**

1. Inflorescence short, very dense and spike-like, to 14 cm long, 1 cm wide (excluding awns). Ligule 3–7 mm long. Shoots extravaginal from a short rhizome ..... *S. pycnostachya*
- 1\*. Inflorescence to 55 cm long, variably contracted or expanded but not spike-like. Ligule usually less than 3 mm long (occasionally to 4 mm in *S. scabra*). Shoots intravaginal or extravaginal but with no rhizome ..... 2
2. Awns long-pubescent or plumose with spreading hairs, most of which are 0.25–0.8 (–1.5) mm long ..... 5
- 2\*. Awns scabrous or puberulous with appressed hairs, most of which are 0.2 mm long or less ..... 3
3. Leaves very fine: sheaths 2–5 mm wide; blades 0.6–1.2 mm wide, inrolled, usually flexuose ..... 4
- 3\*. Leaves coarse: sheaths (3–) 4.5–9 mm wide; blades 1–3 mm wide, inrolled and erect or expanded and flexuose ..... 5
4. Leaf sheaths softly pilose; blades with dense, long ( $\geq 0.5$  mm) spreading hairs ..... *S. trichophylla*
- 4\*. Leaf sheaths glabrous, scabrous or puberulous; blades glabrous, scabrous or shortly pubescent with most hairs less than 0.5 mm long ..... *S. scabra*
5. Panicle contracted, usually dense. Innovations mostly intravaginal. Nodes mostly concealed by the sheaths ..... *S. nitida*
- 5\*. Panicle spreading, usually sparse. Innovations mostly extravaginal. Nodes exerted and conspicuous ..... *S. nodosa*
6. Spikelet small in most parts: lower glume 8–14 mm long, upper glume 6–12.5 mm long; floret 4–6.5 (–7) mm long; awn 38–90 mm long, delicate (0.2–0.3 (–0.4) mm wide near the base), gently falcate ..... 8
- 6\*. Spikelet large in most parts: lower glume 14–20 mm long, upper glume 11.5–18 mm long; floret 7–8 mm long; awn 70–100 mm long, sturdy (0.3–0.4 mm wide near the base), very strongly falcate ..... 7
7. Auricles glabrous or with few short hairs ..... *S. blakei*
- 7\*. Auricles hirsute with a dense line of long white hairs ..... *S. tenuifolia*
8. Leaf blades broad, 2–6 mm wide (0.8–2 mm diameter if inrolled), erect ..... 9
- 8\*. Leaf blades fine (0.3–0.6 mm diameter, usually inrolled), usually slightly flexuose ..... 10
9. Leaves pungent, sheaths narrow and tightly enveloping the culm. Nodes exerted. Panicle contracted. Awn 40–50 mm long ..... *S. pilata*
- 9\*. Leaves acute but not pungent, sheaths broad and loose around the culm. Nodes rarely exerted. Panicle expanded. Awn (40–) 60–90 mm long ..... *S. drummondii*
10. Leaf blades densely hirsute. Column of the awn to 10 mm long. Glumes unequal ..... *S. trichophylla*
- 10\*. Leaf blades mostly glabrous or scabrous (occasionally the very basal blades hirsute). Column of the awn 11–14 mm long. Glumes subequal ..... *S. variabilis*

## Key 2, Multiple-entry

## Part 1: Species with straight or geniculate awns

sc. = scabrous

Taxon	Species group(s)	Upper glume mm	Lower glume mm	Floret mm	Lemna lobe(s) mm	Lemna coma (or Corona*) mm	Column length mm	Awn hairs mm	Awn length mm	Other distinguishing features
leucotricha	A	10-16	10-17	6.5-9	—	1.5-2.5*	20-30	<0.8	50-60	corona
megapotaia	A	9-9.5	8-10	5.5-6	0.1-0.2	0.6-0.8*	30	0.1-0.5	50	corona
neesiana	A	10-18	14-18	6-10	—	1.5*	25-55	0.1-0.5	45-85	corona
caudata	B	6-9.5	6-9	4-6	0.3-0.4	0.2-1	6-9	<0.2	12-18	
hyalina	A	7-8	9	4	—	0.7*	15	sc.	35-40	corona
ramosissima	C	2.4-2.8	2.3-4	1.8-2.5	—	—	4-7	sc.	14-30	cane-like stems, whorled branches
verticillata	C	3-5	3-5	2.7-4	—	—	7-30	0.05-0.1	33-53	cane-like stems, whorled branches
breviglumis	C	4.5-6	5.5-6.5	3-4.5	—	0.2	10-15	sc.	20-35	
nullarborensis	C	4-5.5	4-5.5	3-4	0.1	—	6-13	0.1	14-30	
acrociolata	C	5-7	6-10	4.5-6.5	0.2-0.5	0.3-0.6	12-17	0.2-0.5	30-90	ligule 3-6 mm
platychaeta	C	6-12	7.5-15	4.5-6	0.1-0.2	—	10-15	<0.2	60-90	flattened bristle
elegantissima	C	7-11	7-12	4.5-10	0-0.8	—	8-20	0.1-0.2	20-50	long-hairy (1.5-3 mm) pedicels and branches
tuckeri	C	5-9	6-9	4-5	—	0.1-0.25	10	0.05-0.1	30-35	pedicels and branches hairy (0.3-0.6 mm)
compressa	E	9-14	13-21	6.5-8.5	0.25	—	20-40	0.05-0.2	80-140	± annual
macalpinci	E	8-14	13-22	7-8	0.1-0.4	—	14-40	0.05	60-200	± annual
vickeryana	E	9-14	14-18	6-7	—	1-1.5	26-32	0.2-0.3	80-125	lemma ± glabrous
nullanulla	E	8-10	9-11	5-6	—	1-1.5	18-25	0.2	50-70	lemma ± glabrous
lanata	E	14-19	19-26	6.5-8	—	1.5	22-30	0.3	65-80	lemma glabrous, palea exposed
eremophila	I	10-18	15-25	6-9.5	0.2-0.75	0.4-0.7	15-38	0.2-0.5	50-110	lemma apex appearing shorn or glabrous
plumigera	I	12-15	18-23	7.5-8.5	<0.1	0.5-0.8	20-26	0.5-1	70-110	bristle with hairs 1 mm long
metatoris	I	12-15	16-20	7-8	0.2-0.5	2.5-3.5	20-25	0.2-0.3	55-65	
puberula	I	6-12	8-14	4-6.5	<0.1	0.4-0.7	15-20	0.05-0.1	25-65	lemma apex appearing shorn or glabrous
wakoolica	I	9-11	11-15	5.5-6.5	<0.2	2-2.5	15-25	<0.15	35-60	
centralis	I	12-16	13-18	7-9	0-0.3	0-0.3	19-25	0.25-0.4	50-60	Central Australian ranges
mundula	I	8-14	12-17	6.5-8	0.1-0.5	0.5-1.5	22-30	0.35-0.7	50-80	blades ± smooth and glabrous
exilis	I	7-8	8-12	4.5-5.5	0-0.25	0.6-0.8	15-21	0.2	35-55	blades and sheaths hairy
petraea	G	11-13	11-15	7-9.5	1.5-2.5	2.5	20-25	0.3	40-55	lemma with orange hairs; S.A. gorges
juncifolia	G	9-10	10-12	6.5-9	2-2.5	2-2.5	10-20	0.1-0.2	25-50	
stipoides	G	12-18	12-20	8-13	0.5-3	<3.5	10-15	0.05-0.25	20-40	blades pungent; coastal
oligostachya	H, K	10-15	11-17	7-9	0.1-0.6	—	18-25	0.25-0.8	55-70	lemma glistening, ± glabrous upwards
aristiglumis	H	6-12	8-14	4-7.5	—	0.4-1.5	10-17	0.1-0.2	25-40	very short callus (0.4-1.5 mm)
curticoma	H	9-14	12-18	5.8-8	0.1-0.5	0.5-1	18-25	0.25-0.5	45-65	
gibbosa	H	8-13	11-17	4.5-6	—	0.8-1.3	12-20	<0.2	25-50	
bigeniculata	H	9-15	12-20	6-9.5	—	1.2-2	12-26	<0.2	30-60	
blackii	H	8-15	10-20	5-8	—	2-5	13-20	<0.1	28-50	blades and sheaths hairy
dongicola	H	8-11	7-12	5-6.5	—	0.7	15	0.5-1.5	30-40	
setacea	H	7-10	9-16	5.5-7	—	0.8	10-15	<0.1	25-40	furrow on palea, ligule 2-9 mm
feresetacea	H	4-6	4-7	3-4.5	—	0.2-0.9	7-10	<0.1	12-18	furrow on palea, ligule 3.5-8 mm
echinata	I	14-18	21-23	8-10	0.2-0.7	0.6-1.2	30-35	0.2-0.8	90-110	blades pungent
flavescens	I	9-14	9-16	5.5-9	0.1-0.5	0.3-1.2	18-30	0.2-0.4	40-70	mainly coastal
crinita	I	7.5-11.5	9-15	5-6.5	—	2	7-12	<0.1	23-38	W.A. west coast
velutina	I	6.5-10	9-12	5-6.5	0.1-0.2	0.1-0.5	10-25	0.1-0.3	30-45	blades and sheaths velvety-hairy; Great Australian Bight
multispiculis	I	6.5-9	8.5-10	4.5-6	0.1	0.2-0.8	15-20	0.25-0.5	25-40	
densiflora	J	12-16	13-18	5.5-7	—	—	13-20	0.5-1	35-45	glumes hairy
stuposa	I, J	12-19	15-23	7-12	0.1-0.2	1-3	20-25	0.5-1	45-70	

Taxon	Species group(s)	Upper glume mm	Lower glume mm	Floret mm	Lemma lobe(s) mm	Lemma coma (or Corona*) mm	Column length mm	Awn hairs mm	Awn length mm	Other distinguishing features
mollis	J	15-20	16-20	7.5-9	—	—	20-35	0.6-2	60-100	column hairs in a spiral
hemipogon	J	10-16	15-20	5-7.5	—	—	10-20	0.5-4	30-60	column hairs in a spiral
aquarii	J	9-10	10-12	3.5-5	—	—	10-15	0.8-1.3	40-50	column hairs in a spiral; Central Australian ranges
semibarbata	J	15-25	18-27	9-11.5	—	—	30-40	0.3-1	70-110	blades and sheaths scabrous
campylachne	J	14-18	15-23	8-9	—	—	30	0.3-1.6	50-70	blades and sheaths pubescent to hirsute
muelleri	G, K	15-30	18-30	13-20	3	—	40-55	0.02-0.2	50-100	scrambler, few-flowered
nivicola	K	15-20	20-25	12-15	—	—	55-70	0.05-0.5	85-130	inflorescence alpine and subalpine areas
aphylla	K	14	16	8.5-10	0.5	0.4-0.8	35-50	0.1-0.25	60-85	blades deciduous
pubinodis	K	15-20	18-29	10-13	—	—	30-60	0.1-0.2	55-95	palea full-length, acute
pubescens	K	15-20	17-24	9.5-15	—	—	45-70	0.05-0.15	60-100	palea short, obtuse
rudis	K									
ssp. rudis		9-12.5	10-15	7.2-10	0.05-0.25	—	20-25	0.05-0.3	35-65	lemma apex tuberculate above
ssp. nervosa		7-10	8-12	5-8.5	0.05-0.25	<1	8-20	0.05-0.3	20-45	lemma apex tuberculate above
ssp. australis		11-14.5	12-15	8.6-11.5	—	—	32-45	0.05-0.3	60-90	lemma apex tuberculate above

## Part 2: Species with falcate awns

Taxon	Species group(s)	Upper glume mm	Lower glume mm	Floret mm	Lemma lobe(s) mm	Lemma coma (or Corona*) mm	Column length mm	Awn hairs mm	Awn length mm	Other distinguishing features
pycnostachya	L	10-14	11-15	4-6	<0.2	—	8-15	0.05	35-50	short, dense inflorescence, ligule 3-7 mm
drummondii	L	6-11	7-12	4-7	0-0.2	0-0.5	11-21	0.3-1.5	40-90	blades and sheaths broad, hairy
nitida	L	8-13	8-13	4-6	<0.15	0.2-0.8	10-13	0.1-0.3	45-70	mostly intravaginal, infl. ± contracted
nodosa	L	7-14	10-15	4-7	0.1-0.4	0.4-1	7-15	<0.4	45-100	mostly extravaginal, nodes prominent, infl. open
scabra	L									
ssp. scabra		6-13	8-15	4-6.5	0.2-0.5	0.1-0.6	5.5-15	0.1-0.2	30-70	ligules long, leaves fine, infl. contracted
ssp. falcata		8-13	10-15	4-6.5	0.2-0.5	0.1-0.6	5.5-15	0.1-0.2	55-65	ligules short, leaves fine, infl. open
trichophylla	L	8-11.5	9.5-14	3.8-6.5	<0.3	<1.5	6-10	0.15-0.4	38-75	leaves fine, hairy
pilata	L	7-9	8-10	4-5	—	1	7-11	0.2-0.5	40-50	blades pungent, hairy
variabilis	L	8.5-12.5	10-15	4.5-7	<0.25	<1	11-14	0.2-0.5	50-90	
tenuifolia	L	12-18	13-20	7-9	<0.4	1.5	11-20	0.2-0.6	70-120	auricles hairy, W.A. and S.A.
blakei	L	13-17	14-18	7-8	0.1-0.2	—	9-13	0.2-0.3	70-100	auricles ± glabrous, Qld.





***Stipa acrociliata*** Reader, Victorian Naturalist 13: 167 (1897), *ibid.* 15: 145 (1899); Hughes, Kew Bull. 1921: 28 (1921), *ibid.* 1922: 19 (1922); Black, Fl. S. Austral. 1: 65 (1922), edn 2: 91 (1943); Ewart, Fl. Victoria: 182 (1931); Gardner, Fl. W. Austral. 1, Gram.: 178 (1952); Vickery, Contrib. N.S.W. Natl. Herb. 2: 78 (1953); Willis, Handb. Pl. Victoria 1: 183 (1962), edn 2: 183 (1970).

HOLOTYPE: VICTORIA: Sandy desert, Lowan Shire, *F. Reader*, 1895 (MEL 59867!; apparent isotypes MEL 59869 with panicle, 59868 foliage only).

SYNONYM: *S. readeri* F. Muell. ex Reader, Victorian Naturalist 13: 168 (1897), in syn.

Shortly rhizomatous or caespitose perennial to 1.5 metres high, often with several branches at the nodes, with or without a basal tuft of leaves to about one third the height. Culms erect or slightly geniculate at the base, to 3 mm wide, scarcely compressible, moderately to strongly ribbed, glabrous or just below the nodes very shortly puberulous; nodes 2–3, exserted, glabrous, to 50% wider than adjacent internodes. Leaf sheaths usually inflated, to 10 mm wide, strongly to moderately ribbed, glabrous to scaberulous with minute stiff hairs or pubescent; margins glabrous. Ligule truncate, obtuse, or laciniate, membranous, 2.5–6 mm long, glabrous; auricles thickened, 1–2 mm long, glabrous. Leaf blade expanded or loosely inrolled, 3–10 mm wide, to 40 cm long; abaxial surface strongly ribbed, glabrous to scaberulous with minute stiff hairs; adaxial surface strongly ribbed, glabrous to scaberulous with minute stiff hairs; margins glabrous. Panicle to 50 cm long, expanded, 4–12 cm wide (excluding awns), exserted, with distant fascicles of unequal few-flowered branches; branches 4.5–10 cm long, slightly angular, scabrous along the edges; pedicels 1–10 mm long, angular, minutely scabrous along the edges. Spikelets 6–10 mm long (excluding awn), gaping. Glumes unequal, green, straw-coloured or purplish, scabrous on the nerves; lower glume 6–10 mm long, acuminate to acute, often ciliate at the tip, lower 40–50% 3-nerved; upper glume 5–7 mm long, obtuse to broadly acute, usually ciliate at the tip, the lower 30–50% 5-nerved, the next 20–40% 3-nerved. Floret elliptical, with no definite neck, 4.5–5.5 (–6.5) mm long (including callus). Lemma surface brown and finely tuberculate with erect, spreading white hairs up to the apex; lobes 2, 0.2–0.5 mm long, or absent; coma obscure, 0.3–0.6 mm long. Callus 1.0–1.5 mm long, fine and straight, the tip sharp. Awn 3–7 (–9) cm long with 1–2 slight bend(s), 0.1–0.2 mm wide near the base; column 12–17 mm long, 6–10 mm to the first bend, pubescent with hairs 0.2–0.5 mm long; bristle occasionally slightly curved, scaberulous, often darker than the column. Palea equal in length to the lemma, acute, densely pubescent down the centre, glabrous on the margin; apex ciliate. Lodicules 2, abaxial, membranous, 1–1.7 mm long, obtuse. Anthers 1.5–1.8 mm long, not or minutely penicillate. Caryopsis 3–3.5 mm long; embryo 20–25% the length; hilum 60–65% the length.

DISTRIBUTION: Sandy areas of the western plains of New South Wales and Victoria; arid areas of South Australia and on limestone of the Nullarbor Plain.

SELECTED SPECIMENS: NEW SOUTH WALES: **North Western Plains:** West Bogan–Nyngan, *Buchee* NSW 116147, 26.11.1934 (NSW). **South Far Western Plains:** 7 km N. of highway on Arumpo road E. of Euston, *Cunningham 4022 & Milthorpe*, 13.10.1975 (NSW); 60 miles [96 km] N. of Balranald, *Leigh* NSW 116146, 20.10.1964 (NSW); 20 km W. of Balranald, *Mulham* NSW 116674, 11.1974 (NSW).

VICTORIA: **Region A:** Red Cliffs, *Henshall*, 16.3.1969 (NT 43331). **Region B:** Timberoo Forest Reserve, 10 miles [16 km] SW. of Ouyen, *Beaughtole 40396*, 19.9.1972 (NSW, MEL); 4 miles [6 km] N. of Tempy, *Henshall* NSW 116675, 20.9.1969 (NSW); Wyperfeld National Park, W. of Moorong Rise, *Beaughtole 29519 & Finck*, 12.11.1968 (NSW, MEL). **Region C:** Little Desert, *Reader* 18.11.1896 (MEL 59871, AD); Lowanshire, *no collector*, 1895 (MEL 59874). **Region F:**

Annuello, c. 23 km NNW. of Manangatang, *Beaughtole* 55841, 29.4.1977 (MEL). **Region G:** 5 km SW. of Chinkapook, c. 18 km S. of Manangatang, *Beaughtole* 55495, 17.4.1977 (MEL); 5 km W. of Gama, *Beaughtole* 56907, 22.10.1977 (MEL, NSW).

**SOUTH AUSTRALIA:** **Nullarbor:** 3 miles [5 km] inland from the cliff tops at 'Koonalda' Station, *Symon* 4589, 17.2.1967 (ADW, CANB); 9 km W. of Yalata, *Beaughtole* 49510, 31.8.1974 (CANB); WA/SA border on Eyre Highway, *Phillips CBG* 005337, 8.9.1962 (CBG). **Eyre Peninsula:** 'Colona' Homestead, *Willis*, 27.2.1947 (MEL 60866); c. 15 km W. of Nundroo, *Spooner* 2189, 1.9.1972 (AD); Bookabie Mallee, *Hilton*, 21.8.1955 (ADW 19784, 20593); Wirrulla to Penong Road, *Cleland*, 17.9.1957 (AD); Ceduna, *Canning CBG* 039220, 1.9.1968 (CBG, NSW); 8 miles [13 km] from Streaky Bay towards Ceduna, *Phillips NSW* 116144, 30.8.1968 (CBG, NSW); 63 miles [100 km] from Port Lincoln towards Whyalla, *Phillips CBG* 054383, 3.9.1962 (CBG); 40 km NW. of Kimba, *Rohrlach* 685, 18.10.1959 (AD); 12 miles [19 km] E. of Kimba, *Cleland*, 14.10.1953 (AD); Mangaroo area, *Turner NSW* 116150, 12.1954 (NSW, ADW); between Lock and Cleve, *French*, 9.1954 (ADW 28158); Hambridge Reserve, NW. & NNW. from Prominent Hill, *Symon* 4180, 8.10.1966 (ADW); Verran Hill, Hincks National Park, *Alcock* 2176, 6.10.1968 (AD); Yeelanna, 10 miles [16 km] N. of Cummins, *Hilton*, 20.12.1945 (ADW 43830); Boston I. near Port Lincoln, *Wilson* 303, 8.10.1958 (AD). **Northern Lofty:** Halbury, *Cleland*, 31.8.1963 (AD); Owen, c. 35 km E. of Port Wakefield, *Cleland*, 16.11.1955 (AD). **Murray:** Waikerie, *Cleland*, 29.8.1946 (AD); c. 13 km SW. of Waikerie, *Crisp* 630, 7.10.1973 (CBG); Monarto City Centre, *Symon* 9751, 3.12.1974 (NSW, ADW); Karoonda (Trans-Murray Scrub), *Black*, 12.11.1915 (MEL 60928); Naturi near Victorian border, *Black*, 15.10.1925 (AD). **Yorke Peninsula:** 10 miles [16 km] from Edithburgh towards Moorowie Point, *Phillips* 1247, 3.10.1965 (CBG). **Southern Lofty:** between Reeves Plains & Kangaroo Flat, *Harris* 33, 1.10.1959 (AD); Roseworthy Agricultural College, *Symon*, 1946 (ADW 25095); Hindmarsh I., Goolwa, *Hilton*, 10.10.1945 (ADW 43829); Hundred of Wiltunga, *Copley* 276, 12.5.1966 (NSW). **South-eastern:** 10 miles [16 km] E. of Mannum, *Blake* 16843, 24.8.1946 (BRI); near Goolwa, 11 miles [17 km] ENE. of Victor Harbour, *Hilton*, 23.11.1935 (ADW 43828); Cape Jervis, *Carroll* 1386, 6.10.1965 (CBG); 4 miles [6 km] E. of Tintinara, 63 miles [100 km] SE. of Tailm Bend, *Hilton* (ADW 44075); Tintinara, *Phillips CBG* 037668, 21.10.1966 (CBG, AD).

**WESTERN AUSTRALIA:** **Eucla:** c. 5 km E. of Eucla Pass, *Parsons* 30, 26.11.1967 (AD); Mundrabilla Station, *Aplin* 1701, 2.9.1962 (PERTH); Eyre Highway, 8 miles [13 km] W. of Madura Pass, *George* 10573, 16.10.1966 (PERTH); 46 km WSW. of Madura, *Beaughtole* 49402, 30.8.1974 (CANB); 27 km W. of Madura Hotel, Eyre Highway, *Chinnock* 1176, 20.9.1973 (AD); Twilight Cove, Great Australian Bight, *George* 8568, 16.10.1966 (PERTH). **Coolgardie:** Westonia, *Moffat*, 10.1924 (PERTH); 14 miles [22 km] N. of Norseman on Coolgardie road, *Beaughtole* 11343, 21.9.1965 (CANB, PERTH); 7 km NNE. of Norseman, *Crisp* 5950, 19.7.1979 (CBG); c. 160 km E. of Balladonia, *Jackson* 1469, 24.10.1968 (PERTH); 32 miles [51 km] E. of Balladonia, *Main*, 29.8.1955 (PERTH). **Darling:** Perth district, *per Dept. Agric. W.A., NSW* 116149, 10.1907 (NSW). **Eyre:** 1.5 km N. of Baanga Hill, *Saffrey* 448, 11.8.1968 (PERTH); Israelite Bay, *Jackson* 1306, 1.10.1968 (PERTH); Lovers Cove, Esperance, *Cleland*, 11.10.1950 (AD); East Barren Range, 4 miles [6 km] W. of Hopetoun, *Beaughtole* 13343, 21.9.1965 (CANB; PERTH); between Esperance Bay & Frasers Range, *Dempster*, 1876 (MEL 60927); Fitzgerald River National Park, *George* 10573, 19.12.1970 (PERTH).

***Stipa aphylla* (Rodway) Townrow**, Pap. & Proc. Roy. Soc. Tasmania 104: 85, 96 (1970), *ibid.* 112: 232, 235 (1978). Based on *S. pubescens* var. *aphylla* Rodway, Tasmanian Fl.: 262 (1903).

**TIPIFICATION:** Rodway cites 'Dry hills in Southern Tasmania' without specifying a particular locality. Townrow (on p. 96) provides an amended description in Latin and English and singles out a 'Syntype': 'Huron Road (Hobart), Rodway, November 1897, Sheet No. 995, Rodway Collection' (HO, not seen) which we here designate as **Lectotype**, as doubtless was intended by Townrow.

Caespitose perennial to 0.5–0.6 metres high, shortly rhizomatous without a basal tuft of leaves. Culms erect, 1–2 mm wide near the base, not compressible, very slightly to moderately ribbed, scabrous with minute tubercles; nodes 3–4, exserted, sericeous with hairs 0.2–0.4 mm long, c. 25% wider than the adjacent internodes. Leaf sheath margins glabrous; basal sheath tightly enveloping the culm, 4–8 mm wide, moderately ribbed, scabrous with minute tubercles, sometimes also with hairs; upper sheath slightly inflated, 3.5–4 mm wide,

strongly ribbed, glabrous. Ligule membranous, 0.25–0.4 mm long, with 2–3 obtuse lobes, glabrous; auricles absent. Leaf blade linear, stiff, loosely rolled, c. 1.5 mm wide, 2–3.5 cm long, withering before flowering; abaxial surface glabrous to scabrous with minute tubercles, weakly to strongly ribbed; adaxial surface pubescent with hairs 0.1–0.3 mm long, strongly ribbed. Panicle sparse, c. 11 (–25) cm long, exserted, with distant fascicles of unequal, few-flowered, compound branches, c. 2 cm wide (excluding awns); axis terete, scabrous with minute hairs and tubercles; branches c. 6 cm long, slightly angled, scabrous with hairs 0.05 mm long; pedicels 0.5–1.5 cm long, angled, scabrous with hairs 0.1–0.5 (–1) mm long. Spikelets 16 mm long, gaping. Glumes subequal, acute to acuminate, hyaline with chlorenchyma bands associated with the nerves; lower glume 16 mm long, scabrous with hairs 0.05 (–1) mm long, lower 25% 3-nerved; upper glume c. 14 mm long, scabrous with hairs c. 0.05 mm long, lower 50% 5-nerved, upper 50% 4–1-nerved. Floret cylindrical, without a neck, 8.5–10 mm long. Lemma surface scabrous, sericeous with hairs 0.3–0.6 mm long; coma 0.4–0.8 mm long; lobes c. 0.5 mm long or absent. Callus (1.5–) 2 mm long, weakly bent at the tip, sericeous with dense white hairs 0.2–1 mm long, tip glabrous. Awn 6–8.5 cm long, twice bent, 0.25–0.4 mm wide near the base; column 3.5–5 cm long, 2.5–3.5 cm to the first bend, straw-coloured, pubescent with hairs 0.1–0.25 mm long; bristle straw-coloured, scabrous with hairs 0.05–0.15 mm long. Palea sub-equal to the lemma, obtuse or often erose, surface smooth, sericeous along the centre back with hairs c. 0.5 mm long, margins glabrous. Lodicules 3; 2 abaxial, 1–1.5 mm long, obtuse, brown, brittle; paleal c. 1 mm long, acute, white. Anthers 3.5–5 mm long, penicillate. Caryopsis not seen.

DISTRIBUTION: South-eastern Tasmania.

SELECTED SPECIMENS: TASMANIA: 2 miles [3 km] N. of Bicheno, *Townrow*, 13.1.1965 (MEL 58875); Copping, *Blake 18277*, 15.1.1949 (BRI, NSW); near Hobart, common on dry hills, *Rodway*, 2.1894 (MEL); University of Tasmania, Hobart, *Townrow 77*, 29.11.1967 (JEST); Ferntree, Lower Pipe track, *Townrow 7.3.1965* (JEST); Kingston, *Rodway NSW 116237* 1.1893 (NSW); Huonville, *Martin*, n.d. (CANB 13186); Barnes Bay, Bruny Is, *Townrow 147*, 1.2.1968 (JEST); S. Tasmania, *Rodway*, 1894 (MEL 60850).

*S. aphylla* is superficially similar to *S. muelleri*, especially because of the reduction and deciduous nature of the leaf blades, but *S. aphylla* differs markedly in that the margins of the lemma are not or scarcely continued as distinct membranous lobes and the lemma has a minute crown of hairs. Hence *S. aphylla* does not belong to the group Aphyllae of Hughes, which was described before the name *S. aphylla* was published.

***Stipa aquarii* J. Vickery, S.W.L. Jacobs & J. Everett, sp. nov.**

*S. hemipogoni* affinis sed spicula minore, lemmate anguste fusiformi, arista gracili, differt.

HOLOTYPE: NORTHERN TERRITORY: Waterhouse Range, 24° 02'S, 133° 36'E, *P.K. Latz 6349*, 3 February 1976. Erect perennial. Rare in skeletal soil, walls of gully, sandstone hill (NT).

Caespitose perennial to c. 1 metre high, with basal shoots to three quarters the height, and very short rhizomes. Culms c. 1.5 mm wide near the base, not easily compressed, terete, finely ribbed, glabrous, finely scabrous to densely pubescent 1 cm below the nodes; nodes 5–6, c. 40% broader than adjacent internodes, shortly retrorsely sericeous, scarcely or only the uppermost exserted.

Leaf sheaths c. 2 mm wide, scabrous to sparsely hirsute and scabrous on the basal sheaths; outer margin sparsely ciliate to glabrous; inner margin glabrous. Ligule obtuse, coriaceous, 1–2 mm long, 0.5 mm long on basal leaves, densely long-ciliate, sericeous on the abaxial surface; auricles slightly thickened, tufted with sparse straight hairs. Leaf blades loosely rolled, to 60 cm long, 1–2 mm wide; abaxial surface scabrous with dense, short, antrorsely hooked tubercles; adaxial surface long-pubescent, ribbed. Panicle dense, contracted, with closely spaced fascicles of unequal compound branches, exserted, c. 14–20 cm long, 1 cm wide (excluding awns); axis terete, finely scaberulous; branches slightly flattened, to 3 cm long, scaberulous; pedicels slightly flattened, 1–4 mm long, scaberulous. Spikelets scarcely gaping, 10–12 mm long (excluding awn). Glumes subequal, acuminate, transparent, glabrous except for a scaberulous midrib; lower glume 10–12 mm long, lower 30% 3-nerved; upper glume 9–10 mm long, lower 20% 3-nerved. Floret 3.5–5 mm long (including callus), narrowly fusiform, brown at maturity, the midrib pale. Lemma with sparse spreading yellow hairs, sparser upwards, the upper 1 mm glabrous; surface granular and with antrorsely hooked tubercles on the upper half; coma absent; lobes absent. Callus short and curved, c. 1 mm long, sericeous with yellowish hairs. Awn 40–50 mm long, 0.2 mm wide near the base, pale brown, twice bent; column 10–15 mm long, 7–9 mm to the first bend, villous with hairs 0.8–1.3 mm long, continuing halfway along the bristle, the remaining half of the bristle scaberulous. Palea acute, shorter than the lemma by 0.5 mm, coriaceous, granular and sparsely hairy to glabrous down the midline. Lodicules 2, spatulate, membranous, 0.7 mm long. Anthers 0.8 mm long (chasmogamous), cilia not observed. Caryopsis 2–2.5 mm long; embryo 25–30% the length.

DISTRIBUTION: Central Australian Ranges, on hillsides.

SPECIMENS EXAMINED: NORTHERN TERRITORY: **Central Australia:** Gosses Bluff, 23° 49'S, 132° 18'E, *Latz* 9035, 11.4.1982 (NSW); Waterhouse Range, 24° 02'S, 133° 36'E, *Latz* 6349, 3.2.1976 (NT, NSW, CANB); 13 km NE. Kings Canyon, 24° 13'S, 131° 41'E, *Latz* 8853, 21.7.1981 (NT).

The specific epithet is from the Latin “of the water man”, having a similar derivation to the surname ‘Waterhouse’, after which the Range in which the Type was collected was named.

The ms. name “*S. aquavilla*” appears on some of our early determinavit slips on specimens of this species.

Similar to *S. hemipogon* but differing in the smaller spikelet with narrow-fusiform lemma (turbinate in *S. hemipogon*) and slender awn.

***Stipa aristiglumis* F. Muell.**, Trans. & Proc. Victorian Inst. Advancem. Sci.: 43 (1855), Fragm. Phytogr. Austral. 8: 103 (1873); Bentham, Fl. Austral. 7: 570 (1878); Bailey, Syn. Queensland Fl.: 650 (1883); Moore & Betche, Handb. Fl. N.S.W.: 484 (1893); Hughes, Kew Bull. 1921: 25 (1921), *ibid.* 1922: 19 (1922); Willis, Handb. Pl. Victoria 1: 185 (1962), edn 2: 185 (1970).

HOLOTYPE: VICTORIA: cited as ‘In bushy parts of the Murray Desert, F. Mueller’. Two sheets at MEL (MEL 59879! and (vegetative only) MEL 59878!) marked respectively ‘Murray’ and ‘Ad flumen Murray’ by Mueller appear jointly to be the Holotype. As Hughes (1922) notes, the glumes on MEL 59879 are torn between the nerves so that the nerves project as teeth.

SYNONYM: *S. fusiformis* Hughes, Kew Bull. 1921: 25 (1921). See also Hughes, Kew Bull. 1922: 19 (1922). HOLOTYPE: VICTORIA: Murray River, *Mueller 19277* (K). Hughes also cited the following specimens: NEW SOUTH WALES: Cassilis, *Leichhardt* (K) (not seen definitely); VICTORIA: Avoca River, *F. Mueller* (K) (NSW 116069 from Herb. Hooker is probably a duplicate).

Caespitose perennial to 2 metres high with a sparse basal tuft c. one third the height. Culms erect or slightly geniculate near the base, terete, not compressible, c. (1.5–) 2.5 (–5) mm wide near the base, ribbed, glabrous to puberulous. Nodes 3, exserted, 35–45% broader than adjacent internodes, pubescent with slightly spreading short hairs or occasionally glabrous. Leaf sheaths at first tightly enveloping the culms, soon becoming loose, 3–6 mm wide, ribbed, glabrous or between the ribs scaberulous; inner margin glabrous; outer margin long-ciliate, or the basal part glabrous. Ligule thinly coriaceous to chartaceous, scarcely ciliate, glabrous except for a small tuft of hairs each side, truncate to obliquely truncate, 0.8–1.5 mm long or obtuse and to 3 mm long when continuous with one or both sheath margins; auricles thickened, glabrous. Leaf blades flat or convolute (most tightly in leaves of the basal tuft), to 40 cm long, 3–6 mm wide; abaxial surface scabrous with minute hairs or glabrous, occasionally with widely scattered strong or weak hairs, especially on the basal leaves; adaxial surface minutely scaberulous, occasionally with scattered weak hairs; margins similar to adjacent surface or with sparse long strong hairs. Panicle to 40 (–55) cm long, exserted at length, moderately sparse with distant fascicles of many, unequal, few-flowered compound branches, usually spreading, (2–) 6–10 cm wide (excluding awns); axis terete and glabrous at the base, upwards flattened and scabrous with dense minute hairs mostly on the edges; branches to 20 cm long, flattened, scabrous with minute hairs mostly on the edges; pedicels to 12 mm long, flattened, scabrous, with minute hairs mostly on the edges. Spikelets 8–14 mm long (excluding awn), gaping widely at floret disarticulation, otherwise tightly closed. Glumes unequal, firm and green for most of the length, the tip membranous and transparent between the nerves and often eroded, acuminate with long fine tips often reduced to the midrib, moderately broad and inflated at the middle, glabrous or the nerves scabrous, or scabrous with dense minute hairs overall; chlorenchyma bands associated with the nerves; lower glume 8–14 mm long, lower 75–90% 3-nerved; upper glume 6–12 mm long, lower 60–50% 5-nerved, 3-nerved up to 90% of the length. Floret (4–) 5–7.5 mm long (including callus), fusiform, tapering gradually to the base of the awn. Lemma gold-brown to dark red-brown at maturity, sericeous with appressed white to yellow hairs becoming gold at late maturity and sparse to absent at the apex, central nerve thickened; lobes minute or absent; coma of very sparse, appressed hairs of varying lengths to 0.4–1.5 mm long, or occasionally absent. Callus short and broad, 0.4–1 (–1.5) mm long, scarcely differentiated from the lemma, with hairs similar to those of the lemma, the naked point very short, 0.1–0.15 (–0.2) mm long, and rounded. Awn 25–40 mm long, twice bent, 0.2 (–0.3) mm wide near the base; column 10–17 mm long, 4–9 mm to the first bend, scabrous with sparse appressed hairs less than 0.1 (–0.2) mm long; bristle scaberulous. Palea ± equal to the lemma, coriaceous, slightly thinner at the margins, granular down the centre, acuminate, glabrous or with a few hairs down the centre. Lodicules 3, membranous; 2 abaxial 1.1–1.8 mm long, broadly cuneate; paleal 0.5–1.2 mm long, oblong. Anthers 2–3 mm long, usually penicillate. Caryopsis 3–4.5 mm long; embryo 30–50% the length; hilum 75–90% the length.

DISTRIBUTION: On heavy soils west of the Great Dividing Range from southern Queensland to Victoria.

**SELECTED SPECIMENS: QUEENSLAND:** **Darling Downs:** Jondaryan, *Blake* 7740, 22.2.1935 (NSW); Oakey, *Donges*, 1930 (BRI); nr. Kingsthorpe, *Blake* 13248, 12.2.1938 (NSW); Toowoomba, *Pollock*, 9.12.1938 (BRI); Pitsworth, *Roe*, 5.12.1938 (BRI); Cambooya, *White* 12679, 19.10.1944 (BRI); Tummaville, *White* 12586, 19.11.1944 (BRI); Clifton, *White*, 12.1912 (BRI); Talgai, *Bailey* (BRI); between Toowoomba & Warwick, *White* 13099, 6.3.1944 (BRI); Allora, *Bailey* (BRI). **Moreton:** Brisbane River, *Bailey* 57, 3.1873 (MEL).

**NEW SOUTH WALES:** **North Coast:** Singleton, *Boorman* NSW 116067, 11.1914 (NSW). **Central Coast:** Hawkesbury River, *Cleland*, 4.1912 (AD 98100091). **Northern Tablelands:** New England, *McFarland*, 1890 (MEL); between Tamworth & Glen Innes, *White* 10412, 29.12.1935 (BRI). **Central Tablelands:** Bathurst Experiment Farm, *May*, 26.3.1941 (NSW). **North Western Slopes:** Wallangra, *Rodway* NSW 116083, 28.9.1929 (NSW); Warialda, *Vickery* NSW 116087, 1.1932 (NSW); Gravesend, *Breakwell* NSW 116088, 16.1.1913 (NSW); Glendon nr. Gravesend, *Carne* NSW 116089, 5.1914 (NSW); 3 miles [5 km] N. of Stannifer on Elsmore road, *Jessup & Gray* 2794, 10.3.1954 (CANB); "Derra Derra", 16 miles [26 km] W. of Bingara, *Hindwood* NSW 116092, 7.10.1950 (NSW); Barraba, *Rupp* NSW 116093, 26.2.1914 (NSW); Boggabri, *Cabbage* NSW 116094, 11.1909 (NSW); Gunnedah, *Gardiner* NSW 116095, 29.11.1939 (NSW); Piallaway district, between Currabubula & Carroll, *Goode* 95, 8.11.1954 (NSW); Tamworth, *McKie* NSW 116096, 15.4.1947 (NSW); nr. Tamworth, *Phillips & Vickery* CBG 001275, 21.2.1961 (AD, CANB); Liverpool Plains, NSW 116098, 2.1850 (NSW); Quirindi, *Rowntree* NSW 116100, 11.1917 (N.S.W.); c. 3 miles [5 km] N. of Wallabadah, *Goode* NSW 116103, 11.11.1954 (NSW); nr. Bundella, (c. 41 miles [65.5 km] WSW. of Quirindi), *Pickard & Coveny* 1172, 6.6.1969 (NSW). **Central Western Slopes:** Scott Creek near Blandford, *Reiner* 292, 21.1.1960 (CANB); "Belltrees" via Scone, *White* NSW 116053, 2.1920 (NSW); Cassilis, *Leichhardt*, (MEL); Yangambil Plains, Trangie, *Hutchings* 59, 22.10.1948 (CANB); 1 mile [1.6 km] E. of Bunnan (16 miles [26 km] W. of Scone), *Story* 6947, 27.11.1959 (CANB, BRI); Scone Experimental Station, *Story* 7059, 15.3.1960 (AD, CANB, PERTH); Bow, 7 miles [11 km] W. of Merriwa, *Story* 6989, 1.12.1959 (CANB); Narromine, *Helms* NSW 116054, 12.1892 (NSW); Eulomogo, *Blakely* NSW 116056, 10.1912 (NSW); 6 miles [10 km] W. of Wellington, *Henderson* NSW 116050, 31.12.1946 (NSW); Mudgee, *Beche* NSW 116058, c. 1885 (NSW); Alectown, *Bradford* NSW 116059, 25.11.1949 (NSW); 13 km E. of Condobolin, *Cunningham & Milthorpe* 1546, 19.11.1973 (NSW); Bedgerebong, *Henderson* NSW 116049, 31.12.1946 (NSW); Forbes, *Cashmore*, 2.3.1935 (ADW 250); 'Allandale', Cowra road, Forbes, *Tretheway* NSW 116060, 23.11.1942 (NSW); between Grenfell & Forbes, *Martensz* 4128, 8.12.1968 (CANB); Marsden, *Hill* NSW 116062, 6.11.1962 (NSW); West Wyalong, *Ballantine* NSW 116063, 6.3.1939 (NSW). **South Western Slopes:** between Wagga & Lockhart (19 miles [30 km] from Lockhart), *Moore* 1081, 21.11.1948 (CANB); Burrumbuttock-Howlong Road, *McBarron* 4371 (in part), 3.8.1950 (NSW). **North Western Plains:** Moree to Bullarah, *Waterhouse* NSW 116075, 4.11.1956 (NSW); Narrabri, *Vickery* NSW 116077, 10.12.1928 (NSW); Condobolin, *Cunningham & Milthorpe* NSW 117006, 6.3.1978 (NSW). **South Western Plains:** Euabalong, *Doyle* NSW 116080, 11.1963 (NSW); Deniliquin, *Leigh* NSW 116081, 25.10.1963 (NSW); between Oaklands & Berrigan (8 miles [13 km] from Berrigan), *Moore*, 22.11.1948 (CANB 32524).

**VICTORIA:** **Region C:** Shire of Dimboola, *Reader*, 10.2.1895 (MEL); Horsham, *Willis & Beauglehole* 7870, 17.10.1960 (NSW); Wimmera, *Pye*, 1889 (MEL 60659). **Region G:** nr. Kerang, *Baldwin*, 11.1937 (MEL, ADW 43834). **Region H:** Minyip, *Eckert*, 12.5.1899 (MEL); Avoca River, *Hooker* NSW 116069, (NSW). **Region M:** 4 miles [6.4 km] from Rochester, *Phillips* CBG 046200, 8.11.1965 (CBG); Mooroopna, *Black*, 12.11.1942 (MEL); Tatura, *Gaub* CBG 003585, 20.12.1945 (CBG). **Region N:** 1 mile [1.6 km] south of Laverton, *Cullinore* 125, 28.11.1967 (CANB, BRI). **Region R:** Rutherglen, *Dreven*, 12.1886 (MEL).

*Stipa bigeniculata* *Hughes*, Kew Bull. 1922: 20 (1922); *Vickery*, Contrib. N.S.W. Natl. Herb. 2: 78 (1953).

**HOLOTYPE:** NEW SOUTH WALES: Cooma, *R.T. Baker*, Jan. 1887 (K!). The sheet at K consists of a drawing made from a specimen in the U.S. National Herbarium (US), No. 993695(!), together with a packet containing a portion of a panicle with attached glumes and florets. NSW 116547 from Cooma, but without indication of collector's name or date, is perhaps part of the Type collection and matches the Holotype well.

Caespitose perennial to 1 metre high with a basal tuft of leaves to one third the height. Culms erect or geniculate at the base, terete, c. 2 mm wide near the base, scarcely compressible, not or only slightly ribbed, puberulous at the base, glabrous upwards except just below the nodes; nodes 2-3, exserted, sericeous,

20–50% wider than adjacent internodes. Leaf sheaths enveloping the culm, 4–5 mm wide, minutely scaberulous but upper sheaths glabrous; cataphylls and very basal sheaths pubescent; outer margin ciliate to long and woolly near the orifice, although upper-sheath margins glabrous. Ligule truncate, coriaceous, 0.3–0.5 mm long although occasionally the outer sheath-margin extended 1 mm past the orifice, ciliate, abaxial surface sericeous; auricles usually with tufts of stiff hairs to 1 mm long. Leaf blade weakly rolled (those of the basal tuft more tightly so), c. 3 mm wide, to 25 cm long; abaxial surface slightly ribbed, shortly and strongly scabrous on lower blades, upper blades glabrous; adaxial surface strongly ribbed, densely minutely scaberulous, with occasional longer hairs; margins glabrous or strongly scabrous. Panicle 25–45 cm long, exerted with distant fascicles of unequal, few-flowered, compound branches, contracted and 2–3 cm wide (excluding awns), or expanded and to 15 cm wide (excluding awns); axis terete, strongly scabrous; branches flattened or angular, 3–16 cm long, scabrous; pedicels flattened or angular, scabrous, 6–20 mm long. Spikelets 12–18 (–20) mm long (excluding awn), gaping widely after floret disarticulation, otherwise tightly closed. Glumes unequal, firm throughout, glabrous or minutely scabrous especially at the tip, usually purple-tinged at the base, white at the tip, broad and inflated at the middle, narrowed abruptly at the tip; chlorenchyma bands associated with the nerves; lower glume 12–18 (–20) mm long, lower 75% 3-nerved; upper glume 9–12 (–15) mm long, the lower 35% 5-nerved, the next 30% 3-nerved. Floret oblong-cylindrical to oblanceolate-cylindrical, with a well-defined neck, 6–8.5 (–9.5) mm long (including callus). Lemma reddish brown at maturity, the surface tuberculate, scabrous with antrorse hooks at the apex, the central nerve thickened, usually prominent, with spreading white hairs becoming yellow at maturity; lobes minute; coma (1.2–) 1.4–2.0 mm long. Callus strong, curved, (1.2–) 1.4–2.5 mm long, sericeous with hairs slightly darker than those of the lemma. Awn 30–60 mm long, strongly twice bent, 0.2–0.35 mm wide near the base; column 12–22 (–26) mm long, 6–11 mm to the first bend, scaberulous with hairs less than 0.2 mm long; bristle scaberulous. Palea ± equal to the lemma, acuminate, granular down the centre, coriaceous but hyaline on the margins, very sparsely hairy down the centre. Lodicules 3, membranous; 2 abaxial, 1.3–2.0 mm long, broadly oblong to cuneate; paleal 0.9–1.2 mm long, narrow-oblong. Anthers 3.0–4.5 mm long (occasionally 1.5 mm), penicillate. Caryopsis 3.5–4.5 mm long; embryo 30% the length; hilum 90% the length.

**DISTRIBUTION:** Wooded areas of the Central and Southern Tablelands and Slopes of New South Wales, and scattered through Victoria.

**SELECTED SPECIMENS:** NEW SOUTH WALES: **Central Tablelands:** Bathurst district, *Ingram NSW 116584*, 28.2.1943 (NSW). **Southern Tablelands:** Crookwell district, *Grantham NSW 116560*, 3.1.1956 (NSW); Goulburn, *Dwyer NSW 116558*, 2.1915 (NSW); 18 miles [29 km] SW. of Goulburn, *Daniel NSW 116561*, 12.1955 (NSW); lower east slopes of Black Mt, Canberra, *Pullen 3735*, 12.12.1962 (NSW, CANB, MEL, AD); nr. Lake Burley Griffin, *Solling 49*, 2.2.1972 (NSW); Canberra, Queanbeyan, *Cabbage NSW 116553*, 8.11.1911 (NSW, CANB); Stromlo Forest, *Boden CBG 044555*, 7.1.1970 (CBG); near Tharwa, *Blake 7526*, 2.2.1935 (NSW); Bredbo, *Murray NSW 116568*, 12.1913 (NSW); near Slacks Creek, between Cooma & Jindabyne, *Vickery & Phillips NSW 116551*, 11.1.1956 (NSW); Maffra (Cooma district), *Vickery NSW 116557*, 14.1.1940 (NSW); 4 miles [6 km] N. of Bombala, *Pullen 4466*, 21.1.1972 (CANB). **Central Western Slopes:** Wellington district, *Taylor NSW 116571*, 11.1956 (NSW); Cowra district, *Daniel NSW 116573*, 6.3.1950 (NSW). **South Western Slopes:** Yass district, *Grubor NSW 116556*, 16.2.1939 (NSW); Gerogery, *McBarron 2660*, 24.11.1948 (NSW); Howell Reserve, 4 miles [6 km] W. of Burrumbuttock, *McBarron 4735*, 3.8.1950 (NSW); Albury, *McBarron 1186*, 21.10.1947 (NSW). **South Western Plains:** Binya State Forest, c. 17 km E. of Griffith, *Crisp 1638*, 20.11.1975 (CBG).

**VICTORIA:** **Region A:** Mildura, *Williamson (MEL 60883)*. **Region C:** 5 km NW. of Dimboola, 36° 25', 141° 57', *Everett 191 & Jacobs*, 30.11.1980 (NSW). **Region H:** Inglewood, *Sonnenberg*,

13.11.1929 (MEL 60661). **Region N:** Bacchus Marsh, *Meebold 21813*, 12.1936 (NSW); Newstead, *Black*, 18.11.1931 (CANB 9759). **Region P:** Geelong, *Williamson NSW 116572*, 7.1905 (NSW). **Region R:** Barnawartha, *Black*, 13.11.1939 (CANB 9766).

TASMANIA: Queens Domain, *Curtis* (BRI).

***Stipa blackii* C.E. Hubbard**, Kew Bull. 1925: 431 (1925); *Black*, Fl. S. Austral. edn 2: 92 (1943); Vickery, Contrib. N.S.W. Natl. Herb. 2: 78 (1953); Willis, Handb. Pl. Victoria 1: 185 (1962), edn 2: 185 (1970), perhaps in part.

HOLOTYPE: SOUTH AUSTRALIA: Jamestown, *J.M. Black 2* (K!; see also CANB photo 237009; isotype AD; probable isotype MEL 59881).

SYNONYMS: *S. aristiglumis* var. *cana* Reader, Victorian Naturalist 17: 156 (1901). HOLOTYPE: VICTORIA: Sandy Desert, Lowan, *F.M. Reader 9.10.1898* (MEL 59880!). Another sheet annotated 'Lowan, *F.M. Reader*, 9.10.1898' (MEL 69892) is probably a duplicate. The leaves of these specimens are more strongly hairy than in most specimens of *S. blackii* but appear to us to fall within the range of variation of the species.

*S. pubescens* var. *comosa* J. Black, Fl. S. Austral. 1: 66 (1922), Trans. & Proc. Roy. Soc. S. Austral. 46: 565 (1922). TYPIFICATION: Black cites four specimens from South Australia: 'Marino; Jamestown; Melrose; Moolooloo'. All are in Black's herbarium at AD on sheets AD 97424107!, 97424108!, 97424090!, 97424106!, 97422279!, and have been annotated by him as *S. pubescens* var. *comosa* and, presumably later, as *S. blackii* C.E. Hubbard or, in the case of the specimen from 'Moolooloo' and one from Jamestown, as *S. clelandii*. The specimen from Jamestown, No. 2 (the type number of *S. blackii*) at AD (AD 97424106) is now devoid of florets except for one lemma partially obscured by adhesive tape, but a probable duplicate of it (though not marked No. 2) in good condition is at MEL (MEL 59881).

*S. clelandii* Summerhayes & Hubbard, Kew Bull. 1927: 362 (1927); *Black*, Fl. S. Austral. edn 2: 92 (1943). HOLOTYPE: SOUTH AUSTRALIA: Kinchina, *J.B. Cleland S. 40*, Nov. 1924, (K, 2 sheets!; see also CANB photo 236996). After repeated examination of a wide range of specimens we are convinced that there is no justification for recognizing *S. clelandii* as a species distinct from *S. blackii*. As described, *S. clelandii* had a narrow inflorescence (*blackii*: open), lower glume 18–20 mm (*blackii*: 12–13 mm), upper glume 11–16 mm (*blackii*: 8–9 mm), lemma 7–8 mm (*blackii*: 5.5–6 mm) and the awn 50 mm (*blackii*: 25–30 mm). The respective type specimens undoubtedly display some discrepancies in dimensions but the various individual characters may be found distributed within a population.

Caespitose perennial c. 1 metre high with a basal tuft of leaves c. half the height. Culms erect or geniculate at the base, 1.5–2.5 mm wide near the base, scarcely compressible, slightly ribbed, densely sericeous to scaberulous or glabrous upwards, hairs longer just below the nodes; nodes c. 3–4, exserted, sericeous, 30–50% wider than adjacent internodes. Leaf sheaths at first tightly enveloping the culm, later becoming free, 5–6 mm wide,  $\frac{2}{3}$  the length of the internodes, densely pubescent, scaberulous and hirsute, upper sheaths pubescent or glabrous; outer margins long-woolly to ciliate on upper-sheath margins. Ligule truncate to shortly laciniate, coriaceous, 0.3–1.5 mm long, ciliate; abaxial surface sericeous; auricles usually thickened and spreading, pubescent. Leaf blade expanded or weakly rolled (those of the basal tuft more tightly so), 2–5 mm wide, to 20 cm long; abaxial surface slightly ribbed, densely pubescent or scabrous with short hairs and sparsely hirsute or scabrous with longer hairs, lower blades more scabrous than upper; adaxial surface ribbed, densely minutely scaberulous; margins similar to abaxial surface or with occasional long, rigid hairs. Panicle 10–30 cm long, exserted, with distant fascicles of unequal, few-flowered, compound branches,  $\pm$  contracted (although spreading at anthesis), 2–6 cm wide (excluding awns); axis slightly angular, moderately to sparsely scabrous; branches 2–8 cm long,  $\pm$  terete or triquetrous, scabrous on the edges; pedicels 5–13 mm long,  $\pm$  terete or triquetrous, scabrous on the edges. Spikelets



10–17 (–19) mm long (excluding awn), gaping after floret disarticulation, otherwise tightly closed. Glumes unequal, acuminate, broad and inflated at the middle, narrowed abruptly at the tip, firm and green at the base, purple-tinged across the centre, hyaline and often torn at the tip, densely minutely scabrous to almost glabrous; chlorenchyma bands associated with the nerves; lower glume 10–17 (–20) mm long, lower 80% 3-nerved, margins often ciliate; upper glume 8–15 mm long, lower 30% 4–5-nerved, the next 50% 3-nerved. Floret turbinate to oblanceolate-cylindrical with a weakly defined neck, 5–7 (–8) mm long (including callus). Lemma slightly gibbous at maturity, reddish brown, the surface tuberculate, scabrous with antrorse hooks at the apex, the central nerves slightly thickened, with white spreading hairs becoming yellow to orange at maturity; lobes minute; coma 2–3 (–5) mm long. Callus 1.2–2.3 mm long, sharp, sturdy and curved, with hairs slightly darker than those of the lemma. Awn 28–40 (–50) mm long, strongly twice bent, 0.2–0.4 mm wide near the base; column 13–20 mm long, 6–10 mm to the first bend, scaberulous with hairs less than 0.1 mm long; bristle delicate, often darker than the column, scaberulous. Palea  $\pm$  equal to the lemma, broadly acuminate, granular down the centre, coriaceous but hyaline on the margins, very sparsely hairy down the centre or glabrous. Lodicules 3; 2 abaxial membranous, 1.2–2 mm long, narrow-cuneate to oblong; paleal membranous to slightly coriaceous, narrow-triangular. Anthers 2.5–3.5 mm long, penicillate. Caryopsis 3.4–3.8 mm long, slightly gibbous above; embryo 50–30% the length; hilum 90% the length to  $\pm$  equal in length.

**DISTRIBUTION:** Widespread on heavier soils in New South Wales, Victoria and South Australia with a few records from Western Australia.

**SELECTED SPECIMENS:** **NEW SOUTH WALES:** **Northern Tablelands:** between Brushwood & Currawarua, *Moore 1085*, 17.11.1948 (CANB). **Southern Tablelands:** near Jindabyne, *Vickery NSW 116826*, 5.1.1956 (NSW). **Central Western Slopes:** Minore, *Blakely NSW 116117*, 10.1912 (NSW); Alectown South, *Constable NSW 17466*, 3.10.1951 (NSW); Bogan Gate, *Boorman NSW 116131*, 11.1906 (NSW); Forbes district, *Curtin NSW 116124*, 12.12.1952 (NSW); Morangarell, *per Esplin Pty. Ltd. NSW 116128*, 1938 (NSW); Young, *Patterson NSW 116125*, 12.1917 (NSW); Temora, *Dwyer NSW 116136*, 10.1916 (NSW). **South Western Slopes:** between Illabo & Eurongilly, *Moore 1106*, 18.11.1948 (CANB); Wagga Experimental Farm, Bonen, *McKeown NSW 116130*, 3.12.1906 (NSW); 7 miles [11 km] N. of Wagga Wagga, *Phillips CBG 025123*, 20.10.1965 (CBG); near Mangoplah, *Moore 1121*, 30.11.1948 (CANB); 4 miles [6 km] N. of Pleasant Hills, *McBarron 4569*, 14.6.1950 (NSW); Alma Park near Culcairn, *McBarron 4696*, 14.7.1950 (NSW); 8 miles [13 km] N. of Burrumbuttock, *McBarron 4661*, 26.6.1950 (NSW); Balldale, *McBarron 4730*, 2.8.1950 (NSW). **North Western Plains:** West Bogan, Nyngan, *Butcher NSW 116109*, *116131*, 20.11.1934 (NSW, K). **South Western Plains:** Trida district, *Stannard NSW 116822*, 8.10.1956 (NSW); 8 km S. of Lake Cargellico, 33°23'S, 146°22'E, *Everett 218 & Jacobs*, 2.12.1980 (NSW); Monia Gap, *Constable NSW 4605*, 29.10.1947 (NSW); Griffith, *Vickery NSW 10183*, 18.10.1949 (NSW); Benerembah, Griffith, *McKie NSW 2520*, 27.10.1938 (NSW); Jerilderie district, *Dykes NSW 116113*, c. 1880 (NSW); Wakool Reserve, *Henderson 125*, 10.11.1945 (NSW); Myall Plains, Berrigan, *O'Neill NSW 116121*, 20.10.1935 (NSW); 4 miles [6 km] NE. of Henty, *Flynn NSW 116115*, 23.10.1969 (NSW); Deniliquin, *Williams 41*, 10.1947 (CANB); Gerogery, *McBarron 2462*, 1.11.1948 (NSW). **Far South Western Plains:** 'Milton Grove', c. 60 miles [96 km] SW. of Ivanhoe on Mildura road, *De Nardi 1105*, 24.10.1972 (NSW).

**VICTORIA:** **Region C:** Jung, near Horsham, *Beaughole NSW 116126*, 26.10.1963 (NSW, CANB); Mt Arapiles, *Beaughole 30679*, 15.5.1969 (MEL). **Region G:** 15 miles [24 km] SSW. of Kerang, *Beaughole 40671*, 1.11.1972 (MEL, NSW). **Region H:** 5 miles [8 km] from Wedderburn, *Phillips CBG 003138*, 31.10.1963 (CBG). **Region M:** Tatura, *Gauba CBG 047569*, 30.10.1945 (CBG); near Kamarooka, *Robins 7975*, 26.10.1947 (NSW); between Murchison & Nagambie, *Corrick 3414*, 24.9.1973 (Corrick Herb); Bendigo, *Robins 7968*, 1.11.1948 (NSW). **Region N:** Studley Park, Melbourne, *Muir 24*, 28.9.1956 (MEL). **Region R:** Yarrawonga to Benalla road, 4 miles [6 km] from Hume Highway, *Muir 1760*, 2.11.1960 (MEL). **Region V:** Sawpit Creek, *Wakefield s.n.*, 19.5.1969 (MEL 1509948). **Region W:** between Swifts Creek & Omeo, *Hewitt* (MEL 60667); S. of Lauries Track, East Gippsland, *Beaughole 37217*, 5.3.1971 (NSW).

**SOUTH AUSTRALIA:** **Flinders Ranges:** Fergusons Gorge, 'Moolooloo' Station, *Ising* 707, 9.10.1918 (AD); Wilpena Pound, *Crisp* 919, 22.10.1974 (NSW, CBG); Alligator Gorge, *Hilton*, 5.8.1952 (ADW 44090); Mt Remarkable, *Mueller* (MEL 60664, 60665); 5 miles [8 km] from Melrose, *Hilton*, 12.9.1951 (ADW 43838, 44048, 44050); Melrose Showground, *Copley* 3207, 12.10.1970 (AD). **Eastern:** Morialta Reserve, *Spooner* 672, 2.11.1969 (AD). **Northern Lofty:** Barunga Range, Bute to Snowtown road c. 40 km NNW. of Port Wakefield, *Copley* 739, 20.10.1966 (AD); 1.5 km E. of Barunga Gap Siding, *Copley* 762, 15.10.1966 (NSW, AD); South Hummocks Range, *Copley* 3227, 25.10.1970 (AD); Tothill Range, *Kraehenbuehl* 1098, 27.10.1963 (AD); Saddleworth, *Symon* 789, 27.10.1960 (ADW); Balaklava, 42 miles [67 km] NNW. of Gawler, *Hilton* NSW 116812, 1.10.1944 (ADW, NSW); c. 1 km S. of Freeling, *Kraehenbuehl* 1450, 18.9.1965 (AD). **Murray:** 1 mile [2 km] E. of Kanmantoo, *Hilton*, 7.12.1954 (ADW 44136). **Yorke Peninsula:** Port Germain Pass, *Hilton*, 12.9.1951 (ADW 43842 to 43846). **Southern Lofty:** Roseworthy College, *Hilton*, 23.8.1941 (ADW 43840); c. 1 km W. of Angle Vale road and western side of Parafield aerodrome, *Kraehenbuehl* 1451, 18.9.1965 (AD); Modbury, *Spooner* 1273, 24.10.1970 (AD); Torrens Gorge, *Spooner* 525, 4.10.1969 (AD); Black Hill near Athelstone Oval, *Spooner* 344, 30.10.1968 (AD); Marino Rocks, *Smith* 693, 10.9.1967 (AD); Mt Barker, *Liebelt*, summer 1936–1937 (ADW 2670); Hallett Cove, *Cleland*, 24.9.1932 (AD). **South-eastern:** Greenhill Road E. of Adelaide, *Cleland*, 9.10.1948 (AD).

**WESTERN AUSTRALIA:** **Austin:** Ninghan, *Storr* 3301, 19.10.1959 (PERTH); between Kunnunoppin and Mt Marshall & Lake Barlee, *Fitzgerald Fraser* NSW 116813, winter–spring 1919 (NSW). **Coolgardie:** Merredin, *Maiden* NSW 116814, 10.1909 (NSW).

*S. blackii* is at times difficult to distinguish from *S. aristiglumis*. The coma of *S. aristiglumis* is usually much shorter and less regular. In *S. blackii* the young leaves are shortly pubescent with scattered stiff hairs amongst the pubescence. In *S. aristiglumis* the leaves, sheaths and culms are mostly glabrous and smooth.

***Stipa blakei* J. Vickery, S.W.L. Jacobs & J. Everett, sp. nov.**

*S. tenuifoliae* affinis sed auriculis glabris vel vix pilosis, nodis plerumque tumidis, panicula plerumque sparsiore differt.

**HOLOTYPE:** QUEENSLAND: **Warrego:** Charleville, *S.T. Blake* 11024, 4.4.1936. Open places on sand ca. 950 ft. Tufted, erect, 2–3 ft., dark green, spikelets paler (BRI 250581).

Caespitose perennial 0.3 to c. 1 metre high with a contracted rootstock. Culms robust, narrow, 1–2 mm wide near the base, terete, smooth or slightly ribbed, glabrous or minutely retrorsely puberulous especially just below the nodes; nodes 2–4, glabrous, usually conspicuously thickened (to 60% broader than adjacent internodes), exserted. Leaf sheaths narrow, tight around the culms (except that subtending the panicle slightly broader and looser), slightly ribbed, sparsely to densely retrorsely puberulous between the ribs, the very basal sheaths pubescent; outer margin glabrous to ciliate just below the orifice; inner margin glabrous. Ligule truncate to broad-ovate, 1–2.5 mm long, lightly ciliate, otherwise glabrous; auricles glabrous or with a few short hairs. Leaf blades linear, loosely rolled, to 28 cm long, 1.5–2 mm wide; abaxial surface glabrous and smooth, sparsely but strongly scabrous with short rigid hairs, or pubescent (especially between the nerves and at the back of the orifice); adaxial surface very strongly ribbed, ribs densely pubescent. Panicle 20–35 cm long, 2–3 cm wide (excluding awns) sparse and spreading, with distant fascicles of unequal compound branches, the base exserted; axis terete, ribbed, glabrous, scaberulous or finely pubescent; branches very fine, 3–6 cm long, pedicels very fine, flattened, especially near the apex, 7–25 mm long, minutely scaberulous on the edges. Spikelets scarcely gaping, 14–18 mm long (excluding awn). Glumes subequal, long-acute to acuminate, firm at the base but mostly hyaline, glabrous; lower glume 14–18 mm long, lower 60% 3-nerved; upper glume 13–17 mm long, lower 50% 5-nerved. Floret narrow-cylindrical, 7–8 mm long (including callus). Lemma only loosely enclosing the palea and caryopsis,

visually tuberculate (but so minutely as to feel smooth), dark brown at maturity, with sparse, short, dull white to yellowing hairs, sparsest at the apex, densest on the margins; lobes 2, c. 0.1–0.2 mm long, coma absent. Callus straight, 2.5–3 mm long, with hairs similar to those on the lemma. Awn robust, 0.3–0.4 mm wide near the base, 7–10 cm long, strongly falcate; column 9–13 mm long, pubescent with spreading antrorse hairs 0.2–0.3 mm long; bristle scabrous, much paler than the column at maturity. Palea very broadly obtuse, firm but the margins more delicate, subequal to the lemma, with similar hairs scattered down the back. Lodicules 2, abaxial, long-cuneate c. 2 mm long. Anthers c. 3 mm long, lightly penicillate. Caryopsis c. 4.5 mm long.

DISTRIBUTION: Mainly on sandy soils in western Queensland.

SPECIMENS EXAMINED: QUEENSLAND: **Leichhardt**: Cairdbeign via Springsure, Norton, 2.1903 (BRI 228952); from the Dawson, [? Leichhardt] 322, 16.1.1847 (MEL 60005). **Mitchell**: Williwin, 12 miles [19 km] W. of Yalleroi, *Everist* 1837, 23.6.1939 (BRI). **Warrego**: Chesterton, c. 25°20'S, 147°20'E. *Blake* 11104, 7.4.1936 (BRI, NSW); Charleville, *Blake* 11024, 4.4.1936 (BRI, NSW); 10 km ENE of "Maryvale" homestead, 26°34'S, 146°58'E, *Purdie* 368D, 17.6.1976 (BRI, 2 sheets). **Maranoa**: Mitchell, *Blake* 5690, 4.4.1934 (BRI, NSW); 'Amby Downs', *Scortechini*, 12.1883 (NSW); Wycanna, 134 km W. of Goondiwindi, 28°02'S, 149°01'E, *C.H.P.* Y1644, 30.5.1974 (BRI, CANB); Nindigully, *Willoughby* 17, 4.1940 (BRI).

This species is named after Dr S.T. Blake, a Queensland botanist who, over many years, advanced our knowledge of the taxonomy of Australian grasses.

It differs from *S. tenuifolia* in the glabrous or very sparsely hairy auricles, the usually swollen nodes and in the usually sparser panicle. It differs from *S. nodosa* in the glabrous or very sparsely haired auricles and the stronger awn.

***Stipa breviglumis* J. Black**, Trans. & Proc. Roy. Soc. S. Austral. 65: 333 (1941); Willis, Handb. Pl. Victoria 1: 181 (1962), edn 2: 181 (1970).

SYNTYPES: SOUTH AUSTRALIA: cited as 'Lyndoch, Oct. 1927, J.B. Cleland; Mount Brown, Nov. 1881 (in Tate Herb.)'. At AD there is a sheet from Cleland's herbarium labelled 'Lyndoch 8.10.27' in J.B. Cleland's handwriting, and the initials "J. M. B." (associated with an unpublished epithet) in Black's handwriting; Black has not written the epithet 'breviglumis' on it, but it is evident that he saw and examined it. This sheet bears a satisfactory specimen and we designate it as the **Lectotype**. A small duplicate of this specimen is at MEL (MEL 59884) and bears the name 'breviglumis' and collecting data in Black's handwriting. In AD there is also a sheet from the Tate herbarium bearing a single panicle surmounting a portion of a culm, alongside which Black has written the name *Stipa breviglumis*; the sheet also bears three other panicles, two of which are *S. platychaeta* and the third a species of the Falcatae. In describing this species as a robust rigid grass, Black must have had in mind the Cleland specimen that clearly shows this character, whereas the Tate herb. specimen is inadequate to support his statement.

Caespitose or very shortly rhizomatous perennial c. 1.5 metres high, often with several branches at the nodes, without a basal tuft of leaves. Culms erect or slightly geniculate at the base, terete, c. 2.5 (–4) mm wide near the base, not compressible, slightly to moderately ribbed, glabrous; nodes 2–4, exserted, glabrous, to 50% wider than the adjacent internodes. Leaf sheaths ± inflated, minutely puberulous or scabrous with minute tubercles, glabrous; basal sheath to 1 cm wide, slightly to strongly ribbed; upper sheath 3.5–4 mm wide, moderately ribbed. Ligule truncate, membranous, 1–7 mm long, glabrous; auricles ± thickened, c. 1 mm long. Leaf blade expanded or loosely inrolled, 2–2.5 mm wide, to 20 cm long; adaxial surface strongly ribbed, minutely puberulous or scabrous with minute tubercles; abaxial surface strongly ribbed, glabrous; margins glabrous. Panicle 20–40 cm long, exserted, with distant fascicles of unequal, few-flowered, branches, contracted, 2–4 cm wide (excluding

awns); axis slightly angular or terete and strongly ribbed, glabrous to minutely puberulous; branches 5–10 cm long, slightly angled or terete and moderately ribbed, minutely sericeous along the ribs or edges; pedicels 2–6 mm long, slightly angled, minutely sericeous. Spikelets 5–6.5 mm long (excluding awn), gaping. Glumes subequal, acute-acuminate, hyaline with chlorenchyma bands associated with the nerves, sericeous with hairs minute–0.3 (–0.5) mm long; lower glume 5.5–6.5 mm long, lower 30–65% 5–3-nerved, upper 35–70% 3–1-nerved; upper glume 4.5–6 mm long, lower 75–95% 3-nerved, upper 25–5% 1-nerved. Floret narrowly cylindrical tapering to a slender neck, 3–4.5 mm long (including callus). Lemma slightly granular, with white hairs 0.2–0.4 mm long; lobes absent; coma sparse, c. 0.2 mm long. Callus c. 0.5 mm long, slightly curved, the tip blunt, sericeous with white hairs minute–0.5 mm long. Awn 2–3.5 cm long with 1–2 bends, 0.1–0.2 mm wide near the base; column 1–1.5 cm long, 5–6.5 mm to the first bend, straw-coloured to brown with 2 chlorenchyma bands, minutely scabrous; bristle often darker than the column, minutely scabrous. Palea 50–60% the length of the lemma, obtuse, sparsely sericeous along the centre back with white hairs 0.1–0.4 mm long. Lodicules 3; 2 abaxial, membranous, c. 0.25 mm long, obtuse; paleal membranous, c. 0.25 mm long, lacinate. Anthers c. 1.25 mm long, minutely penicillate. Mature caryopsis not seen.

**DISTRIBUTION:** Central and southern Victoria and into the Lofty Regions of South Australia.

**SELECTED SPECIMENS:** VICTORIA: **Region H:** St Arnaud, *Rouell, s.d.* (BRI). **Region M:** Kamarooka, N. of Bendigo, *Morris*, 10.1947 (MEL 5985); Kamarooka Forest, 30 km NNE. of Bendigo, *Beaglehole 55242 & Kellam*, 17.10.1976 (ACB, NSW); Rushworth State Forest (Forest Park N. of Graytown), *Corrick 3578*, 3.11.1973 (Herb Corrick). **Region N:** Lerderderg Gorge, *Kenna*, 3.6.1956 (MEL 59886); Coimadai Lane, off Bacchus Marsh Road, c. 28 miles [45 km] from Melbourne, *no collector*, 1935 (MEL 59888).

**SOUTH AUSTRALIA:** **Flinders Ranges:** Alligator Gorge, Wilmington, *Cooper*, 14.8.1954 (AD 966071541); Alligator Creek, *Ising NSW 116024*, 23.10.1928 (NSW, ADW). **Northern Lofty:** Northern Tohill Range, Niblet Gap, c. 30 km NE. of Marrabel, *Kraehenbuehl 2177*, 29.10.1967 (AD). **Southern Lofty:** Lyndoch, *Cleland*, 8.10.1927 (BRI, fragment from Lectotype); Finnis, *Cleland*, 10.8.1963 (AD 97210220); Goolwa, Railway line to Currency Creek, *Cleland*, 17.8.1940 (AD 96323293).

*S. breviglumis* differs from *S. verticillata* in having firmer, not hyaline, rather broader and more scabrous glumes, and a relatively longer (60–70% of lemma length) and more hairy palea. *S. breviglumis* is widespread but uncommon and tends to grow under trees or scrub and on rocky areas whereas *S. verticillata* tends to grow in open grasslands. Black, *Fl. S. Austral.* edn 2: 92 (1943), and Eichler, *Suppl. to Black's Fl. S. Austral.*: 49 (1965), incorrectly identified specimens of *S. breviglumis* as *S. verticillata*.

***Stipa campylachne* Nees in Lehmann, Pl. Preiss. 2: 99 (1846).**

*S. semibarbata* var. *campylachne* (Nees) Benth., *Fl. Austral.* 7: 569 (1878); Gardner, *Fl. W. Austral.* 1, Gram.: 179 (1952). Based on *S. campylachne*.

**TIPIFICATION:** Nees cites: 'In solo sublimoso jugi montium Darling's-range, Perth. Herb. Preiss No. 1848. Ad flumen Cygnorum. Drummond'. Nees' herbarium was in B and has been destroyed. Preiss' herbarium is now at LD with a substantial set of duplicates at MEL. There is one specimen of *Preiss 1848* at LD; this specimen is *S. tenuifolia* and it is not a good match for the original description as it lacks both a white-pubescent column and hairy sheaths. There is no annotation by Nees on the specimen and, presumably, he did not see it. In MEL there are two sheets of *Preiss No.*

1848 which have been annotated *S. campylachne* Nees but which manifestly represent two entirely different species. One of these sheets, MEL 59990, bears a complete, rather robust culm with panicle bearing glumes and an imperfect floret, a packet containing other more or less imperfect florets, and a fascicle of strongly hirsute-pubescent leaves with the lower part of a culm. This specimen is a good match for the protologue despite the absence of mature florets. In many ways the specimen strongly resembles *S. semibarbata* R. Br., but differs in its shorter lemma, column and bristle. The other sheet, MEL 59950, bears a plant with a strongly curved falcate bristle above the more or less straight, erectly pubescent column and is *S. tenuifolia* Steud. The florets could not, in any respect, be said to resemble either *S. pubescens* or *S. semibarbata* with which *S. campylachne* was associated by Nees, and later with *S. semibarbata* by Bentham and Hughes. This specimen is presumably a true duplicate of *Preiss 1848* at LD. We have therefore based the following concept of *S. campylachne* on the sheet MEL 59990 and we here designate this as the **Lectotype**. There is a duplicate of this specimen in S but it has only one immature fruit remaining.

Caespitose perennial c. 0.8 metres high, not rhizomatous, with a basal tuft of leaves c. half the height. Culms erect or geniculate at the base, 1–2 mm wide near the base,  $\pm$  compressible, terete, slightly ribbed to smooth; basal culms pubescent with hairs 0.1–0.4 mm long to 0.8 mm near the nodes; upper culms glabrous to pubescent with hairs minute to 0.4 mm long; nodes 2–4, exserted, densely sericeous with hairs 0.2–0.6 mm long, c. 50% wider than the adjacent internodes. Leaf sheaths tightly enveloping the culm, basal sheath 5–8 mm wide, pubescent to hirsute with hairs to 1 mm long, slightly to moderately ribbed, inner margin glabrous, outer margin ciliate with hairs 0.1–0.4 mm long; upper sheath 4–5 mm wide, pubescent to hirsute with hairs to 1 mm long, also with hairs 1.5 mm long around the collar, strongly ribbed, inner margin glabrous, outer margin ciliate with hairs similar to those on the abaxial surface. Ligule truncate, membranous, 0.3–0.6 mm long, minutely ciliate; auricle sometimes present to 1.5 mm long, glabrous. Leaf blade weakly rolled, 1.5–2 mm wide, up to 35 cm long; abaxial surface strongly ribbed, the surface slightly scabrous with minute tubercles, pubescent to hirsute with hairs (0.1–) 0.3–0.9 mm long; adaxial surface strongly ribbed, pubescent to hirsute with hairs (minute–) 0.2–0.4 mm long; margins sparsely ciliate with hairs 0.5–0.7 (–1.5) mm long. Panicle 10–20 cm long, exserted, with distant fascicles of unequal, few-flowered, compound branches, contracted (but spreading at anthesis), 2–3 cm wide (excluding awns); axis slightly flattened to terete, scabrous with stiff hairs 0.05–0.3 mm long; branches angular to slightly flattened, 2–3 cm long, scabrous along the edges with stiff hairs 0.1–0.3 mm long; pedicels angular, 0.2–1 cm long, scabrous with stiff hairs 0.05–0.3 mm long. Spikelets 14–23 mm long (excluding awn) gaping. Glumes subequal to equal, acuminate, scabrous along the nerves with hairs 0.05–0.25 mm long, sparsely scabrous between the nerves with hairs minute–0.15 mm long, hyaline, chlorenchyma bands associated with the nerves; lower glume 15–23 mm long, lower 40–55% 3-nerved, upper 45–60% 2–1-nerved; upper glume 14–18 mm long, lower 35% 5-nerved, upper 65% 4–1-nerved. Floret cylindrical, without a neck, 8–9 mm long (including callus). Lemma surface smooth to scabrous upwards, with sparse hairs 0.3–1 mm long; lobes absent; coma absent. Callus 2–2.5 mm long, densely sericeous with hairs 0.2–0.8 mm long, tip glabrous and weakly bent. Awn 5–7 cm long, twice bent, 0.4 mm wide near the base; column c. 30 mm long, c. 20 mm to the first bend, straw-coloured, pubescent to plumose with hairs (0.3–) 0.5–1 (–1.6) mm; bristle straw-coloured, scabrous with hairs c. 0.1 mm long. Palea equal to the lemma, acute, surface smooth, with sparse hairs 0.5–0.8 mm long down the centre, margins hyaline. Lodicules 2, abaxial, membranous, (1.2–) 1.6–1.8 (–2.4) mm long, obtuse. Anthers 2.5–3.5 mm long  $\pm$  penicillate. Caryopsis 4–5 mm long; embryo 20% the length; hilum 80–100% the length.

DISTRIBUTION: The south-west of Western Australia.

SELECTED SPECIMENS: WESTERN AUSTRALIA: **Darling**: Smiths Mill, *Morrison*, 13.11.1897 (BRI); Mundaring, *Helms*, 25.7.1897 (PERTH); Welshpool to Kalamunda, *Maiden*, 9.1909 (NSW 116932); Armadale, *Symon*, 9.1954 (ADW 28146); Wungong Gorge near Armadale, *Blake 18019*, 24.8.1947 (BRI, PERTH); Araluen, Darling Range, in Jarrah forest, *Burbidge 3641*, 9.12.1951 (CANB); Darling Range, *Morris*, 9.1947 (MEL 60829, 60830); Pinjarra, *Helms*, 27.9.1897 (PERTH); Harvey, no collector, 1911 (PERTH); Hamel near Drakesbrook, *Blake 18045*, 31.8.1947 (BRI); Upper Blackwood R. on wooded ridges, *Mueller*, 10.12.1877 (MEL 60831); banks of Blackwood R., *Oldfield 675* (MEL 60687); 39.4 miles [63 km] from Collie towards Williams, *Canning CBG 039953*, 1.10.1968 (CBG); Capel, *Royce 2684*, 24.9.1948 (PERTH). **Warren**: 3 miles [5 km] W. of Mayanup, *Burbidge 2551*, 9.12.1951 (CANB); Mt Barker, *Mueller*, 10.1867 (MEL 60820); King Georges Sound, *Muir, s.d.* (MEL 60810).

*S. campylachne* is close to *S. semibarbata* but the distinctive hirsute-pubescent of its foliage in many specimens, the usually narrower, more delicate glumes and shorter lemma, column and bristle, appear to make it worthy of separate recognition in specific rank.

\**Stipa caudata* Trin., Mém. Acad. Imp.Sci.- St. Pétersbourg Sér. 6, Sci. Math 1: 75 (1830); Rosengurtt, de Maffei & de Artucio, Gramíneas Uruguayas: 73 (1970); Caro & Sanchez, Darwiniana 16: 643 (1971).

HOLOTYPE: "V. spp. chilens" (LE, not seen), said to be a Lindley collection from Chile, *s.n.*, *s.d.*

Caespitose perennial 0.75–1 metre high with a basal tuft half to three quarters the height, without rhizomes. Culms erect, terete to slightly angled, not compressible, slightly ribbed at the base to smooth or strongly ribbed upwards, glabrous; nodes 2–4,  $\pm$  exserted, glabrous, not swollen. Leaf sheaths tightly enveloping the culm, sometimes becoming loose upwards, glabrous; basal sheaths 6.5–7 mm wide, slightly ribbed, margins glabrous; upper sheaths 3–3.5 mm wide, strongly ribbed, inner margin with hairs 0.4–0.6 mm long to glabrous, outer margin with hairs 0.5–1.5 mm long to glabrous. Ligule truncate to obtuse, membranous, 0.1–0.5 mm long, ciliate with hairs 0.2–1.5 mm long, also with a tuft of hairs present at the sides; auricles, if present, thickened, c. 0.8 mm long, glabrous. Leaf blade expanded to tightly rolled, 1–2.5 mm wide, to 50 cm long; abaxial surface strongly ribbed, glabrous; adaxial surface strongly ribbed, minutely scabrous along the ribs; margin with hairs 0.2–1 mm long to minutely scabrous. Panicle 15–25 cm long, exserted, with distant fascicles of unequal, few-flowered, compound branches, contracted, c. 2.5 cm wide (excluding awns); axis terete to slightly flattened, strongly ribbed, scaberulous with sparse minute hairs; branches 1.5–6 cm long, angled, scaberulous along the edges with hairs minute–0.2 mm long; pedicels 0.1–1 cm long, slightly angled, scaberulous along the edges with hairs minute–0.3 mm long. Spikelets 6–9 mm long (excluding awn), gaping. Glumes subequal, hyaline with chlorenchyma bands associated with the nerves, acuminate; lower glume 6–9 mm long, glabrous or scaberulous along the midrib with hairs minute–0.2 mm long, the margins with sparse hairs 0.05–0.1 mm long, lower 40–65% 3-nerved; upper glume 6–9.5 mm long, scaberulous along the midrib with hairs 0.1–0.2 mm long to glabrous, lower 50–60% 3-nerved, upper 40–50% 1-nerved. Floret cylindrical, 4–6 mm long (including callus), without a neck. Lemma surface scaberulous with minute tubercles, with hairs 0.2–1 mm long along the midrib and margins; lobes 0.3–0.4 mm long, coma of hairs 0.2–1 mm long. Callus c. 0.6 mm long, straight, blunt, densely sericeous with white hairs 0.1–1 mm long. Awn 1.2–1.8 cm long, twice bent, 0.1–0.2 mm wide near the base; column 6–9 mm long, 3–4 mm to

the first bend, straw-coloured, scaberulous with hairs minute–0.2 mm long; bristle straw-coloured, scaberulous with hairs minute–0.2 mm long. Palea  $\pm$  equal to the lemma, acute, the surface smooth to granular, sericeous along the centre back with hairs 0.2–0.8 mm long, margins glabrous. Lodicules 3; 2 abaxial, membranous, oblong, 1–1.3 mm long; paleal membranous, acute, c. 0.5 mm long. Anthers 3–3.5 mm long, penicillate. Only immature caryopsis seen, obovate, c. 3 mm long, embryo 30% the length, hilum c. 80% the length, the stylar appendage eccentric.

**DISTRIBUTION:** An introduction from South America, uncommon on roadsides on the Western Slopes of New South Wales; also scattered on Flinders I. in Bass Strait.

**SELECTED SPECIMENS:** NEW SOUTH WALES: **Central Western Slopes:** Merriwa district, *Henderson NSW 117377*, 15.11.1955 (NSW), *Merriwa Shire Council NSW 117378*, 1.1956 (NSW). **South Western Slopes:** Cootamundra district, *Christenson NSW 117379*, 5.11.1959 (NSW).

**TASMANIA:** **Flinders Island:** Emita, *Warren NSW 117376*, 4.12.1979 (NSW).

*S. caudata* has been known in Australia as *S. brachychaeta* Godron, Mém. Sect. Sci. Acad. Sci. Montpellier 1: 450 (1853). (The latter name appears on some of our determinavit labels.) These two South American species are difficult to distinguish. They are generally said to be distinguished by: (i) *S. caudata* having hairs on the margins and midrib of the lemma, and a broader caryopsis with an eccentric stylar appendage; (ii) *S. brachychaeta* having hairs all over the lemma surface, and a narrower caryopsis with a centric stylar appendage. The type of *S. brachychaeta* (Godron (NYC!)) has lemmas showing both character states on the one inflorescence. In Australian specimens, the only caryopses we have found are immature and in a glasshouse-grown specimen (Morris, 19.1.1981 (HO)); and these match the description of *S. caudata*. We have as yet been unable to find caryopses of either *S. brachychaeta* or *S. caudata* for comparison. We are using the earlier name *S. caudata* although we are not yet convinced the situation is fully understood.

### ***Stipa centralis* J. Vickery, S.W.L. Jacobs & J. Everett, sp. nov.**

*S. eremophilam* aemulans sed cataphyllis et vaginis foliorum basalium lanatis, pilis lemmatis pallidioribus sparsioribusque, differt.

**HOLOTYPE:** NORTHERN TERRITORY: Mt Riddock 23°06'S, 134°38'E. Erect perennial. Common in skeletal soil, southern slope of metamorphic hill. *P.K. Latz 4305*, 13 Sept. 1973 (NT 41138).

Caespitose perennial to c. 0.8 metres high, with a short rhizome. Shoots conspicuously extravaginal, the basal leaves at least as long as the culms. Culms numerous, terete, very tough, c. 1 mm wide near the base, glabrous, smooth; nodes 4–5, glabrous, exserted. Leaf sheaths tight around the culms, minutely puberulous to glabrous, but the cataphylls and most basal sheaths densely woolly with long, soft, slightly spreading hairs. Ligule acute, coriaceous, 0.6–1 mm long, densely sericeous on the back. Leaf blades linear, to 25 cm long, c. 1.5 mm wide, loosely inrolled; abaxial surface slightly ribbed, smooth, glabrous; adaxial surface very strongly ribbed, minutely scabrous; margins glabrous to scabrous. Panicle, with distant fascicles of few-flowered branches, very sparse, with less than 30 spikelets, 10–20 cm long, 1–2.5 cm wide (excluding awns), exserted but not exceeding basal leaves; axis, pedicels and branches angular, scaberulous with sparse, short, stiff hairs; branches 15–40 mm long; pedicels slender, 3–25 mm long. Spikelets gaping, 13–18 mm long (excluding awn). Glumes slightly unequal, broad, acuminate, hyaline, the tips easily torn; densely

short-scabrous to pubescent to glabrous at the tips; lower 13–18 mm long, 3-nerved; upper 12–16 mm long, 5-nerved to the middle. Floret 7–9 mm long (including callus), narrow-turbinate. Lemma pale to dark brown at maturity but the central nerve very pale and visible; with sparse white hairs at the base; becoming glabrous upwards between the nerves; surface finely granular to finely retrorsely hooked-tuberculate upwards; lobes 2, c. 0.3 mm long or minute or absent; coma absent or a few hairs to 0.3 mm long present. Callus straight, 1.5–2.5 mm long, sericeous with dense yellowish hairs. Awn c. 0.3 mm wide, 50–60 mm long, twice bent; column 19–25 mm long, 12–13 mm to the first bend, pubescent with slightly spreading hairs 0.25–0.4 mm long; bristle scabrous. Palea to 0.8 mm shorter than the lemma, acute, ciliate-tipped, granular, sparsely hairy down the middle of the back. Lodicules 2–3, c. 1 mm long; 2 abaxial, linear to slightly spatulate; paleal acute or absent. Anthers 0.8–1.5 mm long, penicillate. Mature caryopsis not seen, apparently c. 2.5 mm long.

DISTRIBUTION: Slopes of the Central Australian Ranges.

SELECTED SPECIMENS: NORTHERN TERRITORY: **Central Australia:** Mt Palmer, Harts Range, 23°06'S, 134°57'E, *Beaglehole* 44747, 28.5.1974 (NSW); Mt Riddock, 23°06'S, 134°38'E, *Latz* 4305, 13.9.1973 (NT, NSW, BRI); Valley of the Eagles, 23°37'S, 134°27'E, *Beaglehole* 44945, 2.6.1974 (NT, NSW); 5 km SE. of Reedy Rockhole, 24°19'S, 131°38'E, *Latz* 8997, 18.8.1982 (NSW, duplicate from NT).

The specific epithet refers to the Central Australian distribution of this species.

Similar in appearance to *S. eremophila* but differing in the woolly cataphylls and basal leaf sheaths, and in the lighter-coloured and sparser hairs on the lemma.

***Stipa compressa* R. Br.**, Prodr.: 175 (1810); Bentham, Fl. Austral. 7: 567 (1878); Hughes, Kew Bull. 1921: 26 (1921); Gardner, Fl. W. Austral. 1, Gram.: 176 (1952).

HOLOTYPE: WESTERN AUSTRALIA: King Georges Sound, A. Menzies (BM!).

SYNONYM: *S. longearistata* Steudel, Syn. Pl. Glum. 1: 127 (1854). HOLOTYPE: Cited as 'Urville legit ad Port George, N. Holl.' (not seen). Steudel's descriptions could only apply, as indeed he himself suggests, to a plant of *S. compressa* R. Br.

Caespitose annual (to short-lived perennial?) to 0.7 metres high, without rhizomes and with a basal tuft of slender shoots c. a quarter the height. Culms erect, mostly terete,  $\pm$  compressible, to 3.5 mm wide, slightly ribbed to smooth upwards, glabrous; nodes 2–5, glabrous, concealed by the sheaths or at length exerted, to 25% wider than the adjacent internodes. Leaf sheaths usually inflated, glabrous to minutely scaberulous; basal sheaths broad, to 12 mm wide, slightly to strongly ribbed, inner margin glabrous, outer margin ciliate with hairs c. 1 mm long; upper sheaths 5–5.5 mm wide, strongly ribbed, inner margin sparsely ciliate with glistening hairs c. 0.5 mm long, outer margin ciliate with hairs 0.6–0.8 mm long. Ligule membranous, obtuse, entire to lacinate, longest on upper leaves, 4–11 mm long, minutely scaberulous on the abaxial surface, continuous on the upper sheaths with acute auricle lobes, the lobes glabrous or minutely scaberulous on the abaxial surface; auricles thickened, 0.5 mm long, with hairs at the base. Leaf blades triangular to linear, either as broad and expanded at the base as the sheaths or to half the width, upwards loosely convolute, to 20 cm long; abaxial surface strongly ribbed, glabrous and smooth to scaberulous with minute hairs; adaxial surface strongly ribbed, densely and



minutely scabrous to pubescent with hairs c. 0.2 mm long; margins glabrous or scabrous. Panicle contracted or at length narrowly spreading, with distant fascicles of many unequal simple or compound branches, 10–30 cm long (excluding awns), 1–4 cm wide; axis smooth and glabrous to minutely scabrous,  $\pm$  angled; branches to 10 cm long, glistening, scabrous with minute hairs; pedicels 0.5–2 cm long, angled, scabrous with hairs minute–0.1 mm long. Spikelets 13–21 mm long (excluding awn), gaping. Glumes green to straw-coloured, translucent, glabrous to scabrous at the tips, very unequal; lower glume 13–21 mm long, acute to acuminate, lower (40–) 66% 3-nerved, scabrous, glabrous at the base; upper glume 9–14 mm long, acute, lower 50 (–66)% 5-nerved, upper 50 (–33)% 3–1-nerved, glabrous to minutely scabrous at the tip. Floret narrow-cylindrical, 6.5–8.5 mm long (including callus). Lemma with 1 or 2 lobes to 0.25 mm long, smooth, white to pale yellow at maturity, at least the central nerve visible externally, shortly and stiffly pubescent with hairs white to grey at maturity 0.2–0.3 mm long; coma absent. Callus straight, 2.5–3.5 mm long, densely sericeous with hairs 0.2–0.5 mm long. Awn 8–14 cm long, 0.25–0.4 mm wide near the base, slightly twice bent; column dark brown at maturity, 2–4 cm long, 1.4–3 cm to the first more gradual but stronger bend, scabrous with hairs 0.05–0.2 mm long; bristle pale yellow, much paler than the column, scaberulous with hairs 0.05–0.1 mm long. Palea acute, subequal to the lemma, with hairs 0.2–0.3 mm long down the centre, the surface smooth, margins glabrous. Lodicules 2 or 3, membranous; 2 abaxial oblong, 1–1.5 mm long; paleal absent or acute and c. 0.2 mm long. Anthers 1.5–2.5 mm long, not penicillate. Caryopsis 3–3.5 mm long; embryo 15–25% the length; hilum 80–90% the length.

DISTRIBUTION: Mainly sandy areas near the coast of south-western Western Australia.

SELECTED SPECIMENS: WESTERN AUSTRALIA: **Darling:** Yanchep, *Aplin* 2979, 12.10.1965 (PERTH); Middle Swan River, *Sewell*, 1894 (MEL 60920); Kings Park, Perth, *Roe*, 4.10.1934 (CANB 1233); South Perth, *Carne*, 11.11.1923 (PERTH); Cottlesloe near mouth of Swan R., *A.M. [?]*, 21.10.1899 (BRI); Claremont, *Andrews*, 10.1902 (PERTH); Helena Valley, *Seabrook* 435, 22.10.1977 (PERTH); S. of Jandakot, *Aplin* 1061, 10.1961 (PERTH); Armadale, *Symon*, 9.1954 (ADW 28127); Jandakot Marsupial Breeding Station, Lake Banganup, *Western* 9805, 2.11.1974 (PERTH); Forrestdale, c. 15 miles [24 km] SSE. of Perth, *Man & George* 11, 7.11.1969 (PERTH); Pinjarra, Murray R., *Helms*, 22.9.1897 (PERTH); Harvey, *Stoward* NSW 116594, 10.1911 (NSW, K); Jindong, *Royce* 2864, 18.10.1948 (PERTH); nr. NW. side of Lake Unicup, S. of Tonebridge, *Pullen* 9975, 11.12.1874 (CANB, NSW); nr. Lake Muir, *Christensen* 181, 10.11.1970 (PERTH); Bow River, *Jackson* NSW 116596, 11.1912 (NSW); between Irwins Inlet & Brookes Inlet, *Jackson* NSW 116597, 12.1912 (NSW). **Eyre:** Cape Arid National Park, E. of Esperance, *Royce* 9934, 1.12.1971 (PERTH).

### *Stipa crinita* Gaudich. in Freycinet, Voy. Uranie Bot.: 407 (1830).

HOLOTYPE: WESTERN AUSTRALIA: 'Novae-Hollandiae ora occidentalis (baie des Chiens Marins)' [Shark Bay] collected by Labillardière (P!; isotypes G, FI-W). This specimen had been regarded as lost for some time (Hughes, *Kew Bull.* 1922: 21), causing much confusion in the use of the name. Fortunately, the specimen was found in P after having been misfiled some time ago. The specimen referred to by Hughes (*ibid.*) as *S. flavescens* is a specimen of *S. pubescens*.

Caespitose perennial to 1 metre high with very short rhizomes. Shoots conspicuously extravaginal. Culms erect, terete, (1.5–) 2–2.5 (–3.5) mm wide, finely to strongly ribbed, glabrous but minutely puberulous between the ribs on the lower parts and just below the nodes; nodes 2–4, sericeous, exserted. Leaf sheaths tight around the culms and shoots, glabrous, lower sheaths sometimes puberulous; outer margin glabrous but sparsely long-ciliate on the basal sheaths; inner margin glabrous. Ligule broadly obovate to ovate, 0.5–2 mm long, short- to long-ciliate, puberulous on the back; auricles with several to many hairs c.

1 mm long in a tuft. Leaf blades flat or weakly rolled, to 30 cm long, 1.5–4 mm wide; abaxial surface ribbed, glabrous to sparsely pubescent on the ribs, densely puberulous to scaberulous between the ribs; adaxial surface ribbed, short- to long-pubescent and, in addition, antrorsely scabrous between the ribs; margins glabrous. Panicle linear, contracted, 15–30 cm long, densely flowered with close fascicles of unequal, many-flowered compound branches, base enclosed by the sheath until late maturity; axis sparsely scaberulous; branches 15–40 mm long, glabrous to scaberulous, slightly ribbed; pedicels slightly angular, 2–8 mm long, puberulous to scaberulous. Spikelet 9–15 mm long (excluding awn), not or only slightly gaping. Glumes acute or shortly acuminate, evenly textured from base to tip, green or bleached, rarely evenly purple-tinged, unequal, puberulous to scaberulous, sometimes glabrous between the nerves; lower glume 9–15 mm long, the lower 65–75% 3-nerved; upper glume 7.5–11.5 mm long, lower 30% 4–5-nerved, the next 35–45% 3-nerved. Floret very narrow elliptic, 5–6.5 mm long (including callus). Lemma smooth, white to tawny at maturity, with long, soft, slightly spreading, white to yellow hairs, the upper overlapping the base of the awn, appearing to form a 2 mm coma, lobes absent. Callus straight, 1.3–1.4 mm long, sericeous with similar hairs to the lemma. Awn very slender, 0.15 mm wide near the base, 23–38 mm long, twice bent; column 7–12 mm long, 3–7 mm to the first bend, antrorsely scaberulous with hairs less than 0.1 mm long; bristle antrorsely scabrous. Palea acute, c. 0.5 mm shorter than the lemma, sericeous with long, soft hairs. Lodicules 2, membranous, abaxial, oblong, 1.5 mm long. Anthers not observed. Caryopsis not observed.

DISTRIBUTION: Islands and coast around the Shark Bay area of Western Australia.

The ms. name "*S. peronensis*" appears on some of our early determinavit slips on specimens of this species.

SELECTED SPECIMENS: WESTERN AUSTRALIA: **Carnarvon:** W. of White Beach, Dorre Island, *Weston 10484*, 13.8.1977 (PERTH); Dorre Island, Shark Bay, *Royce 5909*, 15.7.1959 (PERTH); Sandy Point, Dirk Hartog Island, 25°42'S, 113°03'E, *George 11536*, 5.9.1972 (PERTH); Cape Ransonnet, Dirk Hartog Island, 26°09'S, 113°13'E, *George 11394*, 2.9.1972 (PERTH); nr. 'Peron Peninsula' Station, *Whitley NSW 135864*, 5.9.1972 (NSW); Peron Peninsula, *Blackall 4640* (in part), 9.1940 (PERTH); Mt Elliot, Carrarang, *Beard 7073*, 16.10.1974 (PERTH). **Irwin:** N. to Houtman Abrolhos, *Storr 2225*, 6.9.1959 (PERTH).

***Stipa curticoma* J. Vickery**, *Telopea* 2(1): 11 (1980).

HOLOTYPE: SOUTH AUSTRALIA: Mt Lofty Ranges, 3 km S. of Mt Barker, *M.D. Crisp 884*, 13.10.1974 (CBG 058899).

Caespitose perennial to 1.2 metres high with a basal tuft of leaves c. one third the height. Culms usually geniculate at the base, terete, 2–3 mm wide near the base, scarcely compressible, slightly ribbed, glabrous except puberulous at the very base and just below the nodes; nodes 3–4, exserted, sericeous, 25–40% broader than adjacent internodes. Leaf sheaths at first tightly enveloping the culm, later becoming free, 4–6 mm wide,  $\frac{1}{2}$ – $\frac{2}{3}$  the length of the internodes; basal sheaths puberulous, especially just below the orifice, to almost glabrous; upper sheaths minutely scaberulous or glabrous, occasionally puberulous near the margins; outer margin ciliate or, on upper sheaths, glabrous. Ligule truncate, coriaceous, 0.5–1.5 mm long, ciliate, abaxial surface puberulous; auricles usually thickened and spreading, with hair tufts to 1 mm long. Leaf blade flat or weakly rolled (those of the basal tuft more tightly so), 3–5 mm wide, to 30 cm long; abaxial surface slightly ribbed, glabrous or densely scabrous with minute hairs, with occasional, scattered, moderately long, rigid, straight

hairs or strong hooks; adaxial surface ribbed, minutely scaberulous, sometimes with scattered longer hairs; margins similar to abaxial surface or with occasional long, stiff, scabrous hairs. Panicle 15–30 cm long, exserted, with distant fascicles of unequal, few- to many-flowered, compound branches, usually spreading, 5–7 cm wide (excluding awns); axis terete to flattened upwards, glabrous to scabrous with glistening hairs upwards; branches to 10 cm long, flattened to angular, the edges scabrous with glistening hairs; pedicels 4–16 mm long, flattened to angular, scabrous with glistening hairs on the edges. Spikelets 12–16 (–18) mm long (excluding awn), gaping slightly at first, but widely after floret disarticulation. Glumes unequal, acuminate to acute-oblong, firm and green at the base, membranous and purple-tinged across the centre, hyaline and occasionally torn at the tip, scaberulous on the nerves only, or overall, slender chlorenchyma bands associated with the nerves; lower glume 12–16 (–18) mm long, the lower 60–75% 3-nerved; upper glume 9–14 mm long, lower 30% 5-nerved, next 30–45% 3-nerved. Floret oblong-cylindrical with a well defined neck, (5.8–) 6.5–8 mm long (including callus). Lemma very slightly gibbous at maturity, reddish brown to almost black at maturity, the central nerve slightly thickened, the surface granular, with sparse spreading white hairs glistening at maturity, sparser towards the apex; lobes 2, 0.1 (–0.5) mm long; coma 0.5–1.0 mm long but usually with a few hairs to 0.5 mm longer. Callus 1.5–2.5 mm long, sharp, sturdy and curved, sericeous with hairs yellowing at maturity. Awn 45–65 mm long, twice bent, 0.25–0.35 mm wide near the base; column 18–25 mm long, 9–11 mm to the first and stronger bend, densely pubescent with spreading glistening hairs 0.25–0.5 mm long; bristle scabrous. Palea  $\pm$  equal to the lemma to shorter by 0.3 mm, broadly acute to acuminate, finely granular down the back, hyaline on the margins to membranous at the tip with sparse hairs down the centre and occasionally at the tip. Lodicules 3, membranous; 2 abaxial 1.3–2.0 mm long, oblong to narrow-cuneate; paleal 1–1.3 mm long, oblong to narrow-triangular. Anthers 3–3.5 mm long, penicillate. Caryopsis c. 4 mm long; embryo 30% the length; hilum 90% the length.

**DISTRIBUTION:** Heavier soils of the Lofty regions of southern South Australia, Kangaroo Island and extending into the Grampians, Victoria.

**SELECTED SPECIMENS:** VICTORIA: **Region C:** 4.7 km from Dimboola, Nhill road, *Canning* 2972, 11.11.1969 (NSW); Grampians, Mt. Arapiles, *Beaulehole* 29667, 20.11.1968 (ACB). **Region N:** Melbourne, *Smith* 69/43, 30.10.1969 (MEL).

**SOUTH AUSTRALIA:** **Eyre Peninsula:** Claremont Hill, *no collector*, 11.1925 (ADW 278 in part). **Northern Lofty:** Clare, *Black*, 8.11.1920 (AD 97420231). **Yorke Peninsula:** Point Davenport, *Symon* 11885, 4.11.1979 (ADW). **Southern Lofty:** Black Hill, c. 12 km ENE. of Adelaide, *Czornij* 253, 21.11.1968 (AD); Modbury, c. 15 km NE. of Adelaide, *Spooner* 1274, 24.10.1970 (AD); Beefacres, between Hope Valley Reservoir & Torrens Creek, *Spooner* 2718, 21.12.1973 (AD); Hope Valley, c. 10 km NE. of Adelaide, *Cleland*, 15.11.1947 (AD); near Highbury Hotel, c. 13 km NE. of Adelaide, *Kraehenbuehl* 824, 22.10.1942 (AD); Highbury, Sassafras Drive, c. 15 km NE. of Adelaide, *Spooner* 1318, 12.10.1970 (AD); National Park, c. 6 km SE. of Adelaide, *Cleland*, 17.12.1939 (AD); Adelaide Hills Belair, *Hilton*, 13.10.1944 (ADW 44019); Adelaide Plains near Plympton, c. 5 km SW. of Adelaide, *Smith* 1224, 19.10.1968 (AD); Waite Institute, *Eardley*, 10.11.1931 (ADW 251); Adelaide foothills, Netherby, *Hilton*, 19.9.1944 (ADW 44105); Coss Scrub National Park, c. 55 km SSE. of Adelaide, *Crisp* 121, 30.10.1971 (AD). **Kangaroo Island:** Kingscote, *Cleland*, 23.11.1945 (AD). **South-eastern:** Encounter Bay, Halls Creek, c. 5 km W. of Victor Harbour, *Cleland*, 5.1.1940 (AD).

In habit and general appearance *S. curticoma* resembles some South Australian specimens of *S. blackii* but differs in that the coma of hairs at the apex of the lemma is very short. It differs from *S. eremophila* in its taller habit, essentially flat leaf blades, mostly white (only tardily fulvous) hairs on the

lemma, much shorter bristle and usually broader glumes; from *S. flavescens* in its broader glumes, stouter awn with the column stiffly scabrous-pubescent (not very finely pubescent to pilose), and shows no particular preference for maritime or estuarine habitats; from *S. aristiglumis* in its longer glumes, longer lemma with a longer and almost straight callus, and appears to occur in quite different edaphic and geographic situations; from *S. gibbosa* in its longer and more or less evenly fusiform lemma, usually longer awn, and usually narrower palea with a band of hairs down the middle of the back.

***Stipa densiflora* Hughes**, Kew Bull. 1921: 18, fig. 20, (1921); *non* Smirn. (1929); Vickery, Contrib. N.S.W. Natl. Herb. 2: 78 (1953); Burbidge & Gray, Fl. Austral. Cap. Terr.: 53 (1970).

HOLOTYPE: Central Victoria, *Etheridge* 1865 (K!). The Type sheet consists of a packet containing a small fragment of panicle with spikelets, and a small drawing by Hughes of a spikelet and a lemma; also a drawing of a panicle subtended by two uppermost leaves with no indication of what specimen it represents.

SYNONYM: *S. congesta* Summerhayes & Hubbard, Kew Bull. 1927: 362 (1927). HOLOTYPE: SOUTH AUSTRALIA: Morialta, *Cleland* 33, 2.10.1925 (K!, isotype at AD and fragment at MEL).

Caespitose perennial c. 0.5–1.5 metres high, not rhizomatous, with a basal tuft of leaves one third to half the height. Culms erect, slightly geniculate at the base, terete, not compressible, slightly ribbed, pubescent with hairs 0.1–0.7 mm long becoming minute upwards; nodes 2–4, exserted, densely sericeous with hairs to 0.5 mm long, to 50% wider than the adjacent internodes. Leaf sheaths not inflated; basal sheath 0.5–1.5 cm wide, slightly ribbed, pubescent with hairs to 0.4 mm long to glabrous; inner margin glabrous; outer margin ciliate with hairs minute–0.6 mm long; upper sheath 5–10 mm wide, moderately ribbed, pubescent down the centre with hairs minute–0.5 mm long; margins scaberulous with hairs minute–0.1 mm long or scabrous with minute tubercles; inner margin glabrous or ciliate with hairs 0.1–0.2 mm long, outer margin ciliate with hairs 0.2–0.7 mm long; collar with hairs 0.1–0.7 mm long. Ligule truncate to shortly lacinate, (0.1–) 1–4 mm long, ciliate with hairs 0.1–0.5 mm long; abaxial surface sericeous with hairs 0.1–0.5 mm long; auricles, when present, thickened, 5–15 mm long, glabrous. Leaf blade weakly rolled, linear, 1.5–4.5 mm wide, 15–45 cm long; abaxial surface moderately ribbed, the surface scabrous with minute tubercles, or sparsely pubescent with hairs to 0.5 mm long; adaxial surface strongly ribbed, pubescent with hairs 0.1–0.2 (–0.5) mm long; margins glabrous or similar to adaxial surface. Panicle 10–30 cm long, exserted, moderately dense with distant fascicles of unequal, few-flowered, compound or simple branches, contracted (although spreading at anthesis), 2–5 cm wide (excluding awns); axis terete (or angled), scabrous with hairs minute–0.1 mm long; branches 2–8 cm long, angled, pubescent to scabrous with hairs minute–0.2 mm long. Spikelets 13–18 mm long (excluding awn), gaping. Glumes unequal to equal, acuminate; lower glume 13–18 mm long, sericeous with hairs minute–0.5 mm long, lower (35–) 40–55% (5–) 3-nerved, upper 45–60 (–65)% (3–) 2–1-nerved; upper glume 12–16 mm long, sericeous with hairs minute–0.1 mm long, lower 15–35 (–45)% (5–) 3-nerved, upper 45–60 (–65)% (3–) 2–1-nerved. Floret cylindrical, 5.5–7 mm long (including callus), without a neck. Lemma surface scabrous, especially at the apex, sericeous with white hairs 0.3–0.6 mm long; lobes and coma absent. Callus 1.2–1.8 mm long, weakly bent at the tip, densely sericeous with hairs 0.2–1 mm long. Awn 3.5–4.5 cm long, strongly twice bent, 0.2–0.3 mm wide near the base; column 13–20 mm long,

10–13 mm to the first bend, pubescent to plumose with hairs 0.5–1 mm long; bristle scabrous with hairs minute–0.2 mm long. Palea  $\pm$  equal to the lemma, acute, scabrous, glabrous and smooth on the edges, sericeous with hairs 0.3–0.6 mm long. Lodicules 3; 2 abaxial, membranous, obtuse, 1.5–2 mm long; paleal acute, 1.6–1.8 mm long. Anthers 2–3 mm long, not penicillate. Caryopsis 3–3.5 mm long; embryo 20–25% the length; hilum 70–85% the length.

**DISTRIBUTION:** Tablelands and western slopes of the Great Dividing Range, from southern Queensland into Victoria and higher areas of southern South Australia, usually on low fertility soils.

**SELECTED SPECIMENS:** QUEENSLAND: **Darling Downs:** Wallangarra, *Hilton* NSW 116904, 14.1.1945 (AD, NSW); Wyberba, *Blake* 4632, 23.1.1933 (NSW).

NEW SOUTH WALES: **Central Coast:** The Oaks, Orangeville road, *McBarron* 13704, 12.1966 (NSW, CANB). **South Coast:** Cobargo, *District Agronomist Bega*, NSW 115837, 10.1970 (NSW); Wolumba, *Blacke* NSW 116248, 23.10.1974 (NSW). **Northern Tablelands:** head of the Gwydir (River), *no collector* (MEL 60916); Parlour Mountains, Booralong, c. 18 miles [29 km] SW. of Guyra, *McKie* 2407, 27.12.1943 (BRI); 5.5 miles [9 km] N. of Armidale on road to Guyra, *Jessup & Gray* NSW 115838, 1.1953 (NSW). **Central Tablelands:** Ilford, *Sutor* NSW 115839, 12.1963 (NSW); Sodwalls, *Dellow* NSW 115840, 11.1971 (NSW); Joadja Valley, 12 miles [19 km] W. of Bowral, *Rodway* NSW 115841, 3.1956 (NSW); Berrima, *Calvert* (MEL). **Southern Tablelands:** Goulburn, *Vickery* NSW 18038, 11.1931 (NSW); Cullerin Range, 4.2 km N. of Cullerin, *Crisp* 2319 & *Telford*, 19.11.1976 (CBG); Yass district, *Pastures Protection Board* NSW 15847, 12.1942 (NSW); Bungonia Gorge, S. of Marulan, *Pullen* 4163, 11.1966 (NSW, CANB); c. 4 miles [22 km] from Tarago towards Braidwood, *Wheeler* 16, 23.11.1972 (CBG); 8 miles [13 km] NE. of Bungendore, Gunning Shire, *Story* 7888, 16.4.1967 (CANB); Black Mt, Canberra (A.C.T.), *Pullen* 19, 12.1956 (NSW, CANB, AD); near Doughboy Creek, Goulburn to Braidwood road, *Pullen* 2059, 8.12.1959 (CANB); Mt Majura (A.C.T.), *Burbidge* 1804, 6.1.1948 (CANB); 6 miles [10 km] from Canberra on Federal Highway to Goulburn, *Burbidge* 1803, 6.1.1948 (CANB); Canberra Botanic Gardens, *Beeton* CBG 044493, 1.1972 (CBG); near Tharwa (A.C.T.), *Blake* 7547, 2.1935 (NSW); Cooma, *Mueller* NSW 115845, 12.1952 (NSW). **North Western Slopes:** c. 20 miles [32 km] NNE. of Ashford on road to Emmaville, *Morrow* 96, 22.3.1968 (NSW); Inverell, *Thomas* NSW 115868, 1.1912 (NSW); Barraba, *Rupp* NSW 115866, 11.1913 (NSW); Tamworth district, *Boyle* NSW 115865, 11.1947 (NSW); Coonabarabran, *McDonald* NSW 115867, 10.1903 (NSW). **Central Western Slopes:** Cobbora, *MacCulloch* NSW 15869, 11.1969 (NSW); 8 miles [13 km] NE. of Dubbo towards Mendooran, *Coveny* 2483, 26.11.1969 (NSW); Mudgee, *Wools*, s.d. (MEL 60923); Reefton, *Nixon* NSW 115879 (NSW); Harvey Ranges, Peak Hill, *no collector*, 11.1905 (NSW 115880); Parkes, *Perry* NSW 115876, 11.1962 (NSW); Rankin Springs, *Wallin* NSW 115877, 10.1956 (NSW); Grenfell, *Hill* NSW 115875, 11.1962 (NSW); Ariah to Coolamon road, *Southwood* NSW 115871, 10.1963 (NSW); Ardlethan, *Cambage* NSW 115885, 10.1916 (NSW, CANB); Temora, *Dwyer* NSW 115872, 11.1916 (NSW); 20 km W. of Temora, *Crisp* 1658, 20.11.1975 (NSW, CBG); Narraburra–Trungle Hills, Temora, *Dwyer* NSW 115883, 10.1915 (NSW). **South Western Slopes:** Wagga, *Crisp* 1825, 27.11.1975 (CBG); The Rock, *Constable* 5174, 21.10.1964 (NSW, CANB, BRI); Milbrulong, *Newman* NSW 115870, 11.1955 (NSW); Tumut–Tumbarumba–Holbrook district, *Morland* NSW 115874, 1.1948 (NSW); Walbundry–Albury, *Moore* M492, 7.12.1946 (CANB). **North Western Plains:** Coolabah, *Maiden & Boorman* NSW 115888, 8.1910 (NSW). **South Western Plains:** Monia Gap, *Constable* NSW 4604, 10.1947 (NSW); Milby Hill, Condobolin, *Cunningham* NSW 115886, 11.1972 (NSW); Boppy Mt, *Boorman* NSW 115887, 7.1903 (NSW); Mt Binya, c. 25 km ENE. of Griffith, *Crisp* 1466, 12.11.1975 (NSW, CBG); Griffith, *McKie* NSW 116905, 27.10.1939 (NSW).

VICTORIA: **Region J:** Mt Hamilton, Wulgulmerang, East Gippsland, *Beaulehole* 36115, 16.1.1971 (NSW). **Region K:** Brisbane Range, Staughton Vale (c. 50 km SE. of Ballarat), *Cleland*, 11.1923 (AD). **Region M:** Eaglehawk, *Canning* 3010, 14.11.1969 (CBG); Longwood, *Stewart*, 10.1950 (BRI); Mt McIvor, *Stuart*, s.d. (MEL.). **Region N:** Bairnsdale district, *Hart* (MEL); Kew (Mt Yarra), *Dakin*, 2.1934 (MEL). **Region R:** c. 1.25 miles [2 km] E. of Mt Pilot, c. 6 miles [10 km] N. of Beechworth, *Beaulehole* 43598, 23.11.1973 (NSW); Warby Range, near Wangaratta, *Canning* 3214, 29.11.1972 (CBG); Beechworth Gorge, *Canning* 392, 30.10.1967 (CBG); Mt Stanley, *McBarron* 2914, 3.1.1949 (NSW). **Region S:** Valencia Creek road, 15.5 miles [24.8 km] SE. of Mt Wellington, *Beaulehole* 43434, 30.10.1973 (NSW). **Region V:** Mitta Mitta, *Black*, 5.11.1939 (CANB 9777). **Region W:** Rocky Knob near Bridle Creek, Suggan Buggan, *Beaulehole* 33249, *Finck & Rogers*, 6.1.1970 (NSW). **Region Z:** Upper Genoa River, *Beaulehole* 35010 and *Rogers*, 30.11.1970 (NSW).

SOUTH AUSTRALIA: **Flinders Ranges:** Alligator Creek, *Ising*, 23.10.1928 (AD 966090382). **Eastern:** Morialpa [as Morialta], *Vickery* NSW 116246, 116247, 11.1938 (NSW). **Southern Lofty:** Barossa

Valley, *Hilton 195* (ADW); Torrens Gorge, East, *Spooner 420*, 22.10.1969 (AD); Mt Barker, *Cleland*, 4.12.1943 (AD).

*S. densiflora* has been included in *S. semibarbata* by many authors including Maiden, *Manual Grasses N.S.W.*: 115 (1898); Willis, *Handb. Pl. Victoria* 1: 184 (1962), edn 2: 184 (1970).

***Stipa dongicola* J. Vickery, S. W. L. Jacobs & J. Everett, sp. nov.**

*S. curticomae* affinis sed columna villosa, spicula omnibus partibus minore, palea glabra, nodis conspicuis glabrisque differt.

HOLOTYPE: WESTERN AUSTRALIA: Blackoak Donga, 'Kanandah' Station, approx. 20 km N. of Naretha. Donga. *M. G. Brooker 160*, 16.9.1974 (CANB 249733; isotype NSW).

Caespitose perennial to c. 1 metre tall, with few, conspicuously extravaginal shoots, and a very short rhizome. Culms 1.3–2.3 mm wide, rigid, terete, finely ribbed, minutely retrorsely scaberulous–puberulous between the ribs, glabrous upwards; nodes 3–4, glabrous, usually thickened, to 60% broader than adjacent internodes, exserted. Leaf sheaths narrow, loose, smooth and glabrous, or the lowermost scaberulous and hirsute; the orifice and the collar hairier than the sheath; outer margin similar to adjacent surfaces. Ligule obtuse to truncate, coriaceous, 0.8–1.5 mm long, densely sericeous on the back. Leaf blades linear, to 35 cm long, c. 3–4 mm wide, usually expanded and flexuose or, if inrolled, then erect; abaxial surface sparsely hirsute to scabrous with dense short hairs; adaxial surface sparsely to densely pubescent, scaberulous with sparse minute hairs. Panicle with distant fascicles of unequal compound branches, contracted to spreading at length, exserted early, c. 14–30 cm long, 1–6 cm wide (excluding awns); axis flattened, scabrous to scaberulous with dense short hairs; branches 2–5 cm long, pedicels 2–11 mm long, both with similar indumentum to the axis. Spikelets only slightly gaping even after floret disarticulation, 7–12 mm long (excluding awn). Glumes subequal, broad, acuminate, firm and usually purple in the lower half, hyaline and easily eroded at the tips; lower glume 7–12 mm long, lower 75% 3-nerved; upper glume 8–11 mm long, lower 30% 5-nerved, the next 45% 3-nerved. Floret 5–6.5 mm long (including callus), oblong-cylindrical with a well defined neck showing 3 thickened nerves. Lemma scabrous, especially at the neck, with antrorsely hooked tubercles, reddish brown at maturity, with slightly spreading white to yellow-orange hairs sparser just below the apex, and with a sparse coma to 0.7 mm long mainly in two tufts; lobes absent or minute. Callus 1.5–2 mm long, slightly blunt, sericeous with hairs slightly darker than those on the lemma. Awn c. 0.3 mm wide, 30–40 mm long, twice bent, the first bend less developed; column c. 15 mm long, the first section c. 10 mm long, villous with hairs 0.5–1.5 mm long, the second section scaberulous; bristle scabrous with short dense hairs. Palea subequal to the lemma, broadly obtuse, glabrous, granular down the back, the margins hyaline. Lodicules 3, membranous; 2 abaxial broad-cuneate, c. 0.6 mm long; paleal acute, c. 0.4 mm long. Anthers c. 3.5 mm long with sparse tufts c. 0.25 mm long at the tip. Caryopsis slightly gibbous, 3–3.5 mm long; the hilum 75% the length, the embryo 35% the length.

SPECIMENS EXAMINED: WESTERN AUSTRALIA: **Eucia**: 60 miles [96 km] N. of Loongana, *Mitchell 86*, 5.10.1974 (PERTH, NSW); 50 miles [80 km] NNE. of Rawlinna, *Brooker 170*, 5.9.1974 (CANB, NSW); 50 km N. of Rawlinna, *Brooker 3633*, 4.6.1971 (PERTH); Blackoak Donga, c. 20 km N. of Naretha, *Brooker 160*, 16.9.1974 (CANB, NSW); CSIRO property, Rawlinna, *Goodall 2980*, 20.6.1966 (PERTH); 30 km S. of Rawlinna, 125°28'E, 31°11'S, *Chinnock 1157*, 1.9.1973 (AD); 62 km S. of Rawlinna, Cocklebidy road, *George 11877*, 12.7.1974 (PERTH, NSW).

The specific epithet refers to the habitat common to most of the specimens on the Nullarbor Plain, i.e. dongas (or gilgais).

Like *S. curticoma* but differing in the villous column, the overall smaller dimensions of the spikelet, the glabrous palea and in the conspicuous, glabrous nodes. Differs from *S. blackii* in its shorter coma and villous column.

***Stipa drummondii* Steudel**, Syn. Pl. Glum. 1: 128 (1854); Benth. Fl. Austral. 7: 567 (1878); Hughes, Kew Bull. 1921: 16 (1921), *ibid.* 1922: 17 (1922); Black, Fl. S. Austral. edn 2: 88, fig. 108 (1974); Gardner, Fl. W. Austral. 1, Gram.: 176 (1952); Willis, Handb. Pl. Victoria 1: 186 (1962), edn 2: 186 (1970).

HOLOTYPE: cited as 'Australasia. *Drummond, Coll. IV, nr. 578*'. Drummond's collecting number is believed to have been misunderstood by Steudel. A specimen in Steudel's herbarium (P!) bears Drummond's original collecting ticket numbered 378, and has a label in Steudel's handwriting 'Stipa Drummondii. Steud. quo ad descriptionem a *S. campylachne* Nees et omnibus (...) usque e N. Holl. descriptis speciebus diversa'. This we have taken as the Holotype; duplicates of the Type number at MEL (MEL 59909), PERTH and K (labelled *Drummond 378, 4th collection*, as cited by Benth.). An un-numbered Drummond specimen in NSW (NSW 16249) also matches the Type numbers at MEL and K.

SYNONYMS: *S. luehmannii* Reader, Victorian Naturalist 16: 158 (1900); Hughes, Kew Bull. 1921: 28 (1921). HOLOTYPE: VICTORIA: Sandy Desert, Lowan, 30.11.1898, *F.M. Reader* (MEL 59939).

*S. horrifolia* J. Black, Trans. & Proc. Roy. Soc. S. Austral. 44: 191 (1920). LECTOTYPE, **here designated**: Nullarbor Plain, *R.S. Rogers*, 4.1911 (AD 97424081; isoelectotypes MEL 59940, NSW 116254).

POSSIBLE SYNONYMS: *S. scabra* var. *subtricha* Reader, Victorian Naturalist 17: 156 (1901). HOLOTYPE: cited as 'Jan. 1899. Sandy regions, Lowan, *F.M. Reader*'. We have not found this specimen in MEL, where Reader's collections are now housed. There are, however, two other specimens from the same area (MEL 60784 and 60885) named as such, MEL 60784 in Reader's handwriting. Both these specimens are *S. drummondii*.

*S. scabra* var. *auriculata* J. Black, Fl. S. Austral. 1: 67 (1922). HOLOTYPE: cited as 'Dry Districts'. We have not been able to find a specimen so labelled but in K there is a specimen from Laura, 8.10.1916, labelled as *S. scabra* var. *auriculata* in J.M. Black's handwriting. This specimen is *S. drummondii*.

Caespitose perennial to 1 metre high with a basal leaf tuft often less than one third the height. Culms erect or geniculate, compressible, terete, 2–3 mm wide near the base, slightly ribbed, densely puberulous or scaberulous to almost glabrous, or tomentose especially just below the nodes; nodes 2–3, rarely exserted, to 25% broader than adjacent internodes, almost glabrous or sericeous. Leaf sheaths inflated, slightly ribbed, scaberulous, hirsute, with longer hairs around the collar; uppermost sheaths glabrous; inner margin glabrous; outer margin glabrous or occasionally ciliate just below the orifice. Ligule thinly coriaceous, 0.4–0.8 mm long or continuous with the sheath margins and to 1.5 (–4) mm long, ovate to irregularly truncate, ciliate; abaxial surface sparsely pubescent; auricles tufted. Leaf blades to 20 cm long, 2–6 mm wide, mainly erect, occasionally flexuose, usually expanded with incurved margins or involute; abaxial surface scarcely ribbed, scabrous and hirsute; adaxial surface deeply ribbed, scabrous and pubescent or hirsute. Margins similar to abaxial surface. Panicle to 40 cm long, 4–10 (–16) cm wide (excluding awns), exserted, spreading, dense with moderately distant fascicles of numerous many-flowered branches; axis terete, pubescent and/or scaberulous; branches to 13 cm long ± terete, pubescent or scaberulous; pedicels to 20 mm long, ± terete, pubescent or scaberulous. Spikelets(7–) 8–12 mm long (excluding awn), gaping. Glumes

unequal, acuminate or acute, the tips easily torn, often purple-tinged, usually associated with diffuse chlorenchyma bands; lower glume (7-) 8-12 mm long, membranous and translucent, the lower 25% obscurely 3-5-nerved; upper glume (6-) 7-11 mm long, membranous and translucent at the tip, firm and chaffy at the base, the lower 40-60% 5-nerved, the next 25% 3-nerved. Floret linear to slightly turbinate to fusiform, 4-6 (-7) mm long (including callus). Lemma very finely granular, except tuberculate over the apex of the midvein, red to black-brown at maturity, the midvein slightly paler and thickened; hairs white, erect and slightly spreading, sparse especially at the apex; coma obscure, of few hairs to 0.5 mm long, or absent; 1-2 lobes to 0.2 mm long. Callus 1.5-2.5 mm long, fine and straight, sericeous with dense hairs similar to those of the lemma. Awn (40-) 60-90 mm long, 0.2-0.3 mm wide near the base, falcate; column (11-) 14-18 (-21) mm long, 10-19 mm to the end of the straight portion, densely pubescent or villous with spreading hairs 0.3-0.8 (-1.5) mm long; bristle scaberulous. Palea 0.3-0.5 mm shorter than the lemma, obtuse, coriaceous down the centre with few hairs at the base, margins membranous and glabrous, tip membranous, glabrous or ciliate. Lodicules 2, membranous, abaxial, 0.8-1.8 mm long, linear-spathulate. Anthers 1.8-3 mm long, often lightly pencillate. Caryopsis 3-5 mm long; embryo 40% the length; hilum 50-65% the length.

**DISTRIBUTION:** Sandy areas of the western plains of New South Wales and Victoria, extending across South Australia into the southern regions of Western Australia.

**SELECTED SPECIMENS:** NEW SOUTH WALES: **North Western Slopes:** Liverpool Plains, *no collector* NSW 16259, 2.1880 (NSW). **North Western Plains:** Bungunyah, *Henderson* 335, 27.10.1947 (NSW); Coolabah, *Peacock* NSW 116877, 10.1900 (NSW). **South Western Plains:** Griffith, *Vickery* NSW 10186, 19.10.1949 (NSW); W. of Balranald, *Henderson* 337/2, 5.10.1947 (NSW); 30 km NNW. of Balranald, *Crisp* 1760, 29.11.1975 (NSW, CBG); 5 miles [8 km] W. of Stony Crossing, *Henderson* 337/1, 13.10.1947 (NSW); S. of Tueloga, *Henderson* 337/4, 23.9.1947 (NSW); Cunninyeuk (S. of Balranald), *Henderson* 174, 8.10.1946 (NSW); Coobool Sandhill, *Henderson* 335/2, 6.10.1947 (NSW); Barham, *Vickery* NSW 10195, 13.10.1949 (NSW); Barooga, *Vickery* NSW 116268, 11.10.1949 (NSW). **North Far Western Plains:** c. 150 km NW. of Louth, *Moore* 5050, 25.4.1967 (CANB). **South Far Western Plains:** c. 10 km before Menindee, *Richley* M5, 5.9.1973 (AD); Ivanhoe, *Leigh* NSW 116293, 19.10.1964 (NSW); 60 miles [96 km] S. of Wilcannia, Cobar road, *Martensz* 1513, 2.1968 (CANB).

**VICTORIA:** **Region A:** Northern Plains, 30 km SSW. of Mildura, 9 km S. of Benetook along Meridian road, *Crisp* 3292, 9.10.1977 (CBG); Mildura, *Williamson*, 28.10.1928 (MEL); 41.5 miles [66.4 km] from Mildura towards Renmark (S.A.) along Sturt Highway, *Canning* NSW 116266, 27.8.1968 (NSW; BRI dupl. of CBG); Redcliffs, *Beaulehole* 7550, 18.9.1964 (NSW); Hattah Lakes National Park, *Phillips* CBG 027109, 14.11.1962 (CBG). **Region B:** Murrayville, *Williamson*, 28.10.1928 (MEL); 4 miles [6 km] N. of Tempy, *Henshall* NSW 116676, 20.9.1969 (NSW); Wyperfeld National Park, *Beaulehole* 29231, 29178 & *Finck*, 10.10.1968 (NSW, MEL). **Region C:** Little Desert, *Reader*, 19.11.1899 (MEL); Sandy Desert, *no collector* (MEL 59908). **Region G:** Wathe Wildlife Reserve, 13 km WNW. of Gama, *Beaulehole* 56943, 23.10.1977 (MEL). **Region H:** Boort, *Purdie*, 1894 (MEL 59893); Borung, *Reader*, 23.10.1904 (AD; MEL 59895). **Region L:** Gunbower, *Curtis*, (MEL 59896). **Region M:** Kamarooka, N. of Bendigo, *Morris*, 10.1947 (MEL). **Region Q:** Cobram, *Moore* M977, 20.10.1948 (CANB).

**SOUTH AUSTRALIA:** **Nullarbor:** Colona to Ooldea road, *Cleland*, 8.10.1954 (AD, ADW); Nullarbor Plain, 1.6 km W. of Ivy Tanks, *Beaulehole* 49476, 31.8.1974 (CANB); 'Nullarbor' Station, *Black* NSW 116255, 6.1911 (NSW); 5 km E. of 'Koonalda' Homestead, *Chinmock* 1191, 21.9.1973 (AD, NSW); Tallowan Tank, *Cleland*, 17.10.1953 (AD); 'Yalata' Homestead, *Cleland*, 18.10.1953 (AD). **Flinders Ranges:** Greenhill road, *Cleland*, 9.10.1948 (AD); Parachilna Gorge, *Everett* 298 & *Jacobs*, 18.9.1981 (NSW); Deep Creek, 5 miles [8 km] E. of Burra, *Cleland*, 24.8.1941 (ADW); Waterfall Creek near Baroota, *Kraehenbuehl* 195, 18.9.1960 (AD); Tarcowie Common, 16 km W. of Peterbrough, *Crisp* 590, 9.9.1973 (CBG). **Eastern:** 30 km N. of Yunta, *Crisp* 588, 9.9.1973 (CBG). **Eyre Peninsula:** 49 miles [78 km] from Nundroo towards 'Nullarbor' Homestead, *Canning* NSW 116265, 116267, 3.9.1968 (CBG, NSW, BRI); Kooniba, *Cleland*, 6.10.1954 (AD); Ceduna, *Canning*



CBG 042997, 1.9.1968 (CBG, NSW); near Yardea, *Cleland*, 14.10.1954 (ADW); 24.9 miles [40 km] from Iron Knob towards Port Augusta, *Canning CBG 043034*, 28.8.1968 (CBG, BRI); Minnipa, *Black*, 9.1940 (AD); Minnipa-Wudinna, *French 8*, 10.1954 (ADW, NSW); Kimba, *French 2*, 2.10.1954 (ADW); 9 miles [14 km] from Cleve towards Lock, *Phillips 463*, 20.9.1965 (CBG); near Midgee Rocks on road to Mitchellville, NE. of Cowell, *Pearce NSW 116956*, 2.1965 (NSW, dup. of ADW); nr. Wild Horse Plain, near Lorne, *Blake 16844*, 28.8.1946 (BRI); 5.5 km S. of Cowell towards Whyalla, *Tindale 450*, 12.9.1970 (NSW); Verran Hill, Hincks National Park, *Alcock 2177*, 6.10.1968 (AD); Yelanna, 10 miles [16 km] N. of Cummins, *Hilton NSW 116289*, 20.12.1945 (ADW, NSW). **Northern Lofty:** between Port Wakefield and Kulpapa, *Blaylock 610*, 30.9.1967 (AD); c. 1 mile [1.6 km] S. of Freeling, *Kraehenbuehl 1541*, 18.9.1965 (AD); Gladstone, *Black*, 23.10.1915 (AD); 4 km S. of Kupunda on Adelaide road, *Monfries NSW 11364*, 20.10.1974 (ADW, NSW). **Murray:** 30 km N. of Yunta, *Crisp 588*, 9.9.1973 (CBG); Morgan, *Brummitt*, 28.8.1894 (AD); Markaranka, Morgan, *Symon 3561*, 7.10.1965 (K ex ADW); 1 km downstream from Overland Corner Hotel, River Murray, *Crisp 631*, 7.10.1973 (CBG); Gerrard, near Berri, *Cleland NSW 116274*, 28.8.1946 (AD, NSW); Loveday, *Gauba CBG 003953*, 14.12.1944 (CBG); between Renmark & Blanchtown, *Griffiths*, 18.9.1969 (CANB); Swan Reach, *Cleland*, 8.5.1946 (AD); Alawoona, *Cleland NSW 116256*, 3.12.1913 (NSW, AD); 10 miles [16 km] E. of Mannum, *Vickery NSW 2048*, 24.8.1946 (NSW); Mannum, *Blake 16842*, 24.8.1946 (BRI); Chauncys Line near Monarto, *Cleland SW 116273*, 12.10.1938 (NSW, AD); Monarto City Centre, *Symon 9068*, 26.11.1974 (ADW, NSW); Kinchina, *Cleland NSW 116261*, 23.9.1922 (NSW, AD); Murray Bridge, *Cleland*, 14.10.1949 (AD); 5 km W. of Tailem Bend, *Everett 300 & Jacobs*, 18.9.1981 (NSW); 45 miles [72 km] from Tailem Bend towards Lamerook, *Phillips NSW 116714*, 12.9.1973 (NSW, CBG); Cooke Plains, c. 40 km SSE. of Murray Bridge, *Sharrad 148*, 6.9.1959 (AD). **Yorke Peninsula:** South Kilkerran, *Beck*, 2.1942 (ADW); Port Broughton, *Morris*, 25.9.1947 (MEL); Tooligie district, *French*, 8.10.1954 (ADW); c. 8 km SSW. of Corny Point Lighthouse, *Blaylock 1061*, 13.10.1968 (AD); Corny Point, *no collector*, 10.12.1928 (ADW); 10 miles [16 km] from Edithburgh towards Moorie Point, *Phillips 1247*, 11.6.1971 (CBG). **Southern Lofty:** Roseworthy Agricultural College, *Hilton NSW 116294*, 30.9.1941 (ADW, NSW); 1 mile [1.5 km] past Kangaroo Flat on the Mallalla road, *Harris 34*, 1.10.1954 (AD); Middle Beach, *Noble 41*, 26.9.1972 (AD); Gawler Range near Artiming Dam N. of Yardea, *Symon 8155*, 3.10.1972 (ADW, NSW); Kambrai turnoff on Sedan road, *Cleland*, 14.9.1963 (AD); c. 1 km W. of Angle Vale road and western side of Parafield aerodrome, *Kraehenbuehl 1452*, 18.9.1965 (AD); Brougham Place, North Adelaide, *Black*, 10.12.1920 (AD); Seaton Golf Links (c. 9 km WNW. of Adelaide), *Smith 651*, 13.10.1967 (AD); Outer Harbour (c. 17 km NW. of Adelaide), *Cleland*, 22.10.1932 (AD); Menningham (Adelaide), *Hilton NSW 116291*, 8.9.1946 (ADW, NSW); coastal cliffs at Marino Rocks, *Smith 692*, 10.9.1967 (AD); Marino, *Cleland*, 15.9.1934 (AD); Hallett Cove, *Cleland*, 5.11.1926 (AD); Whittons Bluff at Port Noarlunga, *Smith 438*, 27.11.1967 (AD); Pedlars Beach, *Cleland*, 15.10.1927 (AD); North Willunga, *Hilton NSW 116290*, 20.10.1946 (ADW, NSW); Port Willunga, *Cleland*, 30.10.1928 (AD); Sellicks Beach, *Black*, 25.10.1940 (AD); cliffs at Aldinga Bay, *Andrews*, 2.11.1941 (AD); Goolwa, near Murray Mouth, *Cleland*, 8.1.1940 (AD). **South-eastern:** well c. 11 km from Meningee, *Cleland*, 15.10.1955 (AD); 1 mile [1.5 km] E. of Tintinara, *Hilton*, 11.10.1963 (ADW); Kingston Park, *Eardley*, 20.9.1936 (ADW).

WESTERN AUSTRALIA: **Eucla:** 'Mundrabilla' Station, *Coles Bros.*, 28.7.1930 (ADW); 45 miles [72 km] W. of Eucla, *Phillips NSW 116250*, 8.9.1962 (NSW, dupl. of CBG); pediment of Hampton Range, Eucla, *Noble 13*, 8.8.1973 (NSW); Roe Plain S. of 'Mundrabilla', *Mitchell 35*, 6.8.1974 (PERTH). **Coolgardie:** Frasers Range, *no collector* (MEL 59907); 7 km NNE. of Norseman, *Crisp 5951*, *Taylor & Jackson*, 19.9.1979 (CBG). **Roe:** Western margin of Lake King, *Saffrey 1209*, 29.9.1970 (PERTH). **Eyre:** Israelite Bay, *Brookes NSW 116252*, 9.1915 (NSW); Desmond nr. Ravensthorpe, *Maiden NSW 116253*, 11.1909 (NSW); Esperance district, *Rose*, 11.1962 (PERTH); Fitzgerald R. Reserve, *Royce 9192*, 21.10.1970 (PERTH). **Avon:** Cowcowing, *Koch 1235*, 9.1904 (NSW). **Irwin:** Mullewa, *Cleland*, 26.8.1948 (AD 97234216); c. 4 miles [6 km] S. of Marchagee on Geraldton Hwy., *Maslin 1414*, 20.10.1970 (PERTH).

*S. drummondii* can become infected by the same type of nematode ("Cockle") as *S. nitida* (see note under the latter species). The following specimens are examples of this infection:

VICTORIA: 15 miles [24 km] SSW. of Kerang, *Beauglehole 40672*, 1.11.1972 (NSW, IMI); Wyperfeld National Park, *Beauglehole 28523*, 19.9.1968 (NSW, IMI) p.p.

***Stipa echinata* J. Vickery, S.W.L. Jacobs & J. Everett, sp. nov.**

*S. stipoidem* simulans, sed gluma inferiore longiore, lobis lemmatum brevioribus, callo longiore, et arista multo longiore, differt.

HOLOTYPE: SOUTH AUSTRALIA: Hindmarsh I., E. of Goolwa, F.M. Hilton NSW 117382, 10.10.1945 (NSW).

Caespitose perennial c. 0.5 metres high with a basal tuft of leaves to half the height. Culms erect, terete, 1.5–2 mm wide near the base, not compressible, glabrous, smooth to strongly ribbed upwards; nodes 3–4,  $\pm$  exserted, densely sericeous with white retrorse hairs 0.15–0.25 mm long, not swollen. Leaf sheaths tightly enveloping the culm, 3.5–7 mm wide, glabrous, sometimes minutely scaberulous between the ribs; basal sheath smooth to moderately ribbed, inner margin glabrous, outer margin ciliate with hairs 0.2–0.6 mm long, glabrous on the innovations; upper sheath strongly ribbed, inner margin glabrous, outer margin ciliate with hairs 0.3–1.3 mm long, minutely ciliate on the innovations. Ligule truncate to obtuse, membranous, 1.5–2.5 mm long, glabrous to ciliate with hairs 0.1–0.2 mm long; abaxial surface sericeous with hairs c. 0.1 mm long to glabrous; auricles, when present, thickened, c. 1 mm long, ciliate at the base with hairs to 1.2 mm long; auricular lobes glabrous, to 3.5 mm long. Leaf blade tightly rolled, 1–2 mm wide, to 15 cm long, pungent; abaxial surface smooth and glabrous; adaxial surface strongly ribbed, densely scaberulous with minute siliceous prickles, sometimes also with sparse villous hairs 0.2–0.5 mm long. Panicle 10–20 cm long, exserted, with distant fascicles of unequal, few-flowered, compound branches,  $\pm$  contracted, 1.5–3 cm wide (excluding awns); axis terete to slightly angled, glabrous to scabrous along the edges with hairs c. 0.1 mm long; branches 1.5–2.5 cm long, terete to slightly angled, scaberulous with hairs minute–0.2 mm long; pedicels 2–10 mm long, slightly flattened to flattened, scaberulous with hairs minute–0.1 mm long. Spikelets 21–23 mm long (excluding awn), gaping. Glumes unequal, acute-acuminate, straw-coloured, scaberulous to scabrous with hairs minute–0.3 mm long or glabrous; lower glume 21–23 mm long, lower 50–65% 3-nerved; upper glume 14–18 mm long, lower 40–60% 5 (–7)-nerved, upper 60–40% (5–) 3–1-nerved. Floret cylindrical, without a neck, 8–10 mm long (including callus). Lemma surface smooth to slightly granular, densely sericeous with white hairs turning gold at maturity, 0.4–0.7 mm long; lobes 0.2–0.7 mm long, ciliate with hairs minute–0.1 mm long; coma 0.6–1.2 mm long. Callus 2.6–3.2 mm long, weakly bent at the tip, densely sericeous with white hairs 0.1–1 mm long turning gold at maturity. Awn 9–11 cm long, with 3 weak bends, 0.3–0.5 mm wide near the base; column 3–3.5 cm long, 1–2 cm to the first bend, straw-coloured, densely pubescent with white hairs 0.2–0.8 mm long; bristle straw-coloured to brown, scabrous along the edges with hairs minute–0.2 mm long. Palea  $\pm$  equal to the lemma, obtuse, smooth to slightly granular, sericeous along the centre back with hairs 0.2–0.8 mm long. Lodicules 2 (?), abaxial, membranous, 1–1.5 mm long, oblong. Anthers 3.2–3.8 mm long, penicillate. Mature caryopsis not observed.

DISTRIBUTION: Coastal and near-coastal areas of South Australia.

SPECIMENS EXAMINED: SOUTH AUSTRALIA: **Eyre Peninsula:** Reserve S. of Mt Verran, Cleland, 9.11.1960 (AD 968061288); Lincoln National Park, 34°56'S, 135°55'E, Heyligers 79005, 6.11.1979 (CANB, AD). **Murray:** 2 miles [3 km] E. of Tintinara, Hilton, 11.10.1953 (ADW 44072). **Yorke Peninsula:** Point Davenport, nr. 35°12'S, 137°24'E, Symon 11890, 4.11.1979, (NSW, dupl. of ADW); Ponderlow Bay, Blaylock 48, 10.10.1965 (AD). **Southern Lofty:** Hindmarsh I., E. of Goolwa, Hilton NSW 117382, 10.10.1945 (NSW, dupl. of ADW).

Occurs mainly near the sea but follows the Murray River up at least a short distance. The tussocks are spiny-leaved (similar to *S. stipoides*) and give rise to

the specific epithet. *S. echinata* differs from *S. stipoides* in having a longer lower glume, shorter lemma lobes, longer callus and much longer awns. *S. echinata* can be distinguished from *S. flavescens* by the spiny leaves, longer glumes and much longer awns. All three species are basically coastal.

***Stipa elegantissima* Labill.**, Nov. Holl. Pl. 1: 23, t. 29 (1804); Brown, Prodr.: 175 (1810); Hook. f., Fl. Tasman. 2: 111 (1858); Bentham, Fl. Austral. 7: 565 (1878); Hughes, Kew Bull. 1921: 11 (1921); Moore & Betche, Handb. Fl. N.S.W.: 483 (1893); Ewart, Fl. Victoria: 179 (1931); Willis, Handb. Pl. Victoria 1: 181 (1962), edn 2, 1: 181 (1970); Black, Fl. S. Austral. 1: 65 (1922), edn 2: 86 (1943); Gardner, Fl. W. Austral. 1, Gram.: 172, pl. 50A (1952).

LECTOTYPE: There are two sheets at Florence (FI-W) annotated 'Nova Hollandia et Van Diemen'. One of these bears copious notes in Labillardière's handwriting and we here designate this specimen as **Lectotype** (isolectotypes G, B-W). *S. elegantissima* does not occur in Tasmania and it appears that Labillardière confused Western Australia and Tasmania on the labels as he has done elsewhere (see Willis, Muelleria 1: 136 (1967)). Bentham also points out that Labillardière's specimen from Captain Baudin in herb R. Brown is marked 'Nouv. Holl.', i.e. the more accurate locality information was probably added at a later date.

Caespitose perennial c. 0.5–1 metre high, shortly rhizomatous, without a basal tuft of leaves. Culms decumbent, to 2 metres long, terete, 0.8–1.3 mm wide near the base,  $\pm$  compressible, smooth to slightly ribbed upwards, glabrous; nodes (3–) 6 (–10), exserted, glabrous, 25–50% wider than the adjacent internodes. Leaf sheaths at first tightly enveloping the culm, later becoming slightly free, glabrous; lower sheath 2 (–4) mm wide, slightly ribbed; upper sheath (1.5–) 2–4 mm wide, slightly to moderately ribbed. Ligule obtuse, erose, membranous, 2–3 mm long, glabrous; auricles 2.3–3.6 mm long, not thickened, glabrous. Leaf blade tightly rolled, 1.5–2 mm wide, (3–) 5–7.5 cm long; abaxial surface very slightly ribbed, glabrous or scabrous; adaxial surface moderately ribbed, villous with hairs c. 1 mm long; margins glabrous or scabrous. Panicle 15–25 cm long, exserted, pyramidal, with whorls of long, few-flowered, compound branches, spreading widely, 8–15 cm wide when expanded (excluding awns), disarticulating at maturity; axis terete (to slightly angular), plumose with hairs 1.5–2.5 mm long (to glabrous); branches (2.5–) 4.5–5.5 (–8) cm long, terete, plumose with hairs 1.5–3 mm long; pedicels 2–3 cm long, terete, plumose with hairs (1.5–) 2 mm long. Spikelets (7–) 8–10 (–12) mm long (excluding awn), gaping at maturity. Glumes subequal (to unequal), rounded on the back, acute, purple with a straw-coloured tip, pilose on the nerves with hairs 0.25–1 mm long, scabrous between the nerves, margins glabrous; lower glume (7–) 8–10 (–12) mm long, lower 50–60 (–66)% 3-nerved; upper glume 7–9 (–11) mm long, lower 60–70% 3-nerved. Floret narrowly cylindrical tapering to the apex, 4.5–6.5 (–10) mm long (including callus). Lemma black at maturity, the surface tuberculate, mainly glabrous but with hairs 0.5–0.7 mm long along the lower half of the lemma margins; lobes minute–0.8 mm long; coma absent. Callus 0.5–0.8 mm long, almost straight, sericeous with white hairs 0.5–1.0 (–1.2) mm long. Awn 2–5 cm long, 0.1–0.2 mm wide near the base, strongly once bent, often with another weak bend; column 8–15 (–20) mm long, straw-coloured, scabrous with hairs (0.1–) 0.2 mm long; bristle darker than the column, scabrous with hairs 0.05 mm long. Palea c. 50% the length of the lemma, acute, surface granular, glabrous. Lodicules 2, abaxial, 0.5–0.7 mm long, oblong. Anthers 1.5–3 mm long, penicillate. Caryopsis 4–5 mm long; embryo 20% the length; hilum 60–80% the length.

DISTRIBUTION: Southern Western Slopes and Plains of New South Wales, extending into Victoria, across the mallee regions of South Australia and the southern regions of Western Australia.

SELECTED SPECIMENS: NEW SOUTH WALES: **Central Western Slopes:** Muswellbrook, *Blakely* NSW 115786, 10.1911 (NSW); Peak Hill, *Boorman* NSW 115796, 11.1905 (NSW); Cunninyeuk, *Henderson* NSW 115948, 9.1946 (NSW); 'Lake Cowral' Station, Marsden, *Wilson* NSW 115789, 12.1917 (NSW); Wyalong, *Boorman* NSW 121577, 11.1917 (NSW, CANB, BRI); Alleena via Barmedman, *Winter* NSW 115798, 6.1931 (NSW); Ashbridge via Matong, *Cahill* NSW 115790, 11.1907 (NSW). **South Western Slopes:** Coolamon, *Bridle* NSW 115785, 5.1940 (NSW); Milbrulong, *Dwyer* NSW 115791, 11.1926 (NSW). **North Western Plains:** Nyngan, *Blakely* NSW 115792, 10.1912 (NSW). **South Western Plains:** Tullamore district, Fishpool, *no collector* NSW 115781, 11.1966 (NSW); W. of Weethalle, *Gauba* CBG 008951, 15.12.1950 (CBG); 10 miles [16 km] N. of Oxley on Booligal road, *De Nardi* 1002, 10.1972 (NSW); near Griffith, *J.C.N.* NSW 72702, 11.1964 (NSW); W. of Griffith on Rankin Springs road, *Cunningham* NSW 115780, 10.1971 (NSW); 'Zara' via Hay, *Officer* NSW 115797, 11.1903 (NSW); 40 miles [64 km] N. of Balranald, *Alchin* NSW 120329, 7.1970 (NSW); 7.9 miles [12.8 km] W. of Balranald, *De Nardi* 1017, 10.1972 (NSW); Narrandera, *Warby*, 1895 (MEL); 30 miles [61 km] W. of Moulamein, *Moore* 15.10.1971 (CANB); Hillston to Rankin Springs road, *Constable* NSW 4595, 10.1947 (NSW); Wanganella, *Mulham* NSW 1157805, 8.1967 (NSW); Tulla, Barham district, *Henderson* NSW 115787, 1945 (NSW). **North Far Western Plains:** Barrier Range, *Woolfs* NSW 115782, *s.d.* (NSW); 'Mundi Mundi' Station near Broken Hill, *Constable* NSW 4681, 11.1947 (NSW). **South Far Western Plains:** Junction of the Murray & Darling Rivers, Wentworth, *Holding*, 1890 (MEL).

VICTORIA: **Region A:** 30 km SSW. of Mildura, 9 km S. of Benetock, along Meridian road, *Crisp* 3287, 9.10.1977 (CBG); Hattah Lakes National Park, *Anderson*, 9.12.1965 (MEL). **Region C:** Jeparit, *no collector*, 14.10.1912 (MEL); 3 miles [5 km] NW. of Kanwa, *Melville et al.* 886, 15.9.1952 (NSW); Shire of Dimboola, *Reader*, 23.10.1893 (MEL); Mt Arapiles, *Corrick* 1358, 24.11.1968 (NSW). **Region G:** Kulwin, *Baker*, 20.10.1926 (BRI); Swan Hill district, *French*, 10.1888 (MEL). **Region H:** mallee scrub, Borung, *Reader*, 8.1911 (MEL). **Region J:** Stawell, *Holt*, *s.d.* (MEL). **Region M:** Nathalia, *Black*, 11.11.1932 (CANB 9757); Bendigo, Whipstick, *Hart*, 11.1947 (MEL). **Region N:** Daylesford, *Wallace*, 1878 (MEL); nr. Bacchus Marsh, *Tovey & French*, 3.11.1910 (MEL, PERTH). **Region P:** Mornington Peninsula, Frankston, *Willis* NSW 116706, 8.1.1969 (NSW, MEL). **Region S:** Woods Point, *no collector*, 25.10.1931 (ADW).

SOUTH AUSTRALIA: **Nullarbor:** Barton (c. 345 km E. of the Western Australian border, on the railway), *Ising* 386 & 1336, 20.9.1920 (AD); 4 miles [6 km] inland from cliff tops, Koonalda, *Symon* 4597, 17.2.1967 (ADW). **Flinders Ranges:** Blinman Cemetery, *Frances*, 10.1971 (AD); Oraparinna National Park, *Symon* 7573, 16.9.1971 (ADW); between Wilson & Warren, *Crocker*, 2.10.1944 (CANB 11595); between Wilson & Gordon, Willochra Plain, *Burbidge*, 1.9.1946 (CANB 12811); Pichi Richi Pass, *Lothian* 3057, 7.11.1964 (AD); Mt Remarkable, Melrose, *Eardley*, 2.9.1946 (ADW 19772). **Eastern:** N. of Curnamona, *Symon* 8033, 18.9.1972 (ADW); Koonamore, *Crisp* 635, 22.10.1973 (CBG); Mutooroo, *Morris*, 12.8.1921 (ADW 15069). **Eyre Peninsula:** Coorabie, *Cleland*, 18.10.1953 (AD); 12 miles [19 km] N. of Koonibba siding, *Symon*, 30.9.1959 (ADW 21350); Yudnappina, *Douglas*, 9.1939 (ADW 18280, 22952); Gawler Ranges, 10 km N. of Yardea, *Symon* 8155, 8.10.1972 (ADW); Whyalla Knob, *Cleland*, 1.9.1944 (AD); c. 4 miles [6 km] S. of Mambray Creek, *Copley* 1586, 10.10.1967 (AD); Hambidge National Park (c. 140 km N. of Port Lincoln), *Kraehenbuehl* 2071, 9.10.1966 (AD); c. 11 miles [18 km] SSW. of Port Broughton, *Morris*, 28.8.1946 (MEL); 57 miles [91 km] from Port Lincoln towards Cowell, *Wrigley* CBG 037424, 21.11.1968 (CBG); 3 miles [5 km] N. of Cowell, *Tindale* 454, 12.11.1970 (CANB, BRI). **Northern Lofty:** Bundaleer, Monarto South, *Symon* 3139, 20.11.1964 (ADW); Hincks National Park, *Symon* 6515, 13.10.1968 (ADW); Barunga Gap Cemetery, *Copley* 1502, 4.10.1967 (AD); Northern Tothill Range, Niblet Gap, *Kraehenbuehl* 2172, 29.10.1967 (AD); South Hummocks Range, *Blaylock* 723, 1.10.1967 (AD); Saddleworth, *Symon*, 27.10.1960 (ADW 22951); Freeling, *Kraehenbuehl* 1487, 18.11.1965 (AD). **Murray:** 'Baldina' Station, *Jackson* 379, 9.10.1961 (BRI); 3 miles [5 km] W. of Bower, *Boehm* 410, 16.10.1963 (AD); Overland Corner, *Symon* 3882, 12.10.1965 (ADW); between Kingston & Waikerie, *Whibley* 2651, 28.9.1968 (AD); N. of Owen, *Hilton*, 11.9.1951 (ADW 43863); Loveday, *Gauba* CBG 003982, 12.8.1944 (CBG); Old Coach Road Block 73, County Hamely, *Symon* 3803, 11.10.1965 (ADW); 1 mile [1.6 km] E. of Truro, *Kraehenbuehl* 690, 22.9.1962 (BRI); Barossa Valley, *Wells*, 31.7.1952 (ADW 8004); Mannum, *Blake* 16841, 24.8.1946 (BRI). **Yorke Peninsula:** near Port Germein, *Phillips* CBG 054565, 14.9.1973 (CBG); Mona Railway Yard, *Copley* 873, 8.11.1966 (AD); 4 miles [6 km] from Moonta towards Maitland, *Phillips* CBG 042829, 2.10.1965 (CBG); Hardwicke Bay, *Smith* 756, 25.10.1967 (AD); Greenly Island, North Island, c. 100 km W. of Port Lincoln, *Adelaide Bushwalkers*, 4-17.12.1947 (AD); Innes National Park, *Symon* 9545, 6.10.1974 (ADW, NSW). **Southern Lofty:** Roseworthy Agricultural College, *Hilton*, 23.10.1939 (ADW 28137); 1 mile [1.5 km] W. of Willaston, *Belcher*, 31.10.1967 (MEL); 2.5 miles [4 km]

WNW. of Gawler, *Smith* 958, 23.10.1967 (AD); Highbury, *Smith* 1565, 28.11.1968 (AD); E. side of the Port River between Granger & Royal Park, *Smith* 914, 21.10.1967 (AD); Tea Tree Gully, Dillon Road, *Spooner* 325, 12.10.1968 (AD); Christies Beach, *Perry*, 9.1944 (CANB 18356); c. 1 km NE. of Finnis, *Whibley* 3683, 26.10.1971 (AD); near Milang, c. 65 km SSE. of Adelaide, nr. Lake Alexandrina, *Whibley* 870, 8.10.1962 (AD). **Kangaroo Island:** Kingscote, *Jackson* 219, 16.9.1920 (AD).

WESTERN AUSTRALIA: **Carnegie:** Barwidgee road, 11.5 miles [18 km] S. of Yelma turn off, *Speck* 1347, 7.9.1958 (CANB, PERTH). **Ashburton:** Upper Murchison River, *Tyson* 90, 1892 (MEL). **Austin:** 103 miles [165 km] SSE. of Carnarvon, *Beaglehole* 11789, 21.8.1965 (CANB, PERTH); Mt Narryer, Murchison River, *Tyson* 33, 1898 (PERTH); 65 km NE. of Laverton, *Beaglehole* 59899 & *Errey*, 16.9.1978 (PERTH, NSW). **Coolgardie:** Lake Moore, *Gardner*, 10.1939 (PERTH); Camp 61, c. 160 km ESE. of Kalgoorlie, Elder Expedition, *Helms*, 25.9.1891 (AD); NE. of Kalgoorlie, *Gauba CBG* 003955, 10.10.1955 (PERTH); c. 4 miles [6 km] from Kalgoorlie towards Coolgardie, *Phillips CBG* 025825, 15.9.1962 (CBG, AD); 8 miles [15 km] SE. of Boulder, SE. of Kalgoorlie, *Beaglehole* 13266, 20.9.1965 (PERTH); Kurrawang, *Kessel*, 9.1921 (PERTH); 48 km W. of Coonana near Cardinia Rocks, *Chinmook* 1141, 18.9.1973 (AD); c. 20 km E. of Southern Cross, *Kuchel* 2121, 23.9.1964 (AD); Pioneer Rock, N. of Lake Cowan, *Burbidge* 2672, 19.9.1947 (CANB); Fraser Range, *Aplin* 1771, 6.9.1962 (PERTH); 4 miles [6 km] N. of Norseman on Coolgardie road, *Beaglehole* 13329, 21.9.1965 (CANB, PERTH); Norseman, *Galbraith*, 18.10.1964 (MEL); 2 miles [3 km] S. of Lake Kirk, *Burbidge* 2685, 20.9.1947 (CANB); Lake Hope, *Beard* 3796, 23.10.1964 (PERTH); Dundas Rocks, 10 miles [16 km] S. of Norseman, *Beaglehole* 13200, 18.9.1965 (CANB, PERTH). **Roë:** 5 km NW. of Ongerup, *Newbey* 4590, 16.11.1974 (PERTH). **Avon:** 6 miles [8 km] E. of Ballidu, *Royce* 2167, 13.9.1947 (PERTH); Cowcowing, *Koch* 1133a, 8.1904 (PERTH); Yelbine [Yelben], *Carne*, 11.1925 (PERTH); Merredin, *Carne*, 10.1923 (PERTH); Muntadgin, *Bailey* 177, 9.1945 (PERTH); Wagin, *Gardner* 485, 25.10.1920 (PERTH). **Irwin:** Dirk Hartog Island, *George*, 9.1972 (PERTH); between Denham & Monkey Mia, *Beard* 6770, 9.10.1973 (NSW, PERTH); 1 mile [1.6 km] S. of Wannoo, *Phillips CBG* 035348, 16.9.1968 (MEL); Champion Bay, *Guerin*, 1871 (MEL); c. 70 km NE. of Geraldton, *Muir* 82(FF), 12-16.10.1976 (PERTH); 7 miles [11 km] N. of Geraldton, *Burbidge* 2048, 2.9.1947 (CANB); Geraldton, *Carriage & Ollerenshaw CBG* 062572, 5.10.1975 (CBG, PERTH); between Geraldton & Northampton, *Blake* 18083, 2.9.1947 (PERTH, BRI); West Wallabi Island, Abrolhos Islands, *Storr*, 9.1959 (PERTH); East Wallabi Island, Abrolhos Islands, *Gilham*, 7.9.1959 (PERTH); 'Karara' Station, *Beard* 7193, 28.10.1974 (PERTH); Yandanooka, *Morrison*, 16.9.1904 (PERTH, BRI). **Darling:** Goomalling, *Pullen* 9618, 25.11.1974 (CANB, NSW); Woorooloo-Bailup road, S. of Toodyay road, *Burbidge* 7992, 4.1.1972 (CANB); Woorooloo, *Koch*, 11.1907 (MEL); Darlington, *Helms*, 9.1898 (PERTH); Cottlesloe, *Andrews*, 9.1903 (PERTH); Upper Swan River, *Sewel*, 1855 (MEL); Blackwood River, *Hester*, 1876 (MEL). **Eyre:** Pallarup Rocks, SE. of Lake King, *George* 1547, 13.10.1960 (PERTH); Oldfield River crossing on Ravensthorpe-Esperance road, *Jackson* 1409, 13.10.1968 (PERTH); nr. Culham Inlet, *George* 605, 31.1.1960 (PERTH).

Palatable to stock and now found growing chiefly in situations sheltered from grazing, e.g. under and through the branches of shrubs or fallen timber; it was probably at one time much more abundant.

***Stipa eremophila* Reader**, Victorian Naturalist 17: 154 (1901); Black, Fl. S. Austral. 1: 65 (1922), edn 2: 90, fig. 110 (1943); Gardner, Fl. W. Austral. 1, Gram.: 180 (1952); Willis, Handb. Pl. Victoria 1: 186 (1962), edn 2, 1: 186 (1970).

HOLOTYPE: VICTORIA: Sandy Desert, Lowan, 1898, *F.M. Reader* (MEL 59873!).

SYNONYMS: *Stipa pubescens* var. *auricoma* Reader, Victorian Naturalist 17: 156 (1901). HOLOTYPE: VICTORIA: November, 1897, Desert, Lowan; *F.M. Reader* (not seen). We have seen a specimen in the Melbourne Herbarium (MEL 60695) labelled by Reader '*Stipa aristiglumis* F.v.M. var. *auricoma*, Little Desert, Lowan, 16.10.1898. Coll. F.M. Reader' which, in the absence of the Holotype, we are accepting as the basis for our concept of this variety. This specimen is *S. eremophila* with immature spikelets in which the hairs of the lemma have not yet attained the yellowish to reddish brown colour described by Reader for his variety and characteristic of more mature spikelets of *S. eremophila*.

*S. fusca* C.E. Hubbard, Kew Bull. 1925: 432 (1925). HOLOTYPE: SOUTH AUSTRALIA: Eyre Peninsula, Iron Knob, *Cleland* 3, 22.8.1921 (K!; isotypes AD 9723153 and NSW 9317). Populations

of *S. eremophila* show considerable variation in length of both callus and body of the lemma. *S. fusca* was described from specimens at the extreme of the range in elongation of the callus combined with brevity of the body of the lemma. This combination of characters results in a somewhat distinctive appearance compared with the average proportions of the callus and body of the lemma in *S. eremophila*. However, so many intermediate gradations may be found that we are convinced that this form is unworthy of recognition.

*S. variegata* Summerhayes & Hubbard, Kew Bull. 1927: 363 (1927); Black, Trans. & Proc. Roy. Soc. South Australia 63: 241 (1939). HOLOTYPE: SOUTH AUSTRALIA: Sandergrove near Lake Alexandrina, 21.10.1926 (K; isotype AD 96323303; CANB photo 237008). In the Type the hairs on the lemmas are white, not fulvous, although a slight yellowing can be detected in a lemma of the duplicate; we regard this difference in colour, together with the slenderness of the lemma, to be due to the immaturity of the specimen. This specimen can be matched with immature material of *S. eremophila*. We have been unable to recognise any populations that could justify recognition of *S. variegata* as distinct from *S. eremophila*.

*S. dura* J. Black, Trans. & Proc. Roy. Soc. S. Austral. 65: 333 (1941); Fl. S. Australia edn 2, 1: 86–87 (1943), in part. HOLOTYPE: SOUTH AUSTRALIA: Nullarbor Station (near Fowlers Bay), Black, 1911 (AD 97424089). The Holotype is very imperfect, but we have no doubt that the spikelets agree with *S. eremophila*. Mounted on the same sheet is a specimen from Cape Thevenard (cited by Black, Fl. South Australia) that, although also rather imperfect, appears to be *S. flavescens* Labill.

Caespitose perennial to c. 0.9 metres high, with a basal tuft of leaves at least half the total height. Culms erect or geniculate, 1–1.5 mm wide near the base, terete, slightly compressible, scarcely ribbed, glabrous and smooth to minutely scaberulous or puberulous; nodes 2–3, appressed-pubescent to almost glabrous, exserted, to 60% wider than adjacent internodes. Leaf sheaths tight around the culms, c. 4 mm wide (the uppermost inflated and to 8 mm wide), finely pubescent or hirsute or glabrous, especially upwards; inner margin glabrous; outer margin ciliate, more so just below the orifice. Ligule coriaceous, 0.5–1.5 mm long, truncate (although often torn), densely ciliate; abaxial surface glabrous to pubescent; auricles densely to sparsely ciliate with straight or crinkly hairs or glabrous. Leaf blades mostly rolled, 1.5–4 mm wide, to 30 cm long, abaxial surface scarcely ribbed, glabrous to hirsute; adaxial surface ribbed, scaberulous, densely pubescent or hirsute to almost glabrous; margins scabrous or similar to adjacent surface. Panicle spreading at maturity, 15–30 cm long, 2–7 cm wide (excluding awns), exserted; axis terete, glabrous to sparsely pubescent; branches 10–60 mm long, angular, scaberulous to scabrous-pubescent; pedicels 2–15 mm long, flattened, scaberulous to scabrous-pubescent. Spikelets 15–25 mm long (excluding awn), slightly gaping. Glumes unequal, at least the lower usually broad and inflated, rarely narrow, glabrous or scaberulous on the nerves; lower 15–25 mm long, long-acuminate, the lower 50–75% 3-nerved, pale or usually with a crescentic purple patch in the middle third; upper 10–18 mm long, acuminate, the lower 30–50% 5-nerved, 50–75% 3-nerved, pale or purple at the base. Floret turbinate to cylindrical, usually with a neck, 6–9.5 mm long (including callus). Lemma deep brown at maturity, the surface smooth, sericeous with dense fulvous hairs, but the upper 0.5–1.5 mm scabrous with much shorter but otherwise similar hairs; lobes 2, obtuse to broadly acute, 0.2–0.4 (–0.75) mm long (rarely to 1.5 mm long, and then acute); coma of sparse stiff hairs 0.4–0.7 mm long. Callus 2–4 mm long, straight or slightly curved when short, sericeous with dark fulvous hairs. Awn sturdy, 0.25–0.4 mm wide near the base, 5–9 (–11) cm long, twice bent; column pale, 15–38 mm long, 7–16 mm to the first bend, pubescent with hairs 0.2–0.4 (–0.5) mm long to almost glabrous with few hairs to 0.1 mm long; bristle pale or purple-tinged, scaberulous or pubescent with hairs to 0.25 (–0.5) mm long. Palea acute, from slightly shorter to slightly longer than the lemma, ciliate at the tip, granular, densely sericeous between the nerves, the margins membranous and

glabrous. Lodicules 3, membranous; 2 abaxial 1–1.5 mm long, obtuse to spatulate; paleal 0.5–1.5 mm long, obtuse to acute. Anthers 2.5–4 mm long, penicillate. Caryopsis 3.5–4.5 mm long; embryo 30% the length; hilum 80% the length.

**DISTRIBUTION:** Southern Slopes and Plains of New South Wales, north-western regions of Victoria, across the southern half of South Australia and the Nullarbor Plain into the south of Western Australia. Mainly in woodlands or mallee but not uncommon on the limestone areas of the Nullarbor Plain.

**SELECTED SPECIMENS:** NEW SOUTH WALES: **South Western Slopes:** Urana, W. of Wagga Wagga, Libke, 26.9.1968 (CANB). **South Western Plains:** Griffith, Jacobs 4159 & Everett, 24.9.1981 (NSW); Kyalite, Everett 60 & Jacobs, 22.11.1980 (NSW); Cunninyeuk near Wakool between Moulamein & Swan Hill, Henderson 177, 8.10.1946 (MEL; NSW); N. of Stony Crossing, Everett 88 & Jacobs, 23.11.1980 (NSW); 3 miles [5 km] W. of Stony Crossing, Henderson 431, 9.10.1947 (NSW); Trida district, Stannard NSW 116344, 8.10.1956 (NSW); W. of Tueloga Siding, Henderson 430, 14.10.1947 (NSW); Meran Creek, between Swan Hill & Moulamein, Henderson 435, 5.12.1947 (NSW); E. end of Pt Poon Boon, SE. of Stony Crossing, Henderson 427, 23.9.1947 (NSW); NE. of Lake Tooim, Henderson 432, 5.11.1947 (NSW). **North Far Western Plains:** 11 miles [18 km] S. of Broken Hill, Jacobs 176, 11.11.1971 (NSW); Broken Hill, Morris NSW 9325, 11.1920 (NSW, K). **South Far Western Plains:** 135 miles [216 km] S. of Broken Hill, Richley 1464, 2.9.1974 (NSW); near Thackaringa, Morris 13925, 6.11.1920 (ADW); 13 miles [21 km] E. of Darnick, De Nardi 1095, 22.10.1972 (NSW); 39 km from Wentworth, 'Nulla Nulla' road, Everett 117 & Jacobs, 25.11.1980 (NSW); 6 km NE. of Euston, Balranald road, Everett 105 & Jacobs, 24.11.1980 (NSW); ridge above Lake Benemee, near Euston, Henderson 423, 5.10.1947 (NSW).

**VICTORIA:** **Region A:** Sunny Cliffs, S. of Mildura, Beauglehole 16033, 20.9.1966 (NSW). **Region B:** Bronzewing Wildlife Reserve, 15 km SSE. of Ouyen, Beauglehole 56965, 25.10.1977 (MEL); Beulah, Connor, 10.1963 (MEL). **Region C:** Broughton, no collector (MEL); 18 km SW. of Warracknabeal, Dimboola road, Everett 172 & Jacobs, 29.11.1980 (NSW); Kaniva, Watts NSW 9327, 10.1917 (NSW). **Region F:** 14 km SSE. of Robinvale, Beauglehole 56070, 3.5.1977 (MEL). **Region G:** 5 km SW. of Chinkapook, c. 18 km S. of Manangatang, Beauglehole 55493, 17.4.1977 (MEL); 17 km SSW. of Swan Hill, Beauglehole 56001 and Macfarlane, 1.5.1977 (MEL). **Region H:** Borung, Reader, 28.10.1904 (MEL, AD).

**SOUTH AUSTRALIA:** **Nullarbor:** N. of Cook, Hilton, 22.8.1955 (ADW); vicinity of Koonalda Cave, Symon 4490, 16.2.1967 (ADW); 'Nullarbor' Station, Black NSW 9321, 6.1911 (NSW); W. of Wigunda, Phillips CBG 016293, 7.9.1962 (CBG). **Gairdner-Torrens Basin:** 5 km N. of 'Bon Bon', Donner 1707, 8.9.1966 (AD). **Flinders Ranges:** 10 miles [16 km] N. of Hawker, Hilton, 2.10.1954 (ADW); Waterfall Creek near Baroota, Kraehenbuehl 194, 18.9.1960 (AD); Waukaringa, between Yunta & 'Koonamore', Symon, 19.12.1954 (AD); Craddock, on Wilson road, Hilton NSW 116343, 1.10.1954 (NSW, ADW); Orreroo, Black, 6.10.1910 (AD). **Eastern:** Mt Victor, Lay & Crisp 439, 4.9.1971 (AD, CBG); 'Koonamore', Everett 162 & Jacobs, 28.11.1980 (NSW); Yunta, Black, s.n., s.d. (MEL). **Eyre Peninsula:** 65 km from Ceduna along Eyre Highway towards Poochera, Crisp 5762, Taylor & Jackson, 12.9.1979 (CBG); E. slope of Iron Knob, 50 miles [80 km] NW. of Whyalla, Hilton, 14.9.1951 (ADW); Kimba, Cleland, 8.10.1932 (ADW); Gawler Ranges, S. of Scrubby Peak, 24 km N. of Minnipa, Wilson 527, 16.10.1958 (AD, K); c. 11 miles [18 km] SSW. of Port Broughton, Blake 16847, 28.8.1946 (BRI); c. 35 km W. of Colona, Cleland, 9.11.1955 (AD). **Northern Lofty:** halfway between Wintinerta and Bute – Kadina bitumen, Copley 658, 24.9.1966 (AD); 1 mile [1.6 km] W. of Balaklava, Clarke, 13.10.1936 (ADW); Mallala, Harris 31, 1.10.1959 (AD); S. of Freeling, Kraehenbuehl 1783, 6.11.1966 (AD). **Murray:** 8 miles [13 km] from Morgan towards Burra, Phillips CBC 018940, 2.9.1962 (CBG); Hundred of Bower, Ioannov 52, 5.4.1968 (AD); E. of Sutherlands township, Bohem 314, 9.1958 (AD); road to Walkers Flat, Cleland, 8.10.1966 (AD); Murray Bridge, Cleland, 7.3.1941 (AD). **Yorke Peninsula:** Mission Station, Pt. Victoria, Beck, 2.1942 (ADW); 26 miles [42 km] from Yorketown towards Foul Bay, Phillips CBG 026876, 19.10.1966 (CBG). **Southern Lofty:** 1 mile [1.6 km] past Kangaroo Flat on Mallala road, Harris 45, 11.1959 (AD); Marino, Cleland, 8.10.1932 (AD); Hallett Cove, Cleland NSW 116969, 28.10.1932 (AD, NSW); Balaklava, 42 miles [67 km] NNW. of Gawler, Hilton NSW 116342, 1.10.1944 (NSW, ADW); Echunga, Parsons 163, 27.10.1961 (AD). **South-eastern:** 1 km from Keith on Adelaide road, Specht, 9.1949 (AD); Millicent, Cleland, 14.10.1949 (AD).

**WESTERN AUSTRALIA:** **Eucla:** 3 miles [5 km] S. of Reid, Aplin, 1.9.1962 (PERTH); 1 mile [1.6 km] W. of Forrest, Calaby, 24.10.1947 (CANB, BRI); Loongana, Mitchell 69, 11.9.1974 (PERTH); 50 miles [80 km] NNE. of Rawlinna, Brooker 171, 5.9.1974 (CANB); 26 km E. of Rawlinna, Goodall

2698, 18.8.1966 (PERTH); Rawlinna, *Wilson* 5799, 15.5.1967 (PERTH); 50 km S. of Rawlinna on road to Cocklebidy, *George* 11886, 13.7.1974 (PERTH); 12 miles [19 km] from Madura towards Cocklebidy, Eyre Highway, *Phillips CBG 039214*, 1.9.1968 (CBG, BRI); 46 km WSW. of Madura, *Beaglehole* 49403, 30.8.1974 (CANB). **Coolgardie**: 5 km W. of Coolgardie, *Hacker* 3, 11.3.1971 (PERTH); 30 km E. of Kitchener on Trans-Australian Railway, *Wilson* 7644, 2.9.1968 (PERTH); 147 km E. of Zanthus, *Goodall* 2723, 24.9.1966 (PERTH); Cunderlee Mission, N. of Zanthus, *George* 5893, 22.9.1963 (PERTH); Fraser Range, *Helms* NSW 9320, 30.10.1891 (NSW); 14 miles [22 km] N. of Norseman on Coolgardie road, *Beaglehole* 1335, 21.9.1965 (NSW); c. 160 km E. of Balladonia, *Jackson* 1470, 24.10.1968 (PERTH). **Darling**: 5 km NW. of Wongan Hills town, *Crisp* 6323, *Taylor & Jackson*, 2.10.1979 (CBG).

*S. eremophila* has a greater range of variation than most of the other Australian species of *Stipa*. Several of the recently described species are related to *S. eremophila*; each of these forms uniform populations differing in one or more characters from true *S. eremophila*. It is not uncommon to find individual specimens of *S. eremophila* with characters different from those accepted here as being characteristic of the species. Where the variants occur in populations dominated by what we regard as true *S. eremophila* these variants are not being recognized as taxonomically distinct. The anomalous characters seem to be relatively uncommon and not correlated with either other characters or variations in habitat. Common variations include long lemma lobes, hairy bristles (approaching *S. plumigera*), hairy orifices and almost glabrous lemmas. Examples are cited here of specimens with (i) long lemma lobes and (ii) hairy bristles (see *S. lanata* for a discussion of the latter two variations):

(i) NEW SOUTH WALES: **South Western Plains**: 3 miles [5 km] W. of Stony Crossing, *Henderson* 431, 9.10.1947 (NSW); SE. of Stony Crossing, *Henderson* 427, 23.9.1947 (NSW); W. of Tueloga [as Tueloga] Siding, *Henderson* 428, 29.9.1947 (NSW). SOUTH AUSTRALIA: **Murray**: Oakbank Station, *Cleland*, 21.9.1968 (AD 97308293).

(ii) VICTORIA: **Region A**: Mildura, *Sonenberg* 1937, 4.11.1935 (K). SOUTH AUSTRALIA: **Nullarbor**: Between Eucla & Fowlers Bay, *Richards* (MEL 60925). WESTERN AUSTRALIA: **Eucla**: 3 km N. of Eucla, *Whibley* 632, 14.9.1960 (AD); c. 70 km W. of Madura, *Kuchel* 1570, 9.9.1964 (AD).

### ***Stipa exilis* J. Vickery, Telopea 2(1): 13 (1980).**

HOLOTYPE: SOUTH AUSTRALIA: Northern Yorke Peninsula, section 155, Hundred of Willunga (about 140 km NNW. of Adelaide), *B. Copley* 799, 21.10.1966 (AD 9670326).

Densely caespitose perennial to 0.6 metres high with mostly intravaginal basal leaves to about half the height. Culms usually geniculate or erect, to 1 mm wide near the base, terete, compressible, ribbed, puberulous or scaberulous just below the nodes otherwise glabrous or puberulous; nodes 2, finely pubescent, usually exserted, up to 50% broader than adjacent internodes. Leaf sheaths tightly enclosing the culm although basal sheaths loose, c. 5 mm wide, ribbed, scaberulous and pubescent and/or hirsute; inner margin  $\pm$  glabrous; outer margin short- or long-ciliate or glabrous. Ligule firmly membranous, obtuse, 0.5–2.5 mm long, often continuous with the sheath margin; margin glabrous or ciliate; abaxial surface puberulous; auricle with a dense to sparse tuft of long, straight or woolly hairs. Leaf blades loosely convolute, flexuose, less than 0.5 mm in diameter, to 25 cm long; abaxial surface slightly ribbed, scaberulous and pubescent and/or hirsute; adaxial surface strongly ribbed, pubescent; margins scabrous with short hooks. Panicle loosely contracted or narrowly spreading, moderately sparse, to 20 cm long, to 3 cm wide (excluding awns), exserted at length, with fascicles of unequal, few-flowered branches; axis terete or slightly angular, scaberulous; branches to 7 cm long, slightly angular, scaberulous. Pedicels to 10 mm long, slightly angular, scaberulous. Spikelets



8–10 mm long (excluding awn), gaping narrowly. Glumes unequal, firm and green at the base, purple-tinged to hyaline at the tip, scaberulous on the nerves or scaberulous overall; lower glume 8–10 (–12) mm long, acuminate, the lower 50–60% 3-nerved; upper glume 7–8 mm long, acute or obscurely dentate, the lower 50–70% 5-nerved, the next 10% 3-nerved. Floret linear-cylindrical to fusiform, 4.5–5.5 mm long (including callus). Lemma black at maturity, the main nerve paler, very finely granular to coarsely granular at the apex, with sparse erect and spreading hairs, white to bright gold at maturity; coma obscure, 0.6–0.8 mm long; lobes 2, to 0.25 mm long. Callus 1–1.5 mm long, sturdy, straight, with hairs similar to those of the lemma. Awn 35–55 (–60) mm long, 0.2 mm wide near the base, gently twice bent; column 15–21 mm long, 9–15 mm to the first bend, scaberulous with hairs to 0.2 mm long; bristle scaberulous. Palea broad-acute to obtuse, to 0.5 mm shorter than the lemma, coriaceous, smooth, sericeous down the centre, hyaline and glabrous on the margins, the tip ciliate. Lodicules 3, membranous; 2 abaxial c. 1 mm long, cuneate; paleal less than 0.5 mm long, triangular-acute. Anthers 1–2 mm long, penicillate. Caryopsis 3–3.5 mm long; embryo 25% the length; hilum 70–90% the length.

**DISTRIBUTION:** Heath and scrub on sandy soil in southern South Australia, barely extending into Victoria and Western Australia (although not on the Nullarbor Plain).

**SELECTED SPECIMENS:** VICTORIA: **Region D:** 10 miles [16 km] SW. of Dergholm, *Beaunglehole* 38083, 18.12.1971 (NSW).

**SOUTH AUSTRALIA:** **Eyre Peninsula:** 15 miles [24 km] from Poochera towards Minnipa, Eyre Highway, *Canning* 2277, 30.8.1968 (CBG, NSW); Hambridge National Park, *Kraehenbuehl* 2070, 8.10.1966 (AD); between Prominent Hill & S. edge of Hambridge Reserve, *Symon* 4118, 8.10.1966 (ADW); c. 11 miles [18 km] SSW. of Port Broughton, *Blake* 16848, 28.8.1946 (BRI); Hincks National Park, *Symon* 6455, 11.10.1968 (ADW); Kirton Point Reserve, Port Lincoln, *Whibley* 360, 12.10.1958 (AD); Flora and Fauna Reserve, Hundred of Flinders, *Specht* 2636, 10.11.1960 (AD). **Northern Lofty:** c. 5 km W. of Bute (old Mona railway yard), *Copley* 494, 14.8.1966 (AD); South Hummocks Range, *Copley* 3228, 25.10.1970 (AD). **Murray:** 6 miles [10 km] W. of Murray Bridge, *Crocker*, 23.10.1943 (CANB); Kinchina, *Cleland* NSW 117042, 9.1922 (NSW). **Yorke Peninsula:** Point Davenport, *Symon* 11918, 4.11.1979 (ADW); between Artherton & Maitland, *Blaylock* 1046, 6.10.1968 (AD). **Southern Lofty:** Chaunceys Line Reserve, *Hilton* 1011, 9.10.1954 (ADW). **Kangaroo Island:** Kingscote, *Cleland*, 26.11.1945 (AD 96323204). **South-eastern:** Ki Ki, 30 miles [48 km] SE. of Tailem Bend, *Hilton*, 12.10.1953 (ADW).

**WESTERN AUSTRALIA:** **Roe:** 16 km from Gnowangerup, towards Albany, *Phillips* WA/622116, 10.10.1962 (NSW). **Eyre:** 4 km E. of Needilup, *Newby* 4919, 10.11.1975 (PERTH).

Differs from *S. mundula* in its intravaginal habit, rather finer, pubescent to hirsute leaves with the nerves manifest on the outer surface, its very obtuse rather than truncate ligule, more slender, capillary, and shorter awn, shorter glumes and lemma. The spikelets and lemmas of *S. exilis* resemble those of *S. multispiculis* but the short slender tufted habit of *S. exilis* is very different.

Although *S. exilis* and *S. mundula* as described are quite distinct, two specimens are difficult to place in one or the other of the taxa because of the combinations of the definitive characters: 'Kirton Point Reserve, Port Lincoln, *Whibley* 360, 12.10.1958 (AD)' has smooth and  $\pm$  glabrous foliage as in *S. mundula* but a short lemma, delicate awn and slender, mostly intravaginal shoots as in *S. exilis*. 'Hincks National Park, Blue Range, Oak Amphitheatre, *Alcock* 2224, 7.12.1968, in part (AD)' has a long lemma, sturdy and pubescent awn and  $\pm$  glabrous foliage as in *S. mundula* but ribbed, slender, mostly intravaginal shoots as in *S. exilis*.

Both these specimens are from the area of overlapping distributions of *S. mundula* and *S. exilis*; their existence as intermediates does not affect the basic taxa.

***Stipa feresetacea* J. Vickery, S.W.L. Jacobs & J. Everett, sp. nov.**

*S. setaceae* affinis, sed glumis brevioribus, flosculo calloque aristaque brevioribus differt.

HOLOTYPE: NORTHERN TERRITORY: Mount Giles, 23°39'S, 132°55'E, P.K. Latz 6605, 19.9.1976, Spreading perennial. Rare in skeletal soil, side of gully in shistose [schistose] hill. (NT 51100; isotype NSW).

Caespitose perennial 0.5–1 metre high, without rhizomes, with a basal tuft of leaves from half to the full height. Culms erect, terete, 0.4–1.2 mm wide near the base,  $\pm$  compressible, smooth to strongly ribbed upwards, glabrous to minutely scabrous upwards; nodes c. 3, exserted, glabrous, to 75% wider than the adjacent internodes. Leaf sheaths not inflated, 2–4 mm wide, glabrous to minutely scabrous; basal sheath smooth to moderately ribbed, the innovations pubescent at the base; upper sheath moderately to strongly ribbed; margins glabrous. Ligule acute to acuminate, membranous, 3.5–8 mm long, not ciliate; abaxial surface glabrous to minutely scabrous; auricles  $\pm$  thickened, glabrous. Leaf blade tightly rolled, 0.7–0.9 mm wide, to 30 cm long; abaxial surface smooth to moderately ribbed, minutely scabrous; adaxial surface strongly ribbed, puberulous with minute siliceous prickles; margin minutely scabrous. Panicle 6–12 cm long, exserted, contracted, 5–10 mm wide (excluding awns), with distant fascicles of unequal, few-flowered, compound branches; axis angled, minutely scabrous; branches 1–25 mm long, angled, minutely scabrous; pedicels 2–7 mm long, angled, minutely scabrous. Spikelets 4–7 mm long (excluding awn), gaping at maturity. Glumes subequal to unequal, acute, straw-coloured, glabrous to minutely scaberulous; lower glume 4–7 mm long, lower 40–50% 3-nerved, upper 50–60% 2–1-nerved; upper glume 4–6 mm long, lower 40–70% 5–3-nerved, upper 30–60% 3–1-nerved. Floret turbinate, 3–4.5 mm long (including callus). Lemma surface granular to smooth, with hairs 0.5–1 mm long, without a neck; indefinite coma of hairs 0.2–0.9 mm long; lobes absent. Callus 0.7–1.4 mm long, weakly bent at the tip, densely sericeous with hairs 0.1–1 mm long. Awn 12–18 mm long, twice bent, 0.2 mm wide near the base; column 7–10 mm long, 3.5–6 mm to the first bend, brown, scabrous with hairs minute–0.1 mm long; bristle delicate, minutely scabrous. Palea equal to the lemma, obtuse, densely sericeous in the central groove with hairs 0.5–1 mm long, surface smooth to granular along the central groove. Lodicules 3; 2 abaxial membranous, c. 0.8 mm long, acute; paleal membranous, c. 0.5 mm long, acute. Anthers 1.4–1.8 mm long, not penicillate. Caryopsis 2–2.5 mm long; embryo 30–40% the length; hilum 80–100% the length.

Similar to *S. setacea* but differing in all the spikelet parts being smaller. See notes under *S. setacea* concerning similarities with species of *Piptochaetium*.

The specific epithet is derived from the Latin for 'nearly' or 'almost' (*ferē*) and from the specific epithet of *S. setacea*.

DISTRIBUTION: Rocky hillsides of the Central Australian Ranges.

SPECIMENS EXAMINED: NORTHERN TERRITORY: Chewing Range, 23°39'S, 132°58'E, Latz 6647, 22.9.1976 (NT); Mt Giles, 23°39'S, 132°55'E, Latz 6605, 19.9.1976 (NT, NSW); N. face of Mt Gillen, Latz 1808, 14.10.1971 (NT, CANB).

***Stipa flavescens* Labill.**, Nov. Holl. Pl. 1: 24, pl. 30 (1804); *non* Nees in Lehm. (1846); Brown, Prodr.: 175 (1810), at least in part; Bentham, Fl. Austral. 7: 566 (1878); Hughes, Kew Bull. 1921: 11 (1921); Black, Fl. S. Austral. 1: 66 (1922).

HOLOTYPE: '*Stipa flavescens* billard n. Holl' (FI-W!, dupl. G (poor specimen); probable isotype K).

SYNONYMS: *S. scabra* var. *elator* Benth., Fl. Austral. 7: 571 (1878). TYPIFICATION, as cited (see below): 'Western Australia: Swan River, *Drummond*, 1st coll. and No. 959 (K!); Murchison River, *Oldfield*'.

*S. elator* (Benth.) Hughes, Kew Bull. 1921: 2 (1921); Black, Fl. S. Austral. edn 2: 91 (1943). Based on *S. scabra* var. *elator* Benth. TYPIFICATION: Hughes cites: 'Western Australia, Swan River, *Drummond* 1st coll. and No. 959\*'; Harvey Steward 775; King Georges Sound, Brown 2603 p.p.'; by the asterisk she indicates *Drummond* 959 as the Type of *S. elator* and, by implication, the **Lectotype** of *S. scabra* var. *elator* Benth. Two sheets of *Drummond* No. 959 are at K(!) each named respectively in Bentham's and Hughes' handwritings. Duplicate specimens of this number are NSW 116766; MEL 59917, 59918.

*S. scabra* var. *striata* Benth., Fl. Austral. 7: 571 (1878). *S. variabilis* var. *striata* (Benth.) C. Gardner, Fl. W. Austral. 1, Gram.: 182 (1952). TYPIFICATION, as cited (see below): '*Drummond*, 133 (K!); Murchison River, *Oldfield*'. Gardner also cites, incorrectly, *S. incurva* Hughes and *S. falcata* Hughes as synonyms of the variety and cites 13 specimens from the South West Province of Western Australia (not seen and which may or may not be *S. flavescens*).

*S. tenuiglumis* Hughes, Kew Bull. 1921: 22 (1921); Black, Trans. & Proc. Roy. Soc. S. Austral. 63: 241 (1939), Fl. S. Austral. edn 2: 90 (1943). REPLACED SYNONYM: *S. scabra* var. *striata* Benth. TYPIFICATION: Hughes cites five specimens: 'Murchison River, Oolingarra, *Oldfield*; Sand near Woodmans Point, *Oldfield*; Swan River, *Drummond* 133\*, 138 p.p.; Buckland Hill, near Perth, limestone hills, *Cecil Andrews*, 1st coll. 1205,' indicating, by the asterisk, that *Drummond* 133 (K!) is the Type of her species and, by implication, the **Lectotype** of *S. scabra* var. *striata* Benth. At MEL there are probable duplicates of the *Oldfield* specimens from Woodmans Point and the Murchison River; these are also *S. flavescens* Labill.

*S. compacta* Hughes, Kew Bull. (1921): 24 (1921); 1922: 19 (1922); Willis, Handb. Pl. Victoria 1: 188 (1962), edn 2: 186, 435 (1970); Black, Fl. S. Austral. edn 2: 91 (1943). HOLOTYPE: TASMANIA: *Gunn* 996 p.p. (K!, CANB photo no. 237026).

*S. aphanoneura* Hughes, Kew Bull. 1921: 25 (1921); Black, Fl. S. Austral. edn 2: 93 (1943). HOLOTYPE: TASMANIA: Kents Group, *Brown* 6202 p.p. (K!, CANB photo No. 237025). We have been unable to discern any differences between *S. aphanoneura* Hughes and *S. flavescens* Labill. that could justify maintaining the former as a distinct species. In her description, Hughes states that the culms are pubescent, but in the Holotype they are not, and that the lateral nerves of the lower glume are almost obsolete, but in the Holotype they seem as distinct as in the rest of *S. flavescens*. Her illustration of a transverse section of a leaf of *S. aphanoneura* (fig. 37a, p. 29) clearly shows the difference in the indumentum (cf. fig. 6a, p. 19, *S. flavescens*) that can be readily observed on many specimens. We have, however, seen a number of intermediate specimens with a smooth outer surface of the blade and a pubescent upper surface, or vice versa, and specimens from a particular locality may be either glabrous or hairy. A manifest indumentum is more likely to occur in plants growing in habitats towards the limit of tolerance for the species (a not uncommon trend in grasses) such as on fossil sands (former sand dunes) now well away from the normal maritime or estuarine habitat of *S. flavescens*. *S. aphanoneura* then, is probably just a growth form of *S. flavescens* and is so treated here.

*S. hirsuta* Hughes, Kew Bull. 1921: 22 (1921). HOLOTYPE: WESTERN AUSTRALIA: Swan River, *Drummond* s.n., s.d. (K!)—*S. scabra* var. *barbata* Benth., Fl. Austral. 7: 571 (1878); based on same type.

*S. pubescens* var. *maritima* J. Black, Trans. & Proc. Roy. Soc. S. Austral. 67: 36 (1943); Black, Fl. S. Austral. edn 2: 90 (1943). HOLOTYPE: SOUTH AUSTRALIA: Marino, *J.B. Cleland* s.n., 8.10.1932 (AD 97422295).

POSSIBLE SYNONYMS: *S. laeviculmis* Nees in Lehmann, Pl. Preiss. 2: 99 (1846). HOLOTYPE: cited as 'In insula Van Diemen?' We have not yet found a specimen that could be regarded as the Holotype but the description would seem to apply to *S. flavescens*.

*S. laevis* Mez, Feddes Repert. Spec. Nov. Regni Veg. 17: 210 (1921). HOLOTYPE: cited as 'Western Australia, Esperance (Diels)'. The Holotype was in B and is no longer extant. We have not seen any specimen that could reliably be regarded as a duplicate of the Type. The description is a reasonable match for *S. flavescens*.

Caespitose perennial to 0.8–1.2 metres high with conspicuously extravaginal shoots from a short rhizome. Culms geniculate or erect, slightly compressible, terete, (1.5–) 3–4 mm wide near the base, scarcely ribbed, glabrous but sericeous just below the nodes, or puberulous to pubescent; nodes 2–4, exserted, to 40% broader than adjacent internodes, sericeous to almost glabrous. Leaf sheaths at first tightly enveloping the culms, soon becoming loose, slightly ribbed to almost smooth, minutely puberulous or scaberulous between the nerves to glabrous or occasionally densely pubescent; upper sheaths usually glabrous; inner margin glabrous or ciliate just below the orifice; outer margin ciliate but glabrous at the base. Ligule firm and coriaceous, 0.3–0.6 mm long, truncate, ciliate; abaxial surface sericeous; auricles thickened and spreading, with a sparse to dense tuft of hairs below. Leaf blades usually flexuose, occasionally erect, tightly rolled to expanded, to 7 mm wide, to 70 cm long; abaxial surface not ribbed, puberulous to glabrous or scaberulous, occasionally hirsute or scabrous with long hairs or short hooks; adaxial surface ribbed, scaberulous with minute hairs, or glabrous or rarely sparsely to densely hirsute especially in the basal shoots; margin similar to adaxial surface. Panicle (10–) 20–30 (–40) cm long, c. 3 cm wide (excluding awns), exserted late in development, contracted to loosely spreading, usually dense with moderately close fascicles of usually many-flowered branches; axis terete to angular upward, scaberulous to ± glabrous; branches to 15 cm long, terete to angular, scaberulous; pedicels to 8 mm long, terete to angular, scaberulous. Spikelets 9–14 (–16) mm long (excluding awn), gaping. Glumes unequal, membranous and translucent, scaberulous to scabrous or glabrous on the nerves or occasionally scaberulous overall; lower glume 9–14 (–16) mm long, long- to short-acuminate, the lower 25–70% 3-nerved; upper glume 9–11 (–14) mm long, the lower 30–50% 5-nerved, 3-nerved to 70%. Floret cylindrical to narrow-fusiform or slightly turbinate, (5.5–) 7–9 mm long (including callus). Lemma granular, dark brown at maturity, with sparse, spreading, erect yellow hairs becoming deep golden-brown at maturity; coma 0.3–1.2 mm long; 1–2 lobes, 0.1–0.5 mm long. Callus 1.6–3 mm long, fine and straight, sericeous with hairs similar to those of the lemma. Awn 40–70 mm long, 0.2–0.25 mm wide near the base, twice bent; column 18–30 mm long, 10–15 mm to the first bend, densely and softly pubescent with hairs (0.2–) 0.25–0.4 mm long; bristle scaberulous. Palea to 0.7 mm shorter than the lemma, acute, coriaceous, sericeous down the centre; margins glabrous; tip ciliate. Lodicules 3, membranous; 2 abaxial 0.8–1.6 mm long, spatulate; paleal c. 0.5 mm long, triangular, narrow-acute. Anthers 1.5–3.5 mm long, lightly penicillate. Caryopsis 3.5–4 mm long; embryo 25% the length; hilum 75% the length.

**DISTRIBUTION:** Headlands and sandy soils close to the coast of all southern States, including New South Wales.

**SELECTED SPECIMENS:** NEW SOUTH WALES: **South Coast:** Cave Beach, 3 miles [4.8 km] SW. of Jervis Bay, *Coveny* 3679, 12.10.1971 (NSW); Brush Island, 15 miles [24 km] S. of Ulladulla, *Rodway*, 5.9.1937 (K); Batehaven, *Reiner* 471, 22.11.1960 (CANB); Malua Beach, *Phillips CBG* 067213, 18.11.1967 (CBG); Broulee Head between Batemans Bay & Moruya, *Rodway NSW* 116722, 19.12.1948 (NSW).

**VICTORIA:** **Region D:** Hamilton Native Plant Reserve, Wannon, *Corrick* 1570, 2.1.1969 (Corrick herb). **Region E:** Steep limestone cliffs of Lower Glenelg River at Moretons Hut, *Willis*, 29.10.1948 (MEL); Portland, *Beaglehole* 7888, 10.1949 (NSW); Port Fairy, *Symon* 141, 8.11.1959 (ADW)

**Region K:** c. 24 km N. of Nelson, *Beaglehole* 55340, 6.12.1976 (ACB, NSW); E. of Port Campbell, *Beaglehole* 21609, 31.10.1966 (NSW); Apollo Bay, *Corrick* 3783, 12.12.1973 (Corrick herb). **Region N:** Loddon, *Walter*, 11.1887 (MEL); Seaholme, *Williamson*, 1.11.1930 (MEL); Yarra, *Mueller*, 1852 (MEL). **Region P:** Seaford, *Muir* 31, 28.12.1956 (MEL); Point Addis near Anglesea, *Nelson ANU* 16320, 1.1972 (CANB); Westernport, *Corrick* 2964, 12.12.1972 (Corrick herb); Phillip I. in Westernport Bay, *Vickery NSW* 16727, 7.11.1973 (NSW). **Region T:** Wilsons Promontory, *Muir* 627, 15.12.1958 (MEL). **Region Z:** 2.5 miles [4 km] NW. of Mallacoota, *Beaglehole* 32113, 26.11.1969 (NSW).

TASMANIA: Deal Island, Kents Group, *Whinray* 48, 29.2.1968 (NSW); King Island, *Blake* 18437, 27.1.1949 (BRI, NSW); Cape Barron Island, Furneaux Group, *Whinray* 419, 22.5.1969 (MEL); Tomahawk, *Townrow* 112, 12.1967 (JEST); Hobart, Old Beach, *Townrow* 94, 12.1967 (JEST); Marion Bay, *Hemsley* 6683, 3.1.1972 (NSW); South Arm, Opossum Bay, *Townrow* 42, 11.1967 (JEST); North Bruny I., Variety Bay, *Townrow* 157, 1.1968 (JEST); The Neck, Bruny I., *Phillips* 787, 29.11.1965 (CBG).

SOUTH AUSTRALIA: **Eyre Peninsula:** Fowlers Bay, *Rogers NSW* 116728, 9.1907 (NSW); Morialta, *Hilton NSW* 116966, 23.11.1953 (NSW dupl. of ADW); 2 miles [3 km] from Smokey Bay, *Hilton*, 25.8.1955 (ADW 197773); St Francis I., c. 60 km SW. of Ceduna, *Wace* 128, 8.1.1971 (NSW); Isles of St Francis, Masillon Island, *Wace* 294, 5.10.1972 (AD); Isles of St Francis, Fenelon Island, *Wace* 279, 5.10.1972 (AD); Elliston, c. 150 km NW. of Port Lincoln, *Cleland*, 21.8.1925 (AD); Beaumont, *Smith* 1527, 18.10.1968 (AD); Boston Island near Port Lincoln, *Wilson* 303A, 8.10.1958 (AD); Port Lincoln, *French*, 9.1954 (ADW); c. 15 km SSE. of Port Lincoln, *Specht* 2634, 10.11.1960 (AD); Sleaford Mere, *Alcox* 3288, 3.11.1970 (ADW, AD). **Northern Lofty:** 40 km S. of Port Wakefield, *Tindale NSW* 116980, 10.9.1970 (NSW). **Murray:** Murray Bridge, *Cleland*, 14.10.1949 (AD). **Yorke Peninsula:** Wool Bay, c. 10 miles [16 km] N. of Edinburgh, *Lothian* 1133, 7.10.1962 (AD, NSW); c. 15 km SSE. of Minlaton, *Blaylock* 1554, 10.10.1970 (AD); 8 miles [13 km] SSW. of Corny Point Lighthouse, *Blaylock* 1074, 13.10.1968 (AD); inland from Stenhouse Bay township, *Symon* 9550A, 6.10.1974 (ADW). **Southern Lofty:** Valley View near Dry Creek, *Spooner* 1257, 23.10.1970 (AD); Highbury, *Smith* 1524, 10.4.1968 (AD); Hindmarsh I., *no collector*, 10.10.1945 (AD); Walkerville cemetery, *Cleland*, 3.10.1955 (ADW 13283); Seaton Golf Course c. 9 km WNW. of Adelaide, *Smith* 1443, 7.10.1968 (AD); Heywood Park, Millswood, *Kraehenbuehl* 827, 26.10.1962 (AD); Waite Agricultural Research Institute, *Hilton NSW* 116967, 22.10.1953 (NSW, dupl. of ADW); Wayville near Adelaide, *Hilton NSW* 116970, 29.9.1946 (NSW, dupl. of ADW); Henley Beach, *Cleland*, 4.11.1932 (AD); between Glenelg & Brighton, *Black*, 16.10.1906 (AD); National Park, Belair, *Ising*, 26.11.1932 (ADW 44008); Brighton, *Hilton*, 1.1944 (ADW); Hallett Cove, *Cleland*, 29.9.1932 (AD); *Cooper*, 16.10.1964 (AD); between Hackham & Noarlunga, *Smith* 788, 31.10.1967 (AD); Port Noarlunga, *Cleland*, 5.11.1926 (K); W. of Hackham, *Cleland*, 28.10.1933 (AD); c. 0.5 km inland from Blanche Point, *Smith* 363, 22.9.1967 (AD); cliffs at Pt. Willunga near Aldinga, *Hilton*, 20.10.1946 (ADW 43879); Sellicks Beach, *Cleland*, 18.10.1941 (AD); Aldinga Bay Scrub, *Cleland*, 30.10.1928 (AD); Finnis to Milang road c. 3 km from Finnis, *Spooner* 2554, 8.10.1972 (AD); Normanville, 2 miles [3 km] W. of Yankalilla, *Hilton*, 10.10.1946 (ADW); Goolwa, *Cleland*, 10.10.1945 (AD); Murray Mouth, *Hilton*, 9.10.1954 (ADW); Port Elliot, 4 miles [6 km] NE. of Victor Harbor, *Hilton NSW* 116746, 10.10.1945 (NSW, ADW); Halls Creek, c. 5 km W. of Victor Harbor tributary of the Inman River, *Cleland*, 15.11.1930 (AD); Mouth of Inman River, *Cleland*, 12.1.1940 (AD); Encounter Bay, *Cleland*, 9.1.1941 (ADW); Callawonga Creek, *Hilton*, 25.11.1953 (ADW 44120); Waitpinga Beach, 13 km WSW. of Victor Harbor, *Crisp* 945, 27.10.1974 (CBG, NSW). **Kangaroo Island:** Kingscote, *Cleland*, 19.9.1955 (AD); Penneshaw, *Hilton* (ADW); Rocky River, *Cleland*, 27.11.1954 (AD); mouth of South-West River, *Cleland*, 27.1.1940 (AD). **South-eastern:** near Narrung, E. of the Coorong, *Cleland*, 17.11.1953 (AD); Campbell Park, *Cleland*, 16.10.1955 (AD); Bagshaws turnoff near Meningee, 8 km E. of Princes Highway, *Crisp* 524, 1.9.1973 (CBG); 8.7 km on Cape Jaffa road from Kingston-Robe road, *Pearce* 18, 9.2.1974 (ADW); Big Heath National Park c. 25 km SW. of Naracoorte, *Weber* 1671, 3.11.1969 (AD); 1 km E. of Robe, *Crisp* 3668, 7.12.1977 (CBG); Cape Buffon, Rivoli Bay, *Cleland*, 24.2.1946 (AD); near Millicent, *Cleland*, 13.10.1949 (AD); Myora Forest area, c. 16 km ENE. of Mt Gambier, *Wilson* 704, 11.12.1966 (CANB); Pt MacDonnell, *Cleland*, 31.10.1941 (AD); near Tantanoola Caves, *Cleland*, 28.2.1947 (AD); Hoods Drift c. 14 km W. of Mt Schank, *Cleland*, 17.2.1948 (AD); Cape Northumberland, *Cleland*, 1.11.1941 (AD).

WESTERN AUSTRALIA: **Eucla:** 3.5 miles [6 km] E. of Eucla, *George* 8516, 15.10.1966 (PERTH). **Irwin:** Dongara [as Dongarra], *Maiden NSW* 116760, 10.1909 (NSW); Cockleshell Gully, *Gardner* 8402, 15.10.1946 (PERTH); Murchison R., *Oldfield* (MEL 59921) (probable duplicate of a specimen cited by Hughes as *S. tenuigulumis* Hughes). **Darling:** southwards from New Norcia, *Gardner* 8665, 10.1947 (PERTH); City Beach, 7.5 miles [12 km] W. of Perth, *Willis*, 14.9.1947 (MEL 60670); Perth to Wanneroo, *Salasoo* 4169, 24.9.1970 (NSW); Kings Park, Perth, *Gardner* 861, 30.10.1920

(PERTH); In arenosis sylvae prope Pine-Apple, Perth, *Preiss 1826*, 10.1831 (CBG, see also photo in NSW 116948, dupl. MEL 60038, LD, HBG); Karrakatta, *Fitzgerald NSW 11676*, 11.1900 (NSW); Cottesloe, *Fitzgerald NSW 116766*, 9.1901 (NSW); N. of Claremont, *Fitzgerald NSW 150902*, 26.9.1902 (NSW, PERTH); Claremont, *Gardner NSW 150899*, 9.1920 (PERTH); Catherine Beach, Rottneest, *Green*, 14.11.1956 (PERTH); Melville, 8 miles [13 km] S. of Perth, *Turvey NSW 116769*, 18.9.1965 (NSW); Fremantle to Kevinana, *Salasoo 4016*, 20.9.1970 (NSW); Woodman Pt, *Oldfield*, (MEL 59919) (presumably a duplicate of a specimen cited by Hughes as *S. tenuiglumis* Hughes); Yallingup, *Maiden NSW 116765*, 10.1909 (NSW). Eyre: North Twin Peak I., Recherche Archipelago, *Willis NSW 150901*, 20.11.1950 (PERTH, NSW); 4 km E. of Needilup, *Newbey 4919*, 10.11.1975 (PERTH); John Cove, Bremer Bay, *Newbey 4479*, 8.10.1974 (PERTH).

Benthams cited *Preiss no. 1826* under *S. scabra* var. *occidentalis* Benth. and cited *S. flavescens* Nees non Labill. as a synonym. *Preiss no. 1826* in LD and HBG is actually *S. flavescens* Labill. although differing a little from the majority of specimens in having a rather widely spreading inflorescence. The awns are very slender, delicate and loosely twice bent as in *S. flavescens*, not stout, strongly falcate and with a long bristle as in *S. tenuifolia* (syn. *S. scabra* var. *occidentalis*).

***Stipa gibbosa* J. Vickery, Telopea 2: 14 (1980).**

HOLOTYPE: SOUTH AUSTRALIA: Burnside district, Beaumont Common, c. 6 km SE. of Adelaide, J.B. Cleland, 11.10.1942 (AD 9632316).

Caespitose perennial to 1.5 metres high with a sparse basal leaf tuft to 30 cm. Culms erect, terete, not compressible, 1.5–2.5 mm wide near the base, ribbed, glabrous to scaberulous. Nodes 2–3, exserted, 35–60% wider than adjacent internodes, densely pubescent with slightly spreading short hairs. Leaf sheaths at first tightly enveloping the culms, finally becoming loose, 3–6 mm wide, strongly ribbed, glabrous except densely pubescent to puberulous just above the node; inner margin ciliate just below the orifice; outer margin ciliate. Ligule thinly coriaceous, truncate, ciliate, 0.3–0.5 mm long, although continuous with the sheath margins producing two lobes to 1 mm long, themselves ciliate with a tuft of hairs to 2 mm long; abaxial surface sericeous; auricles thickened and spreading, glabrous. Leaf blades flat or convolute to 30 cm long, 2–5 mm wide; adaxial surface very strongly ribbed, minutely puberulous, occasionally with widely scattered hairs; abaxial surface minutely puberulous or strongly scabrous with minute hairs especially on the basal leaves, occasionally with widely scattered hairs; margins similar to adjacent surface. Panicle to 30 (–40) cm long, exserted, moderately sparse with moderately closely-spaced fascicles of unequal, few-flowered, compound branches, contracted, 1.5–2 (–5) cm wide (excluding awns); axis terete, upwards flattened and scabrous, mostly on the edges; branches to 9 cm long, flattened, scabrous mostly on the edges; pedicels 4–10 mm long, flattened, scabrous mostly on the edges. Spikelets 11–17 mm long (excluding awn), gaping widely at floret disarticulation, otherwise the tips tightly closed. Glumes unequal, firm and green or yellow for most of the length, the tip membranous and white, acute to acuminate, broad and inflated at the middle, glabrous with only the nerves scabrous, or scaberulous to scabrous with dense minute hairs overall; lower glume 11–17 mm long, lower 75% 3-nerved; upper glume 8–13 mm long, lower 50–30% 5-nerved, lower 75% 3-nerved. Floret 4.5–6.0 mm long (including callus), oblong-cylindrical with a short, slightly defined neck, gibbous with a strongly eccentric awn. Lemma red-brown to almost black at maturity, surface strongly granular, with spreading white to yellow hairs, becoming golden at late maturity, the central nerve thickened; lobes absent; coma of spreading hairs, 0.8–1.3 mm long. Callus sturdy, slightly curved, 1–1.5 mm long, with hairs slightly darker than those of the lemma, the

naked point (0.15–) 0.2–0.5 mm long, and squared. Awn 25–35 (–50) mm long, twice bent, 0.3 mm wide near the base; column 12–20 mm long, 5–8 mm to the first bend, scabrous with slightly spreading hairs less than 0.2 mm long; bristle scabrous. Palea  $\pm$  equal to the lemma or to 0.5 mm longer, thickly coriaceous to the margins, granular down the centre, flat or slightly depressed between the nerves, glabrous,  $\pm$  mucronate with the apex tightly convolute and slightly recurved, the tip usually penicillate. Lodicules 3, membranous; 2 abaxial 0.8–1.3 mm long, oblong to narrow-cuneate; paleal 0.5–0.8 mm long, oblong to acute. Anthers 2.5–3 mm long, penicillate. Caryopsis c. 3.5 mm long, slightly gibbous above; embryo 30% the length; hilum 75% the length.

**DISTRIBUTION:** South-western New South Wales, north-western Victoria and the Northern Lofty and Southern Lofty Regions of South Australia.

**SELECTED SPECIMENS:** NEW SOUTH WALES: **South Western Slopes:** Urangeline, *Newman* NSW 117014, 21.11.1955 (NSW). **South Western Plains:** 29 km S. of Deniliquin, *Lloyd* NSW 151487, 7.11.1979 (NSW).

**VICTORIA:** **Region C:** 4–7 km from Dimboola toward Nhill, *Canning* 2972, 11.11.1969 (CBG 067316 p.p.). **Region J:** Cockajemmy Lakes, *Beaughole* 61614, 17.11.1978 (ACB). **Region N:** 1 mile [1.5 km] S. of Laverton, *Cullimore* 125, 22.11.1967 (AD, PERTH).

**SOUTH AUSTRALIA:** **Northern Lofty:** Bundaleer Hills [c. 60 km SW. of Port Pirie], *Black*, 23.11.1925 (AD); Bundaleer, c. 41 km N. of Clare, *Cleland*, 28.11.1930 (AD 96323249); Spalding, *Black*, 21.11.1925 (AD); c. 91 miles [146 km] E. of Snowtown Hospital, *Copley* 987, 25.12.1966 (AD); E. of Mortlock Research Station, Mintaro, *Symon* 3930, 16.12.1965 (ADW, CANB, NSW). **Southern Lofty:** Adelaide Agricultural High School, 7.11.1932 (ADW); Beaumont Common, c. 6 km SE. of Adelaide, *Cleland*, 23.10.1935 (AD 96323196); Halls Creek, Encounter Bay, *Cleland* H70, 16.11.1930 (K).

From *S. aristiglumis* it differs in the distinctly dorsally gibbous floret (instead of  $\pm$  uniformly fusiform narrowing evenly towards the apex) and in usually being a smaller plant. From *S. blackii* it differs in the very short coma of hairs at the apex of the lemma and more distinctly gibbous lemma. From *S. setacea* it differs in the truncate ligule, short  $\pm$  obtuse callus, and palea not deeply furrowed down the back.

***Stipa hemipogon* Benth.**, Fl. Austral. 7: 569 (1878); Hughes, Kew Bull. 1921: 18 (1921), *ibid.* 1922: 18 (1922); Gardner, Fl. W. Austral. 1, Gram.: 178, 181, fig. (1952).

**TYPIFICATION:** Bentham cited 'W. Australia, *Drummond*, no. 231, 376', specimens at K. Hughes (1921) cites 'Swan River, *Drummond* 231, 376\*' and, by her use of the asterisk, has selected *Drummond* 376 as the **Lectotype**. A duplicate of *Drummond* 376 is at MEL. Mueller, Fragm. 8: 104 (1875), regarded *Drummond* 376 (the Lectotype of *S. hemipogon*) as only a variety of *S. semibarbata* ('Varietas brachyathera') but supplied no separate description; he also wrote this *nomen nudum* on MEL 59933.

**SYNONYMS:** *S. nobilis* Pilger in Diels & Pritzel, Bot. Jahrb. Syst. 35: 70 (1904). **TYPIFICATION:** Pilger cited 'Coolgardie pr. Bronti inter frutices in arenosis frequens atque insignis'. His specimen was doubtless at B and presumably has been destroyed. At MEL there is a specimen (MEL 59967) from the Berlin Herbarium which is stated thereon to be part of the Type of *S. nobilis* Pilger and is annotated 'W. Australia: Dist. Coolgardie; Bronti. *Diels* n. 5611' and this is here designated as the **Lectotype**.

*S. indepressa* J. Black, Trans. & Proc. Roy. Soc. S. Austral. 65: 334 (1941); Black, Fl. S. Austral. edn 2: 90 (1943). **HOLOTYPE:** SOUTH AUSTRALIA: Minnipa, Eyre Peninsula, *J.M. Black*, 11.11.1915 (AD 97403332; isotype MEL 59951). Willis, Handb. Pl. Victoria 1: 184 (1962) and edn 2: 184 (1970), regarded *S. indepressa* as a synonym of *S. hemipogon* but included also *S. plagiopogon* J.M. Black (= *S. mollis* R. Br.). See also Eichler, Suppl. Black's Fl. S. Austral.: 49 (1965).

*S. semibarbata* var. *gracilis* J. Black, Trans. & Proc. Roy. Soc. S. Austral. 67: 36 (1943); Fl. S. Austral. edn 2: 89 (1943). **TYPE**: Black cited two localities, Mount Lofty Range and Kangaroo Island, when establishing the name. In his Flora of South Australia he added a third locality, Encounter Bay. All three are represented in Black's collections held at AD, and have been named *S. semibarbata* var. *gracilis* by Black.

- (i) 'Mt Lofty Range, National Park, Belair, J.B. Cleland, 26.11.1932' (AD 97244093). The specimen consists of a small tuft of basal leaves attached to the rootstock and a single culm with panicle now devoid of florets. Three florets have been attached to the sheet. The lemmas are 7–8 mm long, the column 25 mm long with spirally arranged hairs, and the glumes c. 20 mm long. We would confirm a previous identification of this specimen by J. E. S. Townrow as *Stipa mollis* R. Br. A probable duplicate derived from Cleland's herbarium and annotated 'National Park, 26.11.1932' (AD 96323321) is certainly *S. mollis*. The present condition of this Syntype makes it undesirable to select it as the Lectotype.
- (ii) 'Kangaroo Island, near Vivonne Bay, J.B. Cleland, 11.1924' (AD 97244091). The specimen consists of a single culm complete to the base but with only a small tuft of basal leaves and a single panicle in good condition with many florets still attached. We here designate this specimen as the **Lectotype** of the variety. The lemmas are c. 6 mm long, the column c. 15 mm long with spirally arranged hairs, and the glumes 15–17 mm. The specimen agrees with *Stipa hemipogon* Benth., as does an apparent duplicate (AD 96323160).
- (iii) 'Encounter Bay, J.B. Cleland, 17.11.1930' (AD 97244092). As this sheet was not cited with the original Latin description it is not eligible for selection as Lectotype though it was designated as such by Townrow in Pap. & Proc. Roy. Soc. Tasmania 112: 242 (1978). We confirm Townrow's identification of this specimen as *Stipa mollis* R. Br.

Caespitose perennial to 1 metre high, not rhizomatous, with a basal tuft of leaves a third to half the height. Culms erect or geniculate at the base, terete, 2–2.5 mm wide near the base, not compressible, not ribbed, minutely scaberulous; nodes 2–5,  $\pm$  exserted, not swollen. Leaf sheaths not inflated, 0.5–1 mm wide; basal sheath very slightly ribbed, scaberulous between the nerves with hairs minute (–0.3 mm long), inner margin glabrous, outer margin ciliate with hairs minute–0.2 mm long; upper sheath moderately ribbed, scabrous along the centre with minute tubercles or scaberulous, edges glabrous to sparsely pilose, inner margin glabrous, outer margin ciliate with hairs 0.1–0.3 mm long to glabrous; collar of hairs 1 mm long. Ligule truncate, membranous, (0.3–) 1.5–3 mm long, ciliate with hairs 0.4–0.6 mm long; abaxial surface sericeous with hairs (0.2–) 0.6–0.9 mm long; auricles absent. Leaf blade linear, weakly rolled, 1.5–3 mm wide, to 20 cm long; abaxial surface moderately ribbed, the surface scabrous between the nerves with minute tubercles, sometimes also with sparse hairs 0.4 mm long; adaxial surface strongly ribbed, with hairs 0.2–0.6 mm long; margins scabrous with minute stiff hairs. Panicle 10–25 cm long, exserted, with moderately close fascicles of unequal, few- to many-flowered, compound branches, contracted, 1–3 cm wide (excluding awns); axis  $\pm$  terete, scaberulous; branches 2–5 cm long, slightly angled, scabrous with hairs minute–2.5 mm long; pedicels 2–10 mm long, angled, scabrous with hairs minute–2.5 mm long. Spikelets 15–20 mm long, gaping at maturity. Glumes unequal, acute to acuminate, scaberulous to almost glabrous; lower glume 15–20 mm long, lower 45–50 (–85%) 3–1-nerved; upper glume 10–16 mm long, lower 30–40% 5-nerved, upper 60–70% 3–1-nerved. Floret cylindrical, without a neck, 5–7.5 mm long (including callus). Lemma reddish brown at maturity, the surface smooth to granular upwards, sericeous with hairs 0.3–0.7 mm long, white to golden at maturity; lobes and coma absent. Callus 1.5–3 mm long, weakly bent at the tip, densely sericeous with hairs 0.2–0.8 mm long, white to gold at maturity. Awn 30–60 mm long, twice bent, 0.2–0.3 mm wide near the base; column 10–20 mm long, c. 10 mm to the first bend, brown to straw-coloured, densely plumose with hairs 0.5–4 mm long, the hairs produced on one side of the column, spiralling



with it; bristle delicate, brown, scabrous but plumose at the base on one side with hairs 0.2–2 mm long similar to those of the column. Palea  $\pm$  equal to the lemma, acute, the surface granular to smooth, sericeous along the centre with golden hairs 0.4–1 mm long. Lodicules 2, abaxial, 1–1.5 mm long, obtuse. Anthers c. 1–1.5 mm long, not penicillate. Caryopsis 3–4 mm long; embryo 20% the length, hilum 80–100% the length.

DISTRIBUTION: Southern regions of South Australia and Western Australia, and western Victoria.

SELECTED SPECIMENS: VICTORIA: **Region J:** near Stawell, *Gauba CBG 047573*, 21.10.1952 (CBG).

SOUTH AUSTRALIA: **Eyre Peninsula:** Hundred of Hambidge, NE. of Lock, *Specht 2460*, 8.11.1960 (AD); Yeelanna, 10 miles [16 km] N. of Cummins, *Hilton NSW 116486*, 20.12.1945 (ADW, NSW); Hundred of Tooligie, c. 85 km N. of Port Lincoln, *Kuchel 1422*, 23.10.1963 (AD). **Murray:** Alawoona, *Cleland NSW 116491*, 12.1913 (NSW, AD); Peebinga Wild Life Reserve, c. 80 km SSE. of Renmark, *Cleland*, 23.4.1963 (AD); W. of Murray Bridge, *Crocker*, 23.10.1943 (CANB 12173); Kinchinda, *Wood*, 9.1939 (ADW 3969); Swanport, *Story*, 4.11.1870 (MEL 60826). **Southern Lofty:** Finnis, *Eardley*, 3.1.1935 (ADW 277 in part). **Kangaroo Island:** Stokes Bay Road, *Cleland*, 30.10.1967 (AD); American River, *Cleland*, 25.10.1967 (AD); between Kingscote & American River, *Hilton*, 7.1.1945 (ADW 44182); MacGillivray, *Crocker*, 22.11.1941 (ADW 4334).

WESTERN AUSTRALIA: **Eucla:** c. 57 km SE. of Madura, *Parsons 97*, 29.11.1967 (AD); c. 23 km SSW. of Cocklebidly, *Parsons 154*, 1.12.1967 (AD). **Coolgardie:** Campion, *Gardner 2768*, 29.9.1931 (PERTH); Parker Range, *Merrell*, 1890 (MEL); Higginsville, *O'Donnell NSW 150910*, 1942 (PERTH); 1 mile [1.6 km] from Salmon Gums, *Phillips CBG 018938*, 6.11.1972 (CBG). **Irwin:** 23 miles [37 km] N. of Geraldton in Oakabella Hills, *Burbidge*, 2.9.1947 (CANB 15285); between Geraldton & Northampton, *Blake 18094*, 2.9.1947 (BRI, PERTH). **Avon:** 5.3 miles [8.5 km] from Wubin toward Wongan Hills, *Canning 2921*, 13.9.1968 (CBG); Cowcowing, *Koch 1132*, 9.1904 (NSW, PERTH, K); Yorkrakine, *Gardner NSW 150908*, 9.1936 (PERTH, NSW); 17 miles [27 km] E. of Pingelly, *Aplin 775*, 10.1960 (PERTH); 15 miles [24 km] S. of Tammin, *Royce 9359*, 3.11.1970 (PERTH); Wickepin, *Wallace NSW 150909*, 2.1923 (PERTH). **Darling:** 20 km from Keenan College towards New Norcia, *Ollerenshaw & Carriage CBG 062571*, 4.10.1975 (CBG); 14 miles [22 km] from Gingin towards Regans Ford, *Phillips CBG 043728*, 28.9.1968 (CBG); Kings Park, Perth, *Carne NSW 150906*, 18.10.1923 (PERTH); South Perth, *Carne NSW 150907*, 1.12.1924 (PERTH); Inglewood, North Perth, *Gardner NSW 150911*, 11.1933 (PERTH); 46 miles [74 km] from Perth along Albany Highway, *Phillips CBG 043574*, 30.9.1968 (CBG); Porongorup, *Maiden NSW 116934*, 11.1909 (NSW); Albany, *Maiden NSW 116463*, 11.1909 (NSW). **Eyre:** Ninety Mile Tank, Lake King – Norseman Track, *Hopkins & Robinson NSW 150904*, 11.1978 (PERTH); One Mile Rocks Reserve SE. of Lake King, *George 10468*, 12.11.1970 (PERTH); 21 miles [34 km] from Ravensthorpe towards Lake King, *Canning NSW 116458*, 5.11.1968 (NSW, BRI, dupl. of CBG); Desmond near Ravensthorpe, *Maiden NSW 116462*, 11.1909 (NSW, K); between Jerramungup & Ravensthorpe at West River Crossing, *Canning 7553*, 10.11.1968 (CBG); c. 21 km NNW. of the coast at Stokes Inlet, *Orchard 1668*, 20.10.1968 (PERTH); Esperance, *Maiden NSW 116464*, 11.1909 (NSW); c. 69 miles [110 km] from Esperance towards Ravensthorpe, *Canning 7092*, 1.6.1971 (CBG); Fitzgerald National Park, near Fitzgerald River, *George 10556*, 18.12.1970 (PERTH); Cape Arid National Park, E. of Esperance, *Royce 9932*, 1.12.1971 (PERTH); Cape Le Grand National Park, *Royce 8717*, 21.10.1969 (PERTH). **Stirling:** 61.2 km from Gnowangerup towards Albany, *Phillips CBG 054856*, 10.10.1962 (CBG); Frankland River W. of Cranbrook, *Hadley NSW 150912*, 12.1945 (PERTH); c. 35 miles [56 km] from Albany towards Borden via Chester Pass, *Canning CBG 042828*, 25.10.1968 (CBG).

Hughes (Kew Bull. 1921: 19 (1921) and 1922: 18 (1922)) apparently did not see the Type of *S. nobilis* Pilger, and her identification of a Victorian specimen with this species and her comments comparing *S. nobilis* with *S. mollis* and *S. semibarbata* have hence proved somewhat confusing. She cites *Drummond 116* as *S. nobilis*.

Willis, Handb. Pl. Victoria 1: 184 (1962), edn 2: 184 (1970), appears to have erroneously identified Victorian specimens of *S. mollis* as *S. hemipogon* of Western Australia. Reference is made to his comments by Eichler, Suppl. Black's Fl. South Australia: 49 (1965).

\**Stipa hyalina* Nees, Agrost. Bras.: 378 (1829); Hitchcock, Contr. U.S. Natl. Herb. 24: 277 (1925); Caro, Kurtziana 3: 56 (1966); Rosengurtt, de Maffei et de Artucio, Gram. Uruguayas: 77 (1970).

HOLOTYPE: 'Habitat ad Monte Video (Sellow. — Vidi in Hb. Reg. Berol.)'. The Type was *Sellow 636 d* in B which is no longer extant. There are two sheets marked "Brasilia Sello", apparently duplicates of the type, in US and these have formed the basis of our typification.

Caespitose perennial to c. 0.75 metres high, with a basal tuft of leaves, without rhizomes. Culms erect or slightly geniculate at the base, terete, c. 1 mm wide near the base,  $\pm$  compressible, moderately to slightly ribbed upwards, glabrous; nodes 3–4, exserted, glabrous, not swollen. Leaf sheaths at first tightly enveloping the culm, later becoming slightly free, glabrous and smooth; basal sheath 4–6 mm wide, slightly ribbed, moderately ribbed on the innovations; upper sheath 2–5 mm wide, strongly ribbed; margins glabrous. Ligule truncate, membranous, 0.2–2 mm long, glabrous; auricles thickened, 0.5–1.5 mm long, with tufts of hairs at the base on the innovations, glabrous elsewhere. Leaf blade expanded or loosely rolled, 1.5–4 mm wide, to 25 cm long; abaxial surface strongly ribbed, smooth and glabrous; adaxial surface strongly ribbed, smooth and glabrous to scaberulous with minute tubercles; margins scabrous with minute tubercles or sparsely ciliate with hairs to 0.2 mm long. Panicle 15–25 cm long, exserted, with distant fascicles of unequal, few-flowered compound branches, contracted, 2–4 cm wide (excluding awns); axis angular, scabrous with hairs minute–0.2 mm long; branches 2–6 cm long, angular, scabrous with stiff hairs minute–0.2 mm long; pedicels 0.5–5 mm long, angular, scabrous, with stiff hairs minute–0.2 mm. Spikelets 9 mm long, gaping. Glumes unequal, acute to acuminate, hyaline, minutely scaberulous; lower glume 9 mm long, lower 10–30% 3-nerved; upper glume 7–8 mm long, lower 40–50% 3-nerved. Floret 4 mm long (including callus), cylindrical with a weakly defined neck. Lemma surface scabrous with minute crystalline tubercles, sericeous along the midrib with white hairs c. 0.7 mm long; lobes absent; corona 0.5 mm long with crystalline spines c. 0.2 mm long on the upper margin. Callus 0.7 mm long, curved, densely sericeous with white hairs minute–1 mm long. Awn 35–40 mm long, twice bent, c. 0.2 mm wide near the base; column c. 15 mm long, 7–8.5 mm to the first bend, straw-coloured, minutely scabrous; bristle straw-coloured, scabrous with hairs minute–0.1 mm long. Palea 30–40% the length of the lemma, acute, hyaline, smooth and membranous, glabrous. Lodicules 2, abaxial, membranous, brown or hyaline, c. 1 mm long, oblong. Anthers 2–3 mm long, penicillate. Mature caryopsis not observed.

DISTRIBUTION: An introduction from S. America, uncommon on North Western Slopes of New South Wales.

SPECIMENS EXAMINED: NEW SOUTH WALES: **North Western Slopes:** Glen Innes to Inverell, *Plante NSW 117383*, 3.2.1951 (NSW); Gunnedah, cultivated, *Barr NSW 117385*, 1955 (NSW). **Central Coast:** Botanic Gardens, Sydney, cultivated, *Steenbohm NSW 117386*, 17.11.1974 (NSW).

*Stipa juncifolia* Hughes, Kew Bull. 1921: 11 (1921); Gardner, Fl. W. Austral. 1, Gram.: 174, 175, pl. 51 (1952), at least in part (Type cited).

HOLOTYPE: WESTERN AUSTRALIA: Swan River, *Drummond, 4th coll. no. 377* (K!, CANB photo no. 236993). It is recorded by Rica Erickson in 'The Drummonds of Hawthornden' (1969) that Drummond's 4th Collection consists of specimens from King Georges Sound, Stirling Range, Porongorups, Mt Manypeaks, Cape Riche and West Mt Barren, and from N. and E. of Moore River. Most of these localities are more likely than the cited Swan River.

Caespitose perennial to c. 1 metre high, shortly rhizomatous, without a basal tuft of leaves. Culms erect, 1–1.5 mm wide,  $\pm$  compressible, ribbed about the nodes, glabrous; nodes c. 3, exserted, glabrous. Leaf sheaths not inflated, slightly to moderately ribbed; basal sheath 7–9 mm wide, shortly puberulous with hairs < 0.5 mm long between the ribs; upper sheath 3–6 mm wide, glabrous to minutely puberulous between the ribs; margins glabrous. Ligule membranous, obtuse, 2.5–8 mm long, shortly puberulous with hairs < 0.05 mm long. Leaf blade tightly rolled, 1–2 mm in diameter, 2–4.5 mm in circumference, to 50 cm long; abaxial surface smooth and glabrous; adaxial surface densely scaberulous with minute siliceous prickles; margins scabrous with hairs 0.1 mm long or glabrous. Panicle 30–35 cm long, exserted, with distant fascicles of unequal, few-flowered compound branches, spreading, 3.5–8 cm wide (excluding awns); axis terete, glabrous; branches 1–13 cm long, slightly flattened, with sparse hairs < 0.05 mm long; pedicels 0.5–2 mm long, terete, glabrous. Spikelets 10–12 mm long (excluding awn), gaping at maturity. Glumes subequal, acute to acuminate, green at the base, purple-tinged across the centre, straw-coloured at the tip; lower glume 10–12 mm long, lower 60 (–75)% 3-nerved; upper glume 9–10 mm long, lower (30–) 40% 3-nerved. Floret cylindrical, without a neck, 6.5–9 mm long (including callus). Lemma smooth, sericeous with white hairs 0.5 (–0.8) mm long; lobes 2–2.5 mm long; coma 2–2.5 mm long. Callus 1.1–1.5 mm long, weakly bent at the tip; sericeous with white hairs 0.1–1 mm long. Awn 25–50 mm long, twice bent, 0.2–0.25 mm wide near the base; column 10–20 mm long, 5–10 mm to the first bend, scabrous with hairs 0.1–0.2 (–0.5) mm long; bristle darker than the column, scabrous with hairs 0.1–0.15 mm long. Palea equal to the lemma, 3 (–4)-toothed, slightly depressed between the nerves, surface smooth, sericeous along the centre back with hairs 0.5–1.5 mm long, margins glabrous. Lodicules 2, abaxial, membranous, obtuse, 0.5–1.5 mm long. Anthers 5 (–6) mm long, penicillate. Caryopsis not seen.

DISTRIBUTION: Margins of salt lakes or saline depressions in the southern areas of Western Australia.

SPECIMENS EXAMINED: WESTERN AUSTRALIA: **Avon:** c. 20 km N. of Cranbrook, *Kuchel* 1998, 20.9.1964 (AD). **Roë:** Jerramangup, *Gardner*, 9.1939 (PERTH); Lake King, *George* 10466, 11.11.1970 (PERTH, NSW); 5 km S. of Peak Eleanora, *Newbey* 6341, 8.11.1979 (PERTH). **Eyre:** Ravensthorpe, *Gardner*, 11.1944 (PERTH); 5 km NW. of Ongerup, *Newbey* 3587, 24.9.1972 (PERTH); nr. Toompup, *Gardner*, 10.1944 (PERTH); Fitzgerald River Reserve, *Royce* 9282, 24.10.1970 (PERTH); Martin Ck nr. Fitzgerald River, *George* 10939, 7.9.1971 (PERTH); Lake Quaderwardup, *Beard* 7571, 27.9.1975 (NSW); Stirling Range, *Mueller*, 10.1867 (MEL 60662); South Stirling, *George* 6494, 11.12.1964 (PERTH); E. of Albany–Borden rd., *Aplin* 2142, 19.10.1962 (PERTH); Kalgan, *Mueller*, s.d. (MEL 60663).

The specimen from Lake King (*George* 10466) differs from the other specimens in being considerably more robust with broader sheaths, longer leaves, a more compact inflorescence and basically larger spikelet dimensions and an awn to 7 cm long. This population warrants further field studies to assess the significance of the variation.

Bentham labelled and cited (Fl. Austral. 7: 566 (1878)) the Holotype of *S. juncifolia* as *S. flavescens* Labill., and Hughes therefore cited *S. flavescens* Benth. non Labill. as a 'synonym' of *S. juncifolia*.

In his treatment of *Dichelachne setacea* (R. Br.) Nees in Lehmann, Pl. Preiss. 2: 98 (1846), Nees cited *Stipa setacea* R. Br. as the basionym; he also cited a specimen, *Preiss* 1854, from the interior of Western Australia. Veldkamp, *Blumea* 22: 11 (1974), regards a specimen of *Preiss* 1854 at BM as the Holotype of *Dichelachne setacea* Nees and identifies it as *Stipa stipoides* (Hook. f.) Veldk.

We have not been able to find a specimen of *Preiss 1854* at BM (as cited by Veldkamp), but specimens of this collection at MEL and LD are certainly not *S. stipoides*, differing in the shorter glumes and lemma, loose inflorescence and habitat as cited, but are quite consistent with *S. juncifolia* Hughes. *Preiss 1854* is also the basis of Gardner's record (Fl. W. Austral. 1, Gram.: 174 (1952)) for *S. stipoides* from Western Australia. We have seen no material of true *S. stipoides* from Western Australia.

***Stipa lanata* J. Vickery, S.W.L. Jacobs & J. Everett, sp. nov.**

*S. eremophilae* affinis sed lemmate glabro marginibus non incidentibus, orificio et vaginis infernis longe lanatis, foliis plerumque latoribus, statura plerumque brevior, differt.

HOLOTYPE: WESTERN AUSTRALIA: 7 miles [11 km] N. of "Mundrabilla" Homestead. Found growing on gently undulating calcareous plain up to a height of 45 cm in a herbfield. *Mitchell* 2, 31 July 1974 (PERTH).

Short caespitose perennial to c. 0.45 metres high. Culms 1–2 mm wide near the base, terete, ribbed, glabrous except pubescent for several mm below the nodes; nodes 1–2, glabrous to puberulous, exserted only in older geniculate culms. Leaf sheaths broad, the upper sheaths inflated, the innovations held tightly into bundles; ribs of lowermost sheaths long-woolly to hirsute, pubescent between the ribs, to glabrous with age on uppermost sheaths; outer margin glabrous to long-woolly ciliate, especially just below the ligule; inner margin glabrous. Ligule 0.4–1.5 mm long, truncate, densely ciliate; auricles with long woolly hairs. Leaf blades to c. 20 cm long and 1.5–4 mm wide, expanded to loosely rolled; abaxial surface densely long-woolly to very shortly pubescent or glabrous, especially on the older blades; adaxial surface densely long- to short-pubescent on upper leaves. Panicle 10–15 cm long, contracted, generally few-flowered, the base enclosed by the sheath except when fully mature; axis terete, pubescent, ribbed; branches terete, 10–40 mm long, hirsute to pubescent; pedicels angular, 4–15 mm long, hirsute to pubescent. Spikelet 19–26 mm long (excluding awn), not gaping at maturity, only slightly gaping after floret disarticulation. Glumes unequal, smooth, firm and often purple-coloured at the base, hyaline at the acuminate tips; lower glume 19–26 mm long, the lower 75% 3-nerved; upper glume 14–19 mm long, the lower 50% 5-nerved, the next 25% 3-nerved. Floret turbinate, 6.5–8 mm long (including callus). Lemma entire, dark brown at maturity, smooth except for a very few antrorsely hooked tubercles at the neck, glabrous, with a sparse coma of dark rusty hairs 1.5 mm long, in two tufts; lemma margins not fully covering the back of the palea. Callus prominent, c. 3 mm long, sericeous with hairs white to dark rusty at maturity. Awn 0.4–0.5 mm wide near the base, 65–80 mm long, twice bent; column 22–30 mm long, 10–15 mm to the first and stronger bend, densely pubescent with hairs to 0.3 mm long; bristle scaberulous. Palea obtuse, equal in length to the lemma, ciliate at the tip, otherwise glabrous, the central strip c. 0.6 mm wide exposed for most of its length. Lodicules 2–3; 2 abaxial oblong, membranous, c. 1 mm long; the paleal absent or acute, membranous, 0.5–0.8 mm long. Anthers not observed. Caryopsis 4 mm long; embryo c. 30% the length; hilum c. 85% the length.

DISTRIBUTION: Arid regions of southern Western Australia and central and western South Australia.

SPECIMENS EXAMINED: WESTERN AUSTRALIA: **Eucla**: 7 miles [11 km] N. of 'Mundrabilla' Homestead, *Mitchell* 2, 31.7.1974 (PERTH); Forrest, Trans Australia Railway Line, *Johnston, s.d.* (PERTH).

SOUTH AUSTRALIA: **Gairdner-Torrens Basin**: 60 miles [100 km] ESE. of Kingoonya, *Beauglehole* 20041, 1.10.1966 (NSW). **Eastern**: Aldermans Park, 'Koonamore', *Hilton* 234, 16.10.1952 (ADW 44191); 'Koonamore', *Everett* 163, 165 & *Jacobs*, 28.11.1980 (NSW).

See *S. nullanulla* and *S. vickeryana* for comparisons with this species. It is like *S. eremophila* but differs in the glabrous lemma with reduced margins, the long woolly hairs of the orifice and lower sheaths, the usually much broader sheaths and in usually being a shorter plant. Several specimens of *S. eremophila*, listed below, approach *S. lanata* very closely in having lemmas much more sparsely hairy than typical *S. eremophila*, and in having orifices and sheaths hirsute (nevertheless, not softly woolly). These can be found among populations of typical *S. eremophila*, and not differing noticeably from the other plants in any other character. These variants are treated here as *S. eremophila*.

SPECIMENS OF *S. eremophila* SHOWING AFFINITIES WITH *S. lanata*: SOUTH AUSTRALIA: **Murray**: Moorundie [Wild Life Reserve], *Cooper*, 10.1941 (AD); Swan Reach, *Everett* 159, 160 & *Jacobs*, 27.11.1980 (NSW). WESTERN AUSTRALIA: **Eucla**: 12 miles [19 km] from Madura, towards Cocklebiddy, along Eyre Highway, *Phillips*, CBG 039214, 1.9.1968 (CBG).

\****Stipa leucotricha* Trin. & Rupr.**, Mém. Acad. Imp. Sci. Saint-Pétersbourg, ser. 6, Sci., Math., Seconde Pt. Sci. Nat. 5: 54 (1842); Hitchcock, Contr. U.S. Natl. Herb. 24: 225 (1925).

HOLOTYPE: U.S.A.: Texas, (?) *Hooker* (LE) (not seen).

Caespitose perennial to c. 0.5 metres high, without rhizomes, with a basal tuft of leaves about half the height. Culms erect to slightly geniculate at the base, terete to slightly angled, 1.5–3 mm wide near the base, slightly to scarcely compressible, moderately to strongly ribbed; basal culms moderately to strongly ribbed, glabrous; upper culms slightly to moderately ribbed, glabrous to minutely scabrous; nodes c. 2,  $\pm$  exserted, not swollen, glabrous to sericeous with hairs minute–0.8 mm long. Leaf sheaths at first tightly enveloping the culm, later becoming free, glabrous to scabrous between the ribs with minute tubercles; basal sheath 0.5–1.5 cm wide, slightly to moderately ribbed, inner margin glabrous, outer margin glabrous to ciliate with hairs 0.2–0.5 mm long; upper sheath 3–4 mm wide, strongly ribbed, inner margin glabrous, outer margin glabrous. Ligule membranous, truncate, 0.4–0.7 mm long; abaxial surface glabrous to minutely scaberulous; auricles thickened and spreading, 1–2 mm long, ciliate at the base with hairs 0.3–1 mm long. Leaf blade expanded to inrolled, 2–5 mm wide, to 30 cm long; abaxial surface moderately to strongly ribbed, glabrous to sparsely pubescent with hairs 0.3–0.5 mm long; adaxial surface strongly ribbed, glabrous to sparsely pubescent with hairs 0.1–0.5 mm long, denser and longer on the innovations. Panicle c. 15 cm long, exserted, with distant fascicles of unequal few-flowered, compound branches, contracted, 1–3 cm wide (excluding awns); axis terete to slightly angular, glabrous to scabrous along the edges with hairs minute–0.4 mm long; branches 3–7 cm long, angled, glabrous to scabrous with hairs 0.1–0.6 mm long; pedicels 4–9 mm long, angled, scaberulous to scabrous with stiff hairs 0.1–0.5 mm long. Spikelets 10–17 mm long, gaping. Glumes subequal to equal, acute to acuminate, hyaline, glabrous or scabrous along the nerves with stiff hairs minute–0.6 mm long; lower

glume 10–17 mm long, lower 30–50% 3-nerved; upper glume 10–16 mm long, lower (35–) 40% (5–) 3-nerved, margins sometimes ciliate. Floret 6.5–9 mm long (including callus), cylindrical with a neck. Lemma coarsely granular upwards with minute tubercles, sericeous only along the midrib with hairs 0.5–1.5 mm long; lobes absent; corona 1.5–2.5 mm long with a firm basal part 0.5–1 mm long, ciliate with hairs 1–1.5 mm long. Callus 1.2–3.3 mm long, weakly bent at the tip, densely sericeous with white hairs 0.2–1.5 mm long. Awn 50–60 mm long, twice bent, 0.4–0.5 mm wide near the base; column 20–30 mm long, 10–20 mm to the first bend, straw-coloured, scaberulous with hairs minute–0.8 mm long; bristle delicate, straw-coloured, scabrous with hairs minute–0.1 mm long. Palea 35–50% the length of the lemma, acute to obtuse and erose, membranous, smooth and glabrous. Lodicules 2, abaxial, membranous, oblong, c. 1.5 mm long. Mature anthers not observed. Caryopsis c. 4 mm long; embryo 35% the length, hilum 85% the length.

DISTRIBUTION: Native to southern N. America; naturalised in suburban Melbourne, Victoria.

SPECIMENS EXAMINED: VICTORIA: **Region N:** Northcote, *Morris*, 10.1934 (MEL 60727 & MEL 60731); Fairfield, *Willis*, 13.11.1946 (MEL 60729); North Brighton, *Willis*, 14.11.1948 (MEL 60730).

***Stipa macalpinei* Reader**, *Victorian Naturalist* 15: 143 (1899) (as '*McAlpinei*'); Hughes, *Kew Bull.* 1922: 22 (1922); Black, *Fl. S. Austral.* 4: 671 (1929), edn 2: 93 (1943); Gardner, *Fl. W. Austral.* 1, Gram.: 176 (1952); Willis, *Handb. Pl. Vic.* 1: 183 (1962), edn 2: 183 (1970); Eichler, *Suppl. to Black's Fl. S. Austral.*: 50 (1965).

TYPEFICTION: The Holotype was cited as 'Hilly Mallee country and sandy heaths. Lowan, Dimboola Shire, 1892; *F.M. Reader*'. We have not found any specimen collected by Reader in 1892 in MEL, where Reader's specimens are now located, but there are a number of specimens (cited below) collected by him in 1898, some of which are named *S. macalpinei* in his handwriting. These have been taken as the basis of typification of this distinctive species.

VICTORIA: **Region C:** Desert, Lowan, Dimboola Shire, *F.M. Reader*, 20.11.1898 (MEL 59952); Lowan, *F.M. Reader*, 20.11.1898 (MEL 60732); Little Desert, *F.M. Reader*, 5.11.1898 (MEL 60733); Little Desert, Lowan, *F.M. Reader*, 5.11.1898 (MEL 60734) and 18.11.1898 (MEL 60735).

SYNONYMS: *S. compressa* var. *lachnocolea* Benth., *Fl. Austral.* 7: 567 (1878). *S. lachnocolea* (Benth.) Hughes, *Kew Bull.* 1921: 26 (1921). (In 1922 Hughes synonymised this with *S. macalpinei* Reader.) HOLOTYPE: WESTERN AUSTRALIA: '*Drummond, n. 132*' (K!).

*S. setacea* var. *latifolia* Benth., *Fl. Austral.* 7: 568 (1878), as 'var. *?latifolia*'; Hughes, *Kew Bull.* 1921: 30 (1921), under 'Species dubiae vel excludendae'. Hughes did not see any of the specimens quoted by Benth. [*S. scelerata* Behr ex Benth., *Fl. Austral.* 7: 568 (1878), *nomen nudum in syn.*] TYPEFICTION: Benth. cited '*Augusta, Behr*'; Crystal Brook, *F. Mueller*; Murray River, *Blandowski*'. In MEL there are two specimens collected near Angaston, South Australia, by Behr in January (MEL 59988 in part). The locality is in writing that Benth. could easily have mis-read as Augusta. These specimens are certainly *S. macalpinei* Reader. We have not been able to find the other specimens either at MEL or K and so here designate MEL 59988 as **Lectotype**.

*S. scelerata* Behr ex Black, *Fl. S. Austral.* 1: 65 (1922). TYPEFICTION: Black cites two elements: the synonym '*S. setacea* R. Br. var. *latifolia* Benth.' and a specimen from the 'Flinders Range, Sept. Dec.'. Since he attributes the name to Behr, whose specimen was one of the elements of Benth. variety, it appears that *S. setacea* var. *latifolia* Benth. should be taken as the replaced Synonym. At K (see CANB photo no. 237013) there is a specimen annotated in Black's handwriting '*Stipa scelerata*, Pichi Richi Pass, Flinders Range, S.A., 20.9.20, J.M.B.' which presumably represents the second element in Black's protologue. This specimen represents a species entirely different from *S. macalpinei*, with much shorter and strongly falcate awns. It has been identified as *S. arachnopus* Pilg. by some later botanist, but it is *not* the Type of that name. Black's description certainly does

not agree with *S. macalpinei*. Hj. Eichler (1965, see above) regards *S. setacea* var. *latifolia* Benth. and *S. scelerata* Behr ex Black as synonyms of *S. macalpinei* Reader. It is uncertain to what species of *Stipa* Ewart, Fl. Vict.: 182 (1931), applied the name *S. scelerata* Behr, but his description certainly does not apply to *S. macalpinei*.

Caespitose annual (to short-lived perennial?) to 90 cm high, without rhizomes, with a basal tuft to a tenth the height when present. Culms erect, terete,  $\pm$  compressible, c. 1–2 mm wide near the base, slightly ribbed, glabrous and smooth or scaberulous becoming glabrous upwards; nodes 1–4, glabrous, rarely exserted, to 25% wider than adjacent internodes. Leaf sheaths to 13 mm wide, slightly ribbed; basal sheaths not inflated, densely minutely pubescent, also densely covered with characteristic flattened, transparent, blunt and flexuose hairs 0.8–1.2 mm long; upper sheaths inflated, either scabrous to scaberulous with minute antrorse to retrorse hairs or the same as the basal sheaths; inner margin glabrous; outer margin of almost all sheaths ciliate with hairs similar to the long flattened hairs of the lower sheaths. Ligule membranous, truncate, obtuse to laciniate on upper leaves, 1–15 mm long, longest on upper leaves, continuous on the upper sheaths with acute auricle lobes; abaxial surface minutely scaberulous; auricles thickened, 0.4–1.2 mm long. Leaf blades triangular to acuminate, expanded and as broad at the base as the sheaths, the remainder expanded to tightly inrolled, 5–15 (–20) cm long; abaxial surface slightly ribbed, glabrous and smooth to scabrous with minute antrorse to retrorse hairs; adaxial surface strongly ribbed, pubescent with hairs minute–2 mm long, longer on the innovations; margins similar to leaf surface. Panicle contracted or at length narrowly spreading, densely to sparsely flowered, with distant fascicles of unequal compound or simple branches, 10–35 cm long (excluding awns), 1–5 cm wide, exserted at last; axis scabrous to scaberulous with very short strong hairs  $\pm$  angled; branches to 15 cm long, scabrous to scaberulous,  $\pm$  angled. Spikelets 13–21 mm long (excluding awn), gaping. Glumes green to chaffy at the base, hyaline at the tip, very unequal; lower glume acuminate, 13–22 mm long, lower 45–66% 3-nerved, minutely scabrous; upper glume broadly acute, 8–14 mm long, lower 25–60% 5(–6)-nerved, upper 40–70% 4–1-nerved, glabrous but minutely scabrous at the tip, apex broadly acute, denticulate or rarely acuminate. Floret 7–8 mm long. Lemma with 1 or 2 lobes 0.1–0.4 mm long, white to pale yellow at maturity, at least the central nerve visible, pubescent with short and stiff hairs 0.2–0.4 mm long, hairs white to grey at maturity; coma absent. Callus straight, 1.5–3.5 mm long, densely covered with hairs similar to those on the lemma, 0.2–0.6 mm long. Awn 60–200 mm long, 0.2–0.35 mm wide near the base, slightly twice bent, scabrous with stiff hairs c. 0.05 mm long; column dark brown at maturity, 14–40 mm long, 10–30 mm to the first, more gradual but greater bend; bristle pale yellow, much paler than the column, delicate. Palea broadly acute, equal to or slightly longer than the lemma, similarly hairy with hairs 0.2–0.3 mm long, the tip inrolled, the surface smooth; margins glabrous. Lodicules 3, membranous; 2 abaxial oblong, 0.8–1.5 mm long; paleal acute, minute–1 mm long. Anthers 1.5–2.5 mm long, not penicillate. Caryopsis 3–4 mm long; embryo 20–25% the length; hilum 90–95% the length.

**DISTRIBUTION:** Drier parts of western Victoria, in heath or near coastal localities in southern South Australia and in the southern regions of Western Australia (but apparently not on the Nullarbor Plain).

**SPECIMENS EXAMINED:** VICTORIA: **Region B:** 12 km NW. of Broken Bucket Bushland Reserve, Beaglehole 57053, 19.11.1977 (MEL, NSW). **Region C:** Little Desert, Reader, 5.11.1898 (MEL 60733, 60734); Mt Arapiles, Beaglehole 29781, 23.11.1968 (NSW). **Region D:** Mt Sturgeon, Corrick 1246, 3.11.1968 (Corrick Herb.); Mt Abrupt, Grampians, Beaglehole 30205, 30.12.1968 (NSW).

SOUTH AUSTRALIA: **Eyre Peninsula:** Flora and Fauna Reserve, Hundred of Hincks, *Specht* 2572, 11.11.1960 (AD). **Murray:** Angaston, *Behr*, 1.1849 (MEL 59988, 59989). **Southern Lofty:** Hope Valley, Adelaide, *Cleland* NSW 116593, 9.1923 (NSW); Nangkita, *Spooner* 1719, 5.12.71 (AD); Mt Compass, *Cleland*, 26.10.1940 (ADW 43922, AD); Victor Harbor, *Black* 11.1926 (AD). **Kangaroo Island:** nr. Penneshaw, *Hilton*, 12.1946 (ADW 43919, NSW 116588, ADW 43920, 43921, 43924, 43925); between Salt Lake & American R., *Hilton*, 7.11.1945 (ADW 5678); 'Hawks Nest', *Cashmore*, 22.11.1933 (ADW 263); Rocky R., *Cleland*, 18.11.1924 (ADW 43923, AD); mouth of South West R., *Cleland*, 7.12.1934 (AD); Govt. Experimentation plots, *Symon*, s.d. (ADW 44054). **South-eastern:** Dark Island Heath 9 miles (c. 15 km) NE. of Keith, *Specht & Rayson* 2, 12.1950 (AD); 'Pitlochry' station, *Symon* 8800, 30.11.1973 (ADW 43487, NSW 116592); between The Gap & Western Flat, *Hunt* 214, 14.10.1961 (AD).

WESTERN AUSTRALIA: **Eyre:** Scaddan, *Burvil*, 30.10.1938 (PERTH); 17 miles [27 km] from Ravensthorpe, towards Lake King, *Canning* 7264, 6.11.1968 (CANB, NSW); c. 2 km N. of Moore R. bridge, *Pullen* 9731, 30.11.1974 (CANB, NSW); Esperance, *Rose*, 11.1961 (PERTH). **Irwin:** Kalbarri National Park, *Crisp* 6285, 6295, *Taylor & Jackson*, 1.10.1979 (CBG); c. 4 miles [7 km] S. of Marchagee, *Maslin* 1437, 20.10.1970 (PERTH). **Avon:** nr. Mullewa, *Adam*, 9.1928 (PERTH); Watheroo National Park, *Royce* 9534, 4.10.1971 (PERTH); Merredin, *Gardner*, 10.1924 (PERTH); c. 18 km WNW. of Cunderdin, *Haegi* 1181, 3.10.1976 (PERTH); Tutanning Reserve, 30 km E. of Pingely, *Wilson* 3913, 16.11.1965 (PERTH). **Darling:** 5 miles [8 km] SW. of Mogumber, *Fisheries Inspector*, 11.1964 (PERTH).

\* *Stipa megapotamia* *Sprengel ex Trin.*, Mém. Acad. Imp. Sci. St.-Pétersbourg, ser. 6, Sci. Math. 1: 77 (1830); Hitchcock, Contr. U.S. Natl. Herb. 24: 275 (1925); Rosengurt & de Artucio, Bol. Soc. Argent. Bot. 9: 286 (1961); Rosengurt, de Maffei & de Artucio, Gramineas Uruguayas: 79 (1970).

HOLOTYPE: cited as 'brasil merid.', apparently collected from Uruguay (which was then included in Brasil), collected by Otto, no date (LE) (not seen).

Caespitose perennial to c. 1.3 metres high, with a basal tuft of leaves to a quarter the height, without rhizomes. Culms erect, terete, c. 1.5 mm wide near the base, not compressible, strongly ribbed to slightly ribbed upwards, glabrous; nodes 3, exserted, glabrous, slightly swollen. Leaf sheaths at first tightly enveloping the culm, later becoming slightly free, glabrous, innovations scabrous with hairs minute–0.2 mm long; basal sheaths 7–7.5 mm wide, smooth to slightly ribbed, inner margin glabrous, outer margin glabrous on innovations, elsewhere ciliate with hairs minute–0.3 mm long; upper sheaths 5–8 mm wide, strongly ribbed, inner margin glabrous, outer margin ciliate with hairs minute–0.6 mm long, sometimes glabrous on innovations. Ligule truncate, membranous, to 0.7 mm long, glabrous; auricles  $\pm$  thickened, with a tuft of hairs 0.1–1 mm long at the base. Leaf blade expanded or loosely rolled, 3.5–4 mm wide, to 40 cm long; abaxial surface strongly ribbed to slightly ribbed upwards, glabrous; adaxial surface strongly ribbed, glabrous; margin ciliate with hairs 0.1–0.5 mm long, sparse on innovations. Panicle 25–35 cm long, exserted, with distant fascicles of unequal, few-flowered, compound branches, contracted, 2–3 cm wide (excluding awns); axis terete, with hairs 0.2 mm long; branches 7–14 cm long, slightly flattened with hairs 0.2–0.4 mm long; pedicels 0.2–0.8 mm long, slightly flattened, sericeous with hairs 0.1–0.3 mm long. Spikelets 8–10 mm long (excluding awn). Glumes subequal, acute to acuminate, straw-coloured, hyaline at the tip, scabrous along the nerves with hairs 0.1–0.2 mm long; lower glume 8–10 mm long, lower 40–60% (4–) 3-nerved, upper 40–60% (3–) 1-nerved; upper glume 9–9.5 mm long, lower 60% 3-nerved. Floret cylindrical, 5.5–6 mm long (including callus). Lemma surface scabrous with crystalline tubercles c. 0.05 mm long, sericeous along the ribs with white hairs 0.5–1.5 mm long along the nerves or glabrous; lobes 0.1–0.2 mm long; corona 0.5–0.8 mm long with spines 0.1 mm



long on the upper margin. Callus 2–2.5 mm long, weakly bent at the tip, densely sericeous with hairs 0.2–1.5 mm long. Awn c. 50 mm long with 2–3 bends, 0.3 mm wide near the base; column c. 30 mm long, 15–25 mm to the first bend, brown with hairs 0.1–0.5 mm long; bristle delicate, scabrous with hairs 0.1 mm long. Palea 20–25% the length of the lemma, membranous, non-vascular, acute, erose, glabrous and smooth. Lodicules 2, membranous, abaxial, c. 1 mm long, obtuse. Anthers not observed. Caryopsis 2.5–3 mm long; embryo 30–35% the length; hilum 65–80% the length.

DISTRIBUTION: Native to S. America; apparently still confined to the Canberra region near its point of naturalisation.

SPECIMENS EXAMINED: NEW SOUTH WALES: **Southern Tablelands:** Black Mt, Canberra, *Pullen* 2592, 4.2.1961 (CANB, NSW), *Pullen* 3009, 4.1.1962 (NSW).

Apparently an escape from CSIRO plant introduction plots. The material naturalised in Australia matches material included in *S. megapotamia* var. *megapotamia*.

***Stipa metatoris* J. Everett & S.W.L. Jacobs, Telopea 2(4): 399 (1983).**

HOLOTYPE: NEW SOUTH WALES: Kyalite State Forest, 34°58'S 148°32'E. Sandridge with *Dodonaea* and *Callitris*. J. Everett 341 & S.W.L. Jacobs, 16.10.1981 (NSW).

Caespitose perennial to c. 1 metre high, with a basal tuft of leaves at least half the total height. Culms erect or geniculate, 1.5–2.5 mm wide near the base, terete, not compressible, scarcely ribbed, densely pubescent to puberulous or glabrous upwards; nodes 2–3, densely sericeous, exserted, to 50% wider than adjacent internodes. Leaf sheaths tight around the culms, loose with age, 4–6 mm wide (the uppermost inflated and to 8 mm wide), densely pubescent to hirsute, or glabrous upwards; inner margin glabrous; outer margin densely ciliate with long hairs; cataphylls ciliate on both margins. Ligule thinly coriaceous, 1–2.2 mm long, broadly acute, obtuse to truncate, but always lacinate, densely ciliate; abaxial surface villous; auricles densely ciliate with long, fine, straight hair tufts. Leaf blades mostly tightly inrolled, 2–4 mm wide, to 40 cm long; abaxial surface scarcely ribbed, scaberulous and sparsely to densely pubescent, to almost glabrous; adaxial surface strongly ribbed, densely pubescent; margins scabrous with sturdy, minute antrorse hairs. Panicle spreading at maturity, 15–25 cm long, 3–6 cm wide (excluding awns), exserted but the base usually concealed; axis terete, pubescent to scaberulous. Spikelets 16–20 cm long (excluding awn), slightly gaping. Glumes unequal, glabrous or scaberulous on the nerves, the tips occasionally ciliate, firm and opaque, green or straw-coloured at the base, transparent at the tip, usually with a crescentic purple patch in the middle third; lower glume 16–20 mm long, long-acuminate, the lower 50–75% 3-nerved; upper glume 12–15 mm long, acuminate, often broad in the middle, 5-nerved in the lower 50%, the next 20% 3-nerved. Floret turbinate to cylindrical, 7–8 mm long (including callus). Lemma brown at maturity, the surface smooth, sericeous with long white to slightly fulvous hairs, sparse to absent just below the apex centrally; lobes 2, obtuse, 0.2–0.5 mm long; coma of hairs similar to those of the lemma, 2.5–3.5 mm long. Callus 2.0–2.8 mm long, straight, sericeous with hairs slightly darker than those of the lemma. Awn 0.3–0.35 mm wide near the base, 55–65 mm long, weakly twice bent; column 20–25 mm long, 11–13 mm to the first bend, pubescent with hairs 0.2–0.3 mm long; bristle scaberulous or pubescent with hairs 0.2–0.3 mm long. Palea obtuse,

slightly shorter than the lemma, ciliate at the tip, sericeous with long hairs between the nerves, the margins glabrous. Lodicules 3, membranous; 2 abaxial 1.5–2.0 mm long, oblong to slightly spatulate; paleal 0.5–1.0 mm long, acute. Anthers 1.2–4.0 mm long, penicillate. Caryopsis 3.5–4.5 mm long; embryo 30–40% the length; hilum 75–85% the length.

DISTRIBUTION: Sandy areas of south-western New South Wales and south-eastern South Australia.

SELECTED SPECIMENS: NEW SOUTH WALES: **South Western Plains:** Kyalite State Forest, *Everett 341 & Jacobs*, 16.10.1981 (NSW); c. 3 miles [5 km] W. of Stony Crossing, *Henderson 437 & 438*, 9.10.1947 (NSW); N. of Swan Hill, *Henderson 440*, 5.11.1947 (NSW); c. 3 km NNW. of Cunninyeuk, *Everett 78 & Jacobs*, 23.11.1980; Cunninyeuk, *Henderson NSW 149127*, 12.10.1946 (NSW).

SOUTH AUSTRALIA: **South-eastern:** 3 miles [5 km] SE. of Bordertown, *Specht 1584*, 12.10.1947 (AD).

***Stipa mollis* R.Br.**, Prodr.: 174 (1810); Hughes, Kew Bull. 1921: 18 (1921); Vickery, Contrib. N.S.W. Natl. Herb. 2: 78 (1953); Beadle, Evans & Carolin, Handb. Vasc. Pl. Sydney District: 531 (1963); Fl. Sydney Region: 656 (1972), edn 2: 660 (1982).

HOLOTYPE: 'Port Jackson, R. Brown, 1802–5' (BM!), isotype (no. 6205) K, CANB photo (of K sheet) no. 237016.)

SYNONYMS: *S. semibarbata* var. *mollis* (R. Br.) Benth., Fl. Austral. 7: 569 (1878). Based on *S. mollis* R. Br.

*S. plagiopogon* J. Black in Trans. & Proc. Roy. Soc. S. Austral. 65: 334 (1941); Fl. S. Austral. edn 2: 89 (1943). TYPIFICATION: Black cited four syntypes: 'Victor Harbor'; 'Inman Valley, 1926, J.B. Cleland'; 'Mt. Pleasant, 1933, E.C. Black'; 'Wilpena Pound, 1930, J.B. Cleland'. Specimens from Black's herbarium are mounted together on AD 97403342. The specimen mounted on the right hand side of the sheet, from Victor Harbor, Nov. 1926, consists of a complete culm with associated inflorescence in good condition, and we here designate this specimen as the **Lectotype** of *S. plagiopogon* J.M. Black (Dupl. MEL 59968). It is supported by a few detached florets, notes and sketches mounted on the lower left hand corner of the double mounting folder. The specimen 'Inman Valley, 1926, J.B. Cleland' has not been found; there are, however, a few detached glumes and lemmas, with notes and sketches, from 'Back Valley [which is near Inman Valley] 17.11.1930, J.B. Cleland'. The specimen from 'Mt Pleasant, 1933, E.C. Black' consists of a good inflorescence and culm but, as mounted, it is somewhat confused with an additional ticket bearing a few detached florets, sketches and notes, and annotated 'This specimen given Vict. Harb. July 1942' (sic!) (after the species was described). The specimen 'Wilpena Pound, 1930, J.B. Cleland' is represented on this sheet only by detached lemmas and notes. There is, however, another sheet, (AD 96323176) that bears a good specimen from 'Wilpena Pound, J.B. Cleland, 30.11.1930', but we are uncertain whether this was derived directly from Black's herbarium or subsequently from Cleland's herbarium. All the abovementioned specimens are *Stipa mollis* R. Br.

Caespitose perennial to c. 1 metre high, not rhizomatous, with a basal tuft of leaves c. one-fifth the height. Culms erect, terete, 1.5–5 mm wide near the base, not compressible, very slightly ribbed to smooth; basal internodes pubescent with hairs minute–0.4 mm long near the nodes; upper internodes minutely scabrous to pubescent; nodes 3–5, exserted with age, densely sericeous with hairs minute–0.3 mm long to glabrous, if swollen then 15–25% wider than adjacent internodes. Leaf sheaths at first tightly enveloping the culm, later becoming slightly loose, 5–10 mm wide; basal sheath very slightly ribbed, minutely pubescent to glabrous, inner margin glabrous, outer margin ciliate with hairs minute–0.4 mm long; upper sheath slightly to strongly ribbed, pubescent to tomentose, sometimes glabrous, inner margin glabrous, outer margin glabrous to ciliate with hairs 0.1–0.3 mm long; collar ciliate with hairs 0.6–0.7 (–1.1) mm

long. Ligule truncate, membranous, 0.3–3 mm long, ciliate with hairs 0.3–0.7 mm long; abaxial surface densely pubescent to hirsute; auricles absent. Leaf blade linear, tightly rolled, 1.5–3 mm wide, to 30 cm long; abaxial surface slightly to moderately ribbed, glabrous; adaxial surface strongly ribbed, tomentose with hairs minute–0.3 (–0.8) mm long; margins glabrous to minutely scabrous. Panicle 10–30 cm long, exserted, with close fascicles of unequal many- to few-flowered, compound branches, contracted, 2.5–3.5 cm wide (excluding awns); axis terete, scabrous with stiff hairs minute–0.15 mm long; branches 1.5–8 cm long, angled, scabrous with stiff hairs to 0.2 mm long; pedicels 1–10 mm long, angled, scabrous. Spikelets 16–20 mm long (excluding awn), gaping. Glumes equal to subequal, acuminate, hyaline, minutely scabrous, with occasional stiff hairs to 0.5 mm long on the nerves; lower glume 16–20 mm long with lower 55–75% 3-nerved; upper glume 15–20 mm long with lower 20–40% 6-nerved, upper 80–60% 4–1-nerved. Floret narrow-cylindrical, 7.5–9 mm long (including callus), without a neck. Lemma red-brown at maturity, the surface smooth to granular upwards, sericeous with hairs 0.4–0.8 mm long, lobes and coma absent. Callus 1.5–3 mm long, weakly bent at the tip, densely sericeous with white hairs 0.2–0.9 mm long, becoming yellow to fulvous at maturity. Awn 60–100 mm long, twice bent, 0.3–0.4 mm wide near the base; column 20–35 mm long, 10–17 mm to the first bend, brown, plumose with hairs 0.6–2 mm long, the hairs produced mostly along one side of the awn, appearing to spiral as the column twists; bristle dark brown to straw-coloured, scabrous with hairs 0.1 mm long and usually plumose at the base on one side with hairs similar to those of the column. Palea  $\pm$  equal to the lemma, acute, sericeous along the centre with hairs (0.1–) 0.4–0.6 mm long down the centre, surface slightly granular to smooth. Lodicules 2, abaxial, membranous, 1.5–2 mm long, acute. Anthers 1–4.5 mm long, penicillate. Caryopsis c. 4 mm long; embryo 20% the length; hilum 60–80% the length.

**DISTRIBUTION:** Widespread on sandy and/or low nutrient soils of the southern States, including New South Wales.

**SELECTED SPECIMENS:** NEW SOUTH WALES: **Central Coast:** Centennial Park, Sydney, *Cheel* NSW 115832, 15.10.1899 (NSW); Tempe district, *Boorman* NSW 115827, 10.1899 (NSW); Kogarah, *Camfield* NSW 115831, 10.1893 (NSW); Maroubra, *Vickery* NSW 115830, 17.10.1929 (NSW); Long Bay, *Hilton* NSW 116530, 22.11.1944 (ADW, NSW, AD); Sand hills near Sydney, *Maiden, Kneucker, Gram. Exsicc. No. 196*, 10.1900 (NSW); *Sieber, Agrostotheca 60* [probably from the Port Jackson District] (MEL; ex Herb Lang). **South Coast:** Bowen Island, *Rodway* NSW 115823, 17.12.1931 (NSW); Ulladulla, *Pulley 329*, 20.10.1969 (CBG); Bermagui, *Vickery* NSW 116487, 15.1.1940 (NSW); Green Cape, *Phillips CBG 1270*, 8.10.1961 (CBG). **Central Tablelands:** Towrang, *Thomson* NSW 115822, 15.11.1912 (NSW); Marulan to Berrima, *Vickery* NSW 116488, 11.1.1956 (NSW). **Southern Tablelands:** summit of Mt Budawang E. of Braidwood, *Pullen 4126*, 6.12.1965 (NSW, CANB, AD, MEL, BRI); Canberra, *Moore M147*, 19.12.1945 (CANB); Duntroon, A.C.T., *Symon*, 21.1.1952 (ADW 44144); Jerrabomberra lookout near Queanbeyan, *Gray 4663*, 29.12.1959 (CANB). **Central Western Slopes:** Temora, *Dwyer*, 11.1916 (BRI, NSW).

**VICTORIA:** **Region B:** Pink Lakes, *Williamson*, 10.1928 (MEL 60761); Big Desert, 12 km NW. of Broken Bucket Bushland Reserve, *Beaglehole 57054*, 19.11.1977 (MEL). **Region C:** near Dimboola, *Reader* (MEL 60724); Horsham to Hamilton road, W. of the Grampians, *Phillips* NSW 116511, 31.10.1960 (NSW); Mt Arapiles, *Beaglehole 29611*, 19.11.1968 (NSW); between Booroopki & Kaniva, *Phillips CBG 054858*, 2.11.1971 (CBG); John Smith Reserve, c. 12 miles [19 km] SW. of Horsham, *Beaglehole* NSW 116909, (NSW); N. side of Mt Zero, Grampians, *Beaglehole 17823 & Corrick*, 5.11.1967 (NSW). **Region D:** Mt Sturgeon, *Corrick 1614*, 26.12.1968 (Corrick Herb); Billywing Swamp near Gleninla, 40 miles [64 km] N. of Hamilton, *Phillips CBG 001271*, 31.10.1960 (CBG); Lower Glenelg Plantation near Renwick, *Shepherd*, 11.1950 (MEL 60760); W. of Mirranatwa Gap on Dunkeld to Halls Gap road, *Symon 1724*, 1.11.1961 (ADW); Grampians, Victoria Range, Kappa Cave area, *Finck & Beaglehole 4609*, 2.3.1957 (NSW); Lake Mundi area W. of Casterton, *Swindley 1128*, 29.11.1962 (MEL); 7.5 miles [12 km] W. of Casterton, *Beaglehole 37908*, 17.11.1971 (NSW); c. 14 miles [22 km] W. of Hamilton, *Corrick 1545*, 8.12.1968 (Corrick

Herb). **Region E:** Mt Richmond National Park, *Phillips CBG 003170*, 26.10.1963 (CBG). **Region F:** c. 22 km SSW. of Robinvale, *Beaglehole 56200*, 5.5.1977 (MEL); Annuello, c. 23 km NNW. of Manangatang, *Beaglehole 55889*, 24.9.1977 (MEL). **Region G:** 5 km SW. of Chinkapook, c. 18 km S. of Manangatang, *Beaglehole 55494*, 17.4.1977 (MEL); Wathe Wildlife Reserve, 5 km W. of Gama, *Beaglehole 56909*, 22.10.1977 (MEL). **Region H:** Borung, mallee scrub, *Reader*, 25.10.1903 (MEL 60762); Lower Lodden, *Walter NSW 116524* (NSW); Donolly, *Phillips CBG 027106*, 30.10.1963 (CBG); Wimmera, *Wilson*, 1870 (MEL 60763). **Region J:** 2 miles [3 km] SE. of Stawell, *Muir 2647*, 3.11.1962 (MEL); Grampians, Halls Gap, *Symon 299*, 13.11.1959 (ADW); Mt William, Grampians, *Beaglehole 22229*, 13.11.1966 (NSW); Moyston, *Sullivan*, 12.1880 (MEL 60822); Wannon R., *Williamson NSW 116493*, 11.1899 (NSW). **Region K:** Port Campbell National Park, *Finck & Beaglehole 21465*, 29.10.1966 (NSW). **Region M:** Epsom near Bendigo, *Paton*, 11.1921 (MEL 60833); Ravenswood, *Bissill*, (MEL 60823); 8 miles [13 km] ESE. of Melbourne, beyond Alamein railway station, *Cullimore 92*, 16.10.1967 (MEL, NSW). **Region N:** Puckapunyal, *Davis NSW 116519*, 10.11.1942 (NSW); Studley Park, Melbourne, *Muir 519*, 18.10.1958 (MEL, NSW, AD, CANB, BRI); near Dandenong Ranges, *Dixon NSW 116499*, 1891 (NSW, MEL, PERTH); Brighton, ex Herb. Hook. *NSW 116510*, (NSW); Sandringham, *Meebold 21579*, 11.1936 (NSW). **Region P:** Frankston, *Meebold NSW 116492*, 1.1937 (NSW); Frankston to Langwarrin, *Hart*, 31.10.1931 (MEL 59996); Anglesea, *Phillips NSW 116895*, 28.10.1971 (CBG, NSW). **Region S:** Licola to Heyfield road, *Beaglehole 43381*, *Willis & Chesterfield*, 21.10.1973 (ACB, NSW). **Region T:** Wilsons Promontory on road towards Five Mile Beach, *Phillips CBG 027107*, 23.11.1961 (CBG); Wilsons Promontory, Norman Point, *Muir 614*, 13.12.1958 (MEL). **Region W:** Bairnsdale, *Vickery NSW 116900*, 25.1.1935 (NSW); Sperm Whale Head, W. of Lakes National Park, *Muir 2308*, 13.10.1961 (MEL). **Region Z:** 2.5 miles [4 km] W. of Genoa, *Beaglehole 32776*, 24.12.1969 (NSW); 11.5 miles [18 km] SSW. of Mallacoota, *Beaglehole 31068*, 8.10.1969 (NSW); c. 5 miles [8 km] WNW. of Cape Everard, *Beaglehole 32235 & Finck*, 10.12.1969 (NSW); 1 mile [1.6 km] NNW. of Cape Conran, *Beaglehole 34515*, 12.11.1970 (NSW).

TASMANIA: Waterhouse Estate, NE. Tasmania, *Townrow 110*, 18.12.1967 (JEST); 5.5 miles [9 km] S. of St Helens, *Townrow 187*, 19.1.1968 (JEST); Slopem I., *Townrow 81*, 82, 11.12.1967 (JEST); Dianas Basin, *Simson*, 11.1878 (MEL 60809); Launceston, *Cleland NSW 116509*, 11.1912 (NSW); Risdon, *Blake 18323*, 18.1.1949 (NSW, BRI); South Esk, *Stuart 267* (MEL); 6 miles [9 km] N. of Ranger's house, Coles Bay, *Townrow 180*, 18.1.1968 (JEST); Prosser River, 2.1 miles [3 km] W. of Orford, *Townrow 71*, 24.11.1967 (JEST); Runnymede, *Townrow 63*, 24.11.1967 (JEST); 2 miles [3 km] S. of Richmond on Cambridge road, *Townrow 75*, 25.11.1967 (JEST); between Dunalley & Murrundna, *Burbidge 3218*, 20.1.1949 (CANB); Mt Wellington, *Martin NSW 116503*, 3.1933 (NSW); Opossum Bay, *Townrow 49*, 22.11.1967 (JEST).

SOUTH AUSTRALIA: **Flinders Ranges:** Alligator Gorge, *Hilton 44089*, 5.8.1952 (ADW). **Eyre Peninsula:** Kimba district, *French 28131*, 9.1954 (ADW); Koppio turnoff on road from Tumby Bay, 11 miles [18 km] from Tumby Bay, *Symon 917*, 12.11.1960 (ADW); 4 miles [7 km] E. of Wanilla, *Tindale 560a*, 9.1970 (NSW); Port Lincoln, *Crocker*, 12.10.1944 (CANB); MacLaren Flat, *Kraehenbuehl 1341*, 1.11.1964 (AD). **Northern Lofty:** Mangalo area, *Turner 28142*, 12.1954 (ADW); Julia Range, 10 miles [16 km] S. of Burra, *Symon 9355*, 12.12.1953 (ADW); Mona Reserve, c. 5 km W. of Bute, *Copley 834*, 30.10.1966 (AD); Sevenhills, *Copley 3264*, 15.11.1970 (AD); Black Springs, *Symon*, 12.12.1953 (ADW 9354); Central Tothill Range, *Kraehenbuehl 2195*, 27.10.1963 (AD); S. of Freeling, *Kraehenbuehl 1780*, 6.11.1966 (AD). **Murray:** Monarto City Centre site, *Symon 9733*, 26.11.1974 (ADW); Kinchina, *Cleland*, 8.11.1924 (AD, NSW); Wynarka, *Colquhoun 2492*, 12.1936 (ADW); c. 5 km W. of Monarto South, *Spooner 1639*, 24.10.1971 (AD). **Yorke Peninsula:** Happy Valley, *Cleland*, 7.11.1926 (AD). **Southern Lofty:** 1 km N. of Tanunda, *Kraehenbuehl 1675*, 23.10.1966 (AD); Mt Lofty Range, between Gawler & Williamstown, *Salasoo 1727*, 1.1.1959 (NSW); Altona, via Lyndoch, *Hilton 189*, 27.10.1952 (ADW); Highbury, *Smith 1801*, 13.10.1969 (AD); Black Hill, Athelstone, *Spooner 1692*, 17.11.1971 (AD); The Pinery, Grange Golf Links, *Kraehenbuehl 712*, 21.10.1962 (AD); Seaton Golf Links, *Smith 649*, 13.10.1967 (AD); Nixon Skinner Reserve, *Cleland*, 14.11.1944 (AD); Camden [suburb of Adelaide], *Kraehenbuehl 130*, 3.11.1959 (AD); Barossa Reservoir, *Cleland*, 22.11.1939 (AD); Morialta, c. 10 km E. of Adel., *Cleland*, 11.1938 (AD, NSW 116914); Stoneyfell Hills, *Cleland*, 19.10.1952 (AD); Coxs Scrub, *Crisp 115*, 31.10.1971 (AD); Longwood, *Lazaroff 39*, 9.11.1971 (AD); Torrens Gorge West, *Spooner 1119*, 21.10.1970 (AD); Dernancourt, *Smith 1792*, 22.10.1969 (AD); W. of Crafrers, *Belcher 502*, 26.10.1967 (BRI); Mount Lofty Botanic Gardens, *Kuchel 1493*, 5.12.1963 (AD); Blackwood, Adelaide, *Hilton 43961*, 17.11.1940 (ADW); Belair, *Koch 937*, 11.1902 (K, NSW); Happy Valley Reserve, *Symon 1922*, 28.11.1961 (ADW); Echunga, *Parsons 29*, 27.9.1961 (AD); Macclesfield, *Blackburn 28129*, 20.10.1954 (ADW); McLaren Flat, *Jackson 567*, 30.10.1963 (AD); Douglas Gully Scrub, 4 km NE. of McLaren Flat, *Bell 3*, 12.11.1976 (BRI ex AD); Southern hills at Yundi, 5 miles [8 km] SE. of Willunga, *Hilton*, 11.11.1941 (ADW 43963). **Kangaroo Island:** Cape Borda, *Rogers NSW 116918*, 9.1907 (NSW); Haven Garden, American River, *Cleland* (AD); between Kangaroo

River and Kingscote, *Hilton*, 7.11.1945 (ADW 43966, NSW 116907); Stun'sail Boom River, *Eichler 15434*, 12.11.1958 (NSW). **South-eastern:** between Renmark & Blanchetown, *Griffiths NSW 116603*, 18.9.1969 (CANB, NSW); Loveday, *Gauba CBG 047571*, 20.11.1943 (CBG); Back Valley, near Inman Valley, *Cleland*, 17.11.1930 (AD); Messent Wild Life Reserve, c. 170 km SE. of Adelaide, *James 152*, 14.11.1965 (AD); 10 miles [16 km] NE. of Keith on road to Sherwood, *Hilton*, 10.10.1953 (ADW 44079); Dark Island Heath, 15 km NE. of Keith, *Specht 1 & Rayson*, 12.1950 (AD); Bordertown, *Hunt 1619*, 27.10.1963 (AD); between Western Flat & Bordertown, *Hunt 312*, 28.10.1961 (AD); Bangham Scrub, 7–8 miles [11–13 km] S. of Western Flat, *Symon 25881*, 21.11.1962 (ADW); Lucindale, *Carrodus*, 8.1956 (AD); road to Naracoorte Caves, *Phillips 356*, 1.11.1971 (CBG); Stewarts Range district, *Blackburn*, 15.10.1954 (ADW 28128); Big Heath National Park, Hundred of Spence, *Alcock 3066*, 9.11.1969 (AD); 1.6 km NE. of Nangwarry, *Wilson 614*, 24.10.1966 (CANB, AD); 4 miles [6 km] N. of Millicent, *Cleland*, 12.1922 (AD); Princess Margaret Caves, *Hilton*, 31.1.1947 (ADW 44021).

**WESTERN AUSTRALIA:** **Darling:** between Augusta & Nannup turnoff on highway, *Phillips CBG 027108*, 18.10.1962 (CBG); Tunney, S. of Kojonup, *Royce 8052*, 4.10.1963 (PERTH); near Lake Carabundup between Frankland & Mt Barker, *Pullen 9996*, 12.12.1974 (CANB); Kalgan, *Mueller*, 10.1867 (MEL 60811); 36.5 miles [58 km] from Albany towards Borden via Chester Hill, *Canning 6929*, 28.10.1968 (BRI, AD). **Avon:** Wedgicarrup, W. of Wagin, *Burbidge 2358*, 10.9.1947 (CANB). **Eyre:** c. 32 km NNE. of the coast at Stokes Inlet, *Orchard 1605*, 18.10.1968 (PERTH); Cape Le Grand National Park, *Royce 8777*, 22.10.1969 (PERTH); Fitzgerald River near junction with Tivertup, *George 10557*, 19.12.1970 (PERTH).

*S. mollis* is quite similar to both *S. semibarbata* and *S. hemipogon*. From *S. semibarbata* it differs in the shorter floret (9–11 mm in *S. semibarbata*) and the tendency for the hairs on the column to be longer and arranged in a more distinct spiral. From *S. hemipogon* it differs in the longer upper glume (10–16 mm in *S. hemipogon*), longer floret (5–7.5 mm in *S. hemipogon*) and relatively shorter hairs on the longer column (0.5–4 mm; 10–20 mm in *S. hemipogon*).

Forms with hairs extending almost to the tip of the bristle could be confused with *S. plumigera*, but the presence of much longer hairs on the column, especially upwards, readily distinguishes *S. mollis*.

***Stipa muelleri* Tate**, Trans. & Proc. Roy. Soc. South Austr. 7: 70 (1885); Hughes, Kew Bull. 1921: 11 (1921), *ibid.* 1922: 16 (1922); Black, Fl. S. Austral. 1: 65 (1922), edn 2: 86 (1943); Willis, Handb. Pl. Vict. 1: 181 (1962), edn 2: 181 (1970).

**HOLOTYPE:** SOUTH AUSTRALIA: 'Open parts in the stringy bark forests (*Eucalyptus obliqua*) at Uraidla, Mt Lofly Range, and scrublands c. Mt Jagged, towards Encounter Bay, flowering in October, R. Tate' (AD!).

Spreading perennial to c. 1 metre high without a basal tuft of leaves, shortly rhizomatous. Culms decumbent or at first erect, 0.7–0.9 (–1.2) mm wide near the base, wiry, compressible only when young, usually branching at the nodes, slightly ribbed, scabrous with hairs 0.2–0.25 mm long to glabrous upwards; nodes 3–7, exserted, not swollen, glabrous. Leaf sheaths tightly enveloping the culm, except where branching occurs; basal sheaths c. 4 mm wide, slightly to moderately ribbed, glabrous; upper sheaths 1–5 mm wide, very slightly ribbed, glabrous to tuberculate. Ligule a tuft of minute hairs; auricles absent. Leaf blade linear, thickened, 0.15 mm wide, to 1 mm long, readily deciduous; abaxial surface not ribbed, glabrous; adaxial surface not ribbed, scabrous with tubercles; margins glabrous. Panicle reduced to 1–3 spikelets, 2–3.5 cm long, exserted, without branches, open; axis terete, scabrous with stiff hairs 0.2 mm long; pedicels 0.6–1.5 cm long, terete to slightly flattened, scabrous with stiff hairs 1.5 mm long. Spikelets 1.8–3 cm long (excluding awn), gaping at maturity,

otherwise tightly closed. Glumes subequal to equal, acute, straw-coloured or purple, glabrous on lower 80%, upper 20% scabrous with stiff hairs 0.05–0.2 mm long; lower glume 18–30 mm long, lower 95% 3-nerved, upper 5% 2-nerved; upper glume 15–30 mm long, lower 70% 5-nerved, upper 30% 3–2-nerved. Floret narrow-cylindrical, without a neck, c. 13–20 mm long (including callus). Lemma surface tuberculate, sericeous with hairs 0.3–0.6 mm long; lobes c. 3 mm long; coma absent. Callus c. 2–3 mm long, weakly bent at the tip, sericeous with white hairs 0.5–1 mm long. Awn 50–100 mm long, 0.5 mm wide near the base, twice bent, second bend stronger; column 40–55 mm long, 35–45 mm to the first bend, straw-coloured or dark brown, scabrous with hairs 0.02–0.2 mm long; bristle scabrous. Palea 75% the length of the lemma, acute to acuminate, surface smooth with a band of hairs 0.2–0.5 mm long down the centre back, margins glabrous. Lodicules 3; 2 abaxial membranous, 2–5 mm long, acute or erose; paleal membranous, 3.5–5 mm long, erose. Anthers 8–13 mm long, penicillate. Mature caryopsis not observed.

DISTRIBUTION: Woodland and shrubland of southern Victoria and south-eastern South Australia.

SPECIMENS EXAMINED: VICTORIA: **Region D:** Grampians, *Williamson NSW 116016*, 11.1902 (ADW, NSW); 5 miles [8 km] W. of Mirranatwa Gap, *Muir 2738*, 6.11.1962 (MEL); Mirranatwa Gap, *Symon 146*, 9.5.1959 (ADW); Victoria Range, *Walter*, 11.1899 (MEL 60742); Wannon R. above Dunkeld, *Williamson*, 10.11.1899 (MEL 60738). **Region E:** S. of Moleside, *Beaglehole 715*, 10.1946 (NSW). **Region N:** South of Belgrave, *Corrick 3498*, 20.10.1973 (NSW); Emerald, *St. John*, 11.1907 (MEL 59956). **Region P:** Arthurs Seat, *Melville 2168*, 30.11.1952 (NSW). **Region S:** Beenak, *Willis*, 22.12.1946 (MEL 60737); Gembrook, *French*, 11.1885 (MEL 60922).

SOUTH AUSTRALIA: **Southern Lofty:** Mt Lofty, *Crisp 1853*, 24.12.1975 (CBG); Stirling West, *Ising*, 7.12.1959 (AD); Mosquito Flat nr. Mt Compass, *Cleland*, 26.10.1940 (AD); between Currency Creek & Mt Compass, *Cleland*, 15.1.1940 (AD); S. of Second Valley Forest Reserve, *Cleland*, 12.12.1938 (AD); nr. Yankalilla, *Eichler 14383*, 15.11.1957 (AD). **Kangaroo Island:** Kangaroo Island, *Tate*, 1883 (MEL 60739). **South-eastern:** Riddock [Bay], *Crocker*, 9.11.1939 (ADW 4126).

***Stipa multispiculis* J. Black**, Trans. & Proc. Roy. Soc. S. Austral. 65: 333 (1941); Black, Fl. S. Austral. edn 2: 91 (1943).

TYPEFICTION: Black cited three Syntypes, all of which are extant in his herbarium now at AD. The first cited, 'Morialta, Oct. 1925, *J.B. Cleland*', represents a species different from the other two; it agrees with the species which Black knew as *S. tenuiglumis* (= *S. flavesces*). There is little doubt that Black drew upon the characters of this specimen, as well as the other two, in compiling his description, notably in arriving at the dimensions of the lemma and callus. However, Black's comments clearly indicate that he was distinguishing his new species from *S. tenuiglumis* and it would therefore be inappropriate to select the specimen from Morialta as the lectotype.

The second cited specimen, 'Port Noarlunga, Nov. 1926, *J.B. Cleland*' (AD 97421231), is a reasonably good specimen (though lacking the base) and seems to represent the species that Black was intending to describe. Black has clearly written '*Stipa multispiculis*' on the sheet beside the specimen and initialled it. We here designate this specimen as the **Lectotype** of *S. multispiculis* J. Black. A good duplicate of it, derived from the Cleland herbarium, is also in AD.

The third cited specimen, 'Ardrossan (Yorke Peninsula) Nov. 1932, *E.C. Black*', consists of a single panicle without foliage or culm, but it certainly agrees with the specimen from Port Noarlunga.

Caespitose perennial to c. 1 metre high, with few conspicuously extravaginal shoots from a short rhizome. Culms geniculate or erect, not compressible, terete, (2–) 3–3.5 mm wide near the base, scarcely ribbed, scaberulous with dense, minute stiff hairs or puberulous to sericeous (especially just below the nodes) or occasionally ± glabrous; nodes 3–5, exserted, to 30% broader than adjacent internodes, densely sericeous. Leaf sheaths at first tightly enveloping the culms, soon becoming loose, slightly ribbed, scaberulous with dense, minute

hairs, with or without scattered scabrous or soft hairs, or puberulous to almost glabrous; basal sheaths usually with more and longer hairs; inner margin glabrous; outer margin long-ciliate. Ligule firm and coriaceous, 0.2–0.7 mm long, truncate, usually dark-coloured, short- or long-ciliate; abaxial surface densely sericeous; auricles usually thickened and spreading with a tuft of hair at the base. Leaf blade expanded or only loosely rolled, to 8 mm wide and 60 cm long; abaxial surface ribbed, scaberulous with dense minute hairs or occasionally  $\pm$  glabrous; basal leaves usually more scabrous; adaxial surface ribbed, minutely scabrous or scaberulous to almost glabrous; margins glabrous. Panicle to 40 cm long, to 6 cm broad (excluding awns), exerted, loosely contracted, dense, with moderately distant fascicles of unequal many-flowered branches; axis terete to angular upwards, scabrous or scaberulous; branches to 12 cm long, terete to angular upwards, scabrous or scaberulous; pedicels 2–10 mm long, terete to angular upwards, scabrous or scaberulous. Spikelets 8.5–10 mm long (excluding awn), gaping. Glumes subequal, membranous, colourless, or green or purple-tinged, appressed-pubescent to scaberulous overall or scaberulous only on the nerves; lower glume 8.5–10 mm long, long-acuminate, the lower 55–65% 3-nerved; upper glume 6.5–9.0 mm long, acuminate, the lower 45–50% 5-nerved, the next 20% 3-nerved. Floret narrow-cylindrical to narrow-fusiform, 4.5–6.0 mm long (including callus), with a weakly developed neck, the 3 main nerves slightly thickened at the apex. Lemma very finely granular, with sparse spreading white to yellowish hairs; coma 0.2–0.8 mm long; lobes 1–2, c. 0.1 mm long. Callus 0.5–1.2 mm long, sturdy and curved, with hairs similar to those of the lemma. Awn 25–40 mm long, 0.2–0.3 mm wide near the base, gently twice bent; column 15–20 mm long, 7–12 mm to the first bend, scaberulous and densely pubescent with soft hairs 0.25–0.5 mm long; bristle scabrous. Palea broad-acute to obtuse, to 0.5 mm shorter than the lemma, coriaceous, smooth, with a band of sparse hairs down the centre; margins glabrous; tip ciliate. Lodicules 3, membranous; 2 abaxial c. 1 mm long, spatulate; paleal c. 1 mm long, triangular, broadly acute. Anthers 1.8–2.5 mm long, penicillate. Mature caryopsis not observed.

DISTRIBUTION: Northern Lofty, Yorke Peninsula and Southern Lofty regions of South Australia.

SPECIMENS EXAMINED: SOUTH AUSTRALIA: **Northern Lofty**: South Hummocks Range, *Copley* 3235, 25.10.1970 (AD). **Yorke Peninsula**: Innes National Park, *Copley* 4434, 28.8.1974 (AD). **Southern Lofty**: 3 miles (c. 4 km) from Sandy Creek on the Williamstown road, *Harris* 36, 1.10.1959 (AD); Gawler cemetery, *Spooner* 3109, 13.10.1973 (AD); Torrens Gorge West, *Spooner* 1115, 13.11.1970 (AD); Enfield, *Smith* 920, 12.10.1967 & 1456, 24.10.1968 (AD); Morialta Conservation Park, *Spooner* 3208, 4.12.1973 (AD); Glen Osmond, *Cleland*, 9.10.1955 (AD); Waite Institute, *Hilton*, 20.9.1944 (ADW 43835, NSW); Greenhill Road, *Cleland*, 9.10.1948 (AD); Waterfall Gully, Adelaide Hills, *Hilton*, 14.10.1944 (ADW 44010); Blackwood, *Ewers s.n.*, 14.10.1956 (AD 97737564); Port Noarlunga, *Smith* 449, 27.9.1967 (AD).

Similar to *S. flavescens* but differing in the shorter (8.5–10 mm lower, 6.5–9 mm upper) glumes and shorter (4.5–6 mm) floret. Young plants of *S. curticoma* could be confused with *S. multispiculis* but differ in the longer (6.5–8 mm) floret and longer (4.5–6.5 cm) awn.

***Stipa mundula* J. Black**, Trans & Proc. Roy. Soc. S. Austral. 65: 333 (1941); Black, Fl. S. Austral. edn 2: 91 (1941).

HOLOTYPE: SOUTH AUSTRALIA: Chaunceys Line (N. of Lake Alexandrina), *J.B. Cleland* 12.10.1933 (AD 97423406); probable isotypes AD 96323226, 96323235, 97422298 in part; MEL 59957; ADW 44028, 44191).

Densely caespitose perennial to 60 cm high with conspicuously extravaginal basal leaves usually c. one-third the height. Culms erect or geniculate, to 1 mm wide near the base, terete, compressible, scarcely ribbed, glabrous to puberulous, especially just below the nodes; nodes 2, pubescent to almost glabrous, just exerted, to 30% broader than adjacent internodes. Leaf sheath tightly enclosing the culm, slightly ribbed, glabrous to minutely puberulous; inner margin glabrous; outer margin long-ciliate or, on the upper sheaths, glabrous. Ligule firmly membranous, truncate, 0.3–3.0 mm long, continuous with the sheath margin, ciliate or glabrous, abaxial surface glabrous; auricles often with a tuft of long straight hairs. Leaf blades tightly convolute-erect, 0.5–1 mm in diameter, to 15(–30) cm long; abaxial surface unribbed, glabrous or with occasional strong or weak hairs; adaxial surface ribbed, scabrous with dense minute hairs and densely pubescent to hirsute; margins scabrous with short hooks. Panicle contracted or narrowly spreading, sparse, to 12 cm long, to 3 cm wide, exerted at length, with fascicles of few, unequal, few-flowered branches; axis  $\pm$  terete, scaberulous with very short hairs; branches terete to slightly angular, to 4 cm long, scaberulous with very short hairs; pedicels terete to slightly angular, to 10 mm long, scaberulous with very short hairs. Spikelets 12–17 mm long (excluding awn), gaping early in development. Glumes subequal to unequal, narrow, membranous, usually deeply purple-tinged at the base, hyaline at the tip, glabrous to minutely scaberulous on the nerves; lower glume 12–17 mm long, finely acuminate, the lower 60% obscurely 3-nerved; upper glume 8–14 mm long, acuminate to broad-acute, the lower 30–60% 5-nerved, the next 10–20% 3-nerved. Floret narrow-turbinate to narrow-fusiform, the main nerve just visible, 6.5–8.0 mm long (including callus). Lemma red-brown at maturity, finely granular; hairs sparse, sparser at the apex, white becoming fulvous at maturity; coma obscure, 0.5–1.5 mm long; lobes 2, 0.1–0.5 mm long. Callus 2.2–3.0 mm long, fine and straight with hairs similar to those of the lemma. Awn 50–80 mm long, 0.25–0.35 mm wide near the base, gently twice bent; column 22–30 mm long, 10–16 mm to the first bend, pubescent with hairs 0.35–0.70 mm long; bristle scaberulous. Palea obtuse, c. 0.5 mm shorter than the lemma, very finely granular and with a band of dense long hairs down the centre, hyaline and glabrous at the margins, the tip ciliate. Lodicules 3, membranous; 2 abaxial, 1–1.5 mm long, oblong; paleal less than 0.2 mm long, acute. Anthers c. 3.5 mm long, not penicillate. Caryopsis 3–4 mm long; embryo 25% the length; hilum 80% the length.

DISTRIBUTION: South-eastern South Australia, extending into Victoria.

SPECIMENS EXAMINED: VICTORIA: **Region B:** Big Desert, 35° 17' S, 141° 14' E, *Corrick* 6394, 2.10.1979 (NSW). **Region C:** Little Desert National Park, 36° 31' S, 141° 58' E, *Everett* 203 & *Jacobs*, 30.11.1980 (NSW); Sandy Desert, *Reader*, 27.10.1895 (MEL 60775); N. side of Mt Arapiles, *Beaulehole* 29857, 27.11.1968 (NSW). **Region E:** E. bank of Glenelg River, c. 1.6 km upstream from Donovans, *Jackson* 252, 18.11.1959 (AD).

SOUTH AUSTRALIA: **Eyre Peninsula:** Warramboo, *French* 11, 10.1954 (ADW); Hincks National Park, *Alcock* 2178, 6.10.1968 (AD); Mt Wedge, *Eichler* 19388, 9.10.1967 (AD). **Murray:** Wanbi, *Cleland*, 12.10.1960 (AD 968061296). **Yorke Peninsula:** Hundred of Curramulka, *Blaylock* 252, 8.10.1966 (AD); Point Davenport, nr. 35° 12'S., 137° 24'E., *Symon* 11890, 4.11.1979 (ADW). **South-eastern:** 32 km E. of Taillem Bend, *Everett* 304, 23.9.1981 (NSW); Ki-Ki, 30 miles [48 km] SE. of Taillem Bend, *Hilton* NSW 116369 (NSW); 2 miles [3 km] W. of Coombe, *Hilton*, 11.10.1953 (ADW 44077); Big Heath National Park, *Alcock* 3029, 6.11.1969 (AD); Beachport & Robe, *Crocker*, 3.1940 (ADW 4123); MacDonnell, c. 27 km S. of Mt Gambier, *Cleland*, 1.11.1941 (AD 96323318).



\* *Stipa neesiana* Trin. & Rupr., Mém. Acad. Imp. Sci. Saint-Pétersbourg, ser. 6, Sci., Math., Seconde Pt. Sci. Nat. 5: 17 (1842); Hitchcock, Contrib. U.S. Natl. Herb. 24: 279 (1925); Caro, Kurtziana 3: 25 (1966); Rosengurtt, de Maffei & de Artucio, Gramíneas Uruguayas: 80 (1970).

HOLOTYPE: 'Monte Video, Sellow' (LE, not seen).

SYNONYM: *S. eminens* Nees, Agrost. Bras.: 374 (1829), *non* Cav. (1799). For further synonymy see Hitchcock (*loc. cit.*).

Caespitose perennial to c. 0.75 metres high, with a basal tuft of leaves to half the height, without rhizomes. Culms erect or geniculate at the base, slightly angled, c. 1 mm wide near the base,  $\pm$  compressible, moderately to slightly ribbed, glabrous; nodes c. 2, exserted, sericeous with hairs (minute-) 0.3–1.2 mm long, slightly swollen, to 25% wider than the adjacent internodes. Leaf sheaths at first tightly enveloping the culm later becoming slightly free, 0.5–1 mm wide, strongly ribbed; basal sheath glabrous or minutely scabrous, margins glabrous; upper sheath with scattered hairs 0.3–0.9 mm long to glabrous, outer margin ciliate with hairs 0.3–0.4 mm long to glabrous, inner margin glabrous. Ligule sometimes almost absent on lower leaves, otherwise truncate to obtuse, membranous, 0.5–3 mm long, with tufts of hairs at the sides, glabrous elsewhere; auricles thickened, 0.5–1.3 mm long, sparsely covered with hairs 0.1–0.3 mm long to glabrous. Leaf blade expanded to loosely inrolled, 2–2.5 mm wide, to 30 cm long; abaxial surface moderately to strongly ribbed, hirsute with hairs 0.1–1 mm long to glabrous; adaxial surface strongly ribbed, with hairs minute–0.7 mm long; margins scabrous with minute tubercles and occasional hairs 0.2–0.5 mm long. Panicle 10–40 cm long, exserted, with distant fascicles of unequal, few-flowered compound or simple branches, contracted, although narrowly spreading at anthesis, 1(–7) cm wide (excluding awns); axis angled, strongly ribbed, scabrous along the edges with hairs minute–0.4 mm long; branches 2.5–8.5 cm long, angled, scabrous along the edges with hairs 0.1–0.5 mm long; pedicels 1–8 cm long, angled, scabrous along the edges with hairs minute–0.6 mm long. Spikelets 14–18 mm long, gaping. Glumes equal to subequal, acuminate, hyaline; lower glume 14–18 mm long, lower 30–55% 3-nerved, scabrous along the nerves with hairs 0.1–0.5 mm long; upper glume 10–18 mm long, lower 20–50% 5 (–3)-nerved, upper 50–80% 3–1-nerved, scabrous along the nerves with hairs 0.1–0.8 mm long. Floret 6–10 mm long (including callus), cylindrical with a neck. Lemma with one involute-margin coarsely scabrous with crystalline tubercles to c. 0.1 mm long, sericeous along the midrib of the lemma with white hairs 0.4–1.2 mm long; lobes absent; corona 1.5 mm long with spines c. 0.5 mm long on the upper margin. Callus 2.5–3.5 mm long, weakly bent at the tip, densely sericeous with white hairs 0.1–1.5 mm long. Awn 45–85 mm long, bent 2–3 times, 0.4 mm wide near the base; column 25–55 mm long, 15–30 mm to the first bend, straw coloured, scabrous to pubescent with hairs 0.1–0.5 mm long; bristle straw-coloured, scabrous with hairs c. 0.1 mm long. Palea membranous, non-vascular, similar to the lodicules, erose, oblong-acute, 20–25% the length of the lemma, glabrous and smooth. Lodicules 2, abaxial, membranous, 1–1.3 mm long, obtuse. Anthers 3–3.5 mm long, penicillate. Caryopsis 3–5 mm long; embryo 30–40% the length; hilum 80% to equal the length.

DISTRIBUTION: Introduced from S. America and now spreading in the Central Coast, Northern Tablelands and Southern Tablelands subdivisions of New South Wales, also in Victoria.

SPECIMENS EXAMINED: NEW SOUTH WALES: **Central Coast:** Mt Druitt, *Campbell* NSW 117398, 7.11.1974 (NSW). **Northern Tablelands:** Tenterfield, 29° 06' S, 152° 00' E, *Johnson* NSW 117399,

1.12.1976 (NSW); Glen Innes, *Plante NSW 117402*, 6.2.1948 (NSW). **Southern Tablelands:** Burbong, *Pullen 2485*, 20.12.1960 (CANB, NSW); Black Mountain, *Gray 6443*, 4.12.1969 (CANB, NSW, BRI); Commonwealth Gardens, Canberra, *Gray 6441*, 30.11.1969 (CANB, NSW); O'Connor, Canberra, *Gray 6442*, 2.12.1969 (CANB, NSW, BRI).

VICTORIA: **Region J:** "Bung Bong", Yan Yean, *Hewson*, 16.1.1961 (MEL). **Region K:** Purnim, c. 9 miles [14 km] NE. of Warrnambool, *Crook*, 3.5.1967 (MEL 59964). **Region N:** Woodstock, *Colchin*, 1.1964 (MEL); Rosanna, Melbourne, *Corrick 2914*, 28.11.1973 (Corrick Herb).

All Australian specimens seem to belong to *S. neesiana* var. *neesiana*.

***Stipa nitida* Summerhayes & Hubbard**, Kew Bull. 1927: 60 (1927); Black, Fl. S. Austral. edn 2: 87 (1943).

HOLOTYPE: SOUTH AUSTRALIA: Finnis Springs (S. of Lake Eyre), *F.D. Warren*, 25.8.1926 (K, 4 sheets!; CANB photo 237015; isotypes: AD 97422294, MEL 59959).

SYNONYM: *S. scabra* var. *pallida* Reader, Victorian Naturalist 17: 156 (1901). HOLOTYPE: VICTORIA: Desert, Lowan, *F.M. Reader*, 11.1898 (MEL).

POSSIBLE SYNONYM: *S. scabra* var. *auriculata* J. Black, Fl. S. Austral. 1: 67 (1922). We have not yet found a specimen that can be definitely recognized as the Type, which was cited only as 'Dry districts'. One specimen labelled as *S. scabra* var. *auriculata* in Black's handwriting, from Laura, 8.10.1916 (K!) is a specimen of *S. drummondii* Steudel (see also note under that species).

Caespitose perennial c. 0.75 metres high, without rhizomes, with a basal tuft of mainly intravaginal shoots about half the height. Culms erect or slightly geniculate at the base, terete, 1–3 mm wide near the base,  $\pm$  compressible; basal culms smooth to slightly (–moderately) ribbed, glabrous or minutely puberulous to scaberulous with hairs minute–0.2 mm; upper culms smooth and glabrous; nodes 2–3, exserted at length, glabrous, to 50% wider than the adjacent internodes. Leaf sheaths at first tightly enveloping the culm, later becoming slightly loose; basal sheath 3–9 mm wide, slightly (to moderately) ribbed, glabrous to scaberulous to pubescent with hairs minute–0.3 mm long, inner margin glabrous, outer margin glabrous to ciliate with hairs (0.1–) 0.2–0.4 mm long; upper sheath 3–5 mm wide, moderately ribbed, (glabrous–) scaberulous to puberulous with minute tubercles or hairs minute–0.2 mm long, the innovations (glabrous–) scabrous to pubescent with minute tubercles or hairs, inner margin glabrous, outer margin glabrous or ciliate with hairs (0.1–) 0.4–0.8 mm long. Ligule truncate, membranous, 0.3–1(–1.5) mm long, ciliate with hairs minute–0.2 (–0.6) mm long; abaxial surface glabrous; auricle, when present, glabrous, c. 0.5 mm long, auricular lobes 0.5–3 mm long, ciliate with hairs 0.2–2 mm long, sometimes longer on the innovations. Leaf blade expanded to inrolled, 1–2 mm wide, to 40 cm long; abaxial surface slightly to moderately ribbed, (glabrous–) scaberulous to scabrous with hairs or tubercles minute–0.1 (–0.5) mm long, the innovations sometimes hispid with hairs 0.1–0.5 mm long; margins glabrous to ciliate with hairs 0.1–0.2 mm long; collar glabrous. Panicle 25–55 cm long,  $\pm$  exserted, with distant fascicles of unequal, few-flowered, compound or simple branches,  $\pm$  contracted (although spreading at anthesis), 0.5–7 cm wide (excluding awns), axis smooth to moderately ribbed, terete to slightly angled, glabrous to minutely scabrous; branches 2–6 cm long, angled, scaberulous with hairs to 0.1 mm long; pedicels 2–10 mm long, almost flat, scaberulous with hairs to 0.1 mm long. Spikelets 8–13 mm long (excluding awn), gaping slightly. Glumes subequal, straw-coloured, acute to acuminate, 8–13 mm long, glabrous to scabrous along the midrib with hairs to 0.1 mm long; lower glume with the lower 20–30 (–40)% 3-nerved; upper glume with the lower (15–) 30 (–35)% (3–) 5-nerved, upper (65–) 70 (–85)% 3–1-nerved. Floret narrow-

cylindrical, without a neck, (4–) 5–6 mm long (including callus). Lemma smooth to slightly granular, sericeous with hairs (0.2–) 0.3–0.5 (–0.6) mm long; lobes to 0.15 mm long, glabrous to ciliate with hairs to 0.1 mm long; coma obscure, of few hairs (0.2–) 0.3–0.8 mm long. Callus 1.2–2.2 mm long, weakly bent at the tip, densely sericeous with hairs to 1.5 mm long. Awn 45–70 mm long, falcate, 0.1–0.2 mm wide near the base; column 10–13 mm long, 6–9 mm to the first bend, straw-coloured to brown at maturity, scaberulous to pubescent with hairs mainly 0.1–0.3 mm long; bristle delicate, angled, straw-coloured to brown at maturity, scabrous with hairs to 0.2 mm long. Palea c. 90% the length of the lemma, obtuse to acute, often erose, smooth to slightly granular, sericeous down the centre back with hairs 0.2–0.4 (–0.7) mm long. Anthers usually penicillate, 1–3.5 mm long. Lodicules 2, abaxial, membranous, obtuse, 0.6–1.2 mm long. Caryopsis 2.5–3.5 mm long; embryo 25–40% the length; hilum 30–80% the length.

**DISTRIBUTION:** Widespread on sandy soils of the drier winter rainfall areas in all mainland States.

**SELECTED SPECIMENS:** NEW SOUTH WALES: **North Western Plains:** Gundabooka, *Henderson* NSW 117249, 16.1.1948 (NSW); c. 40 km from Louth, Tilpa road, *Moore* 4079, 20.9.1966 (CANB); 121 miles [194 km] W. of Cobar towards Wilcannia, *Dunlop* 1219, 27.8.1969 (CBG). **South Western Plains:** 21 km E. of Darnick, *De Nardi* 1094, 22.10.1972 (NSW); 12 miles [19 km] N. of Ivanhoe, *Leigh* NSW 117033, 30.9.1966 (NSW); Cunninyeuk, S. of Balranald, *Henderson* 181, 12.10.1946 (NSW). **North Far Western Plains:** Broken Hill, *Johnson* NSW 117029, 29.8.1946 (NSW); 11 miles [18 km] S. of Broken Hill on Silver City Highway, *Jacobs* 125, 11.11.1971 (NSW); 60 miles [96 km] E. of Broken Hill, *Vickery* NSW 117271, 20.8.1939 (NSW); 115 miles [184 km] E. of Broken Hill, *Pidgeon & Vickery* NSW 117272, 20.8.1939 (NSW); 10 miles [16 km] E. of Silver City Highway on "Bindara" & "Middlecamp" road, *Jacobs* 177, 12.11.1971 (NSW). **South Far Western Plains:** Menindee, *Henderson* 456, 18.9.1948 (NSW); Kinchega National Park, *Ryan & Everley* NSW 117259, 2.6.1969 (NSW); 26 km NW. of Gum Lake Railway Station, c. 28 km ESE. of Menindee, *De Nardi* 639, 22.9.1971 (NSW); Harcourt, *Butler* NSW 17261, 28.8.1968 (NSW); 37 miles [59 km] from Pooncarie towards Darnick, *Dunlop* 1454, 31.6.1969 (CBG); 71 km from Pooncarie on road to Wentworth, *De Nardi* 1048, 18.10.1972 (NSW); Wilcannia road, Dareton, *Butler* NSW 117260, 18.7.1969 (NSW); 12.8 km W. of Balranald, *De Nardi* 1020, 16.10.1972 (NSW).

**SOUTH AUSTRALIA:** **North-western:** Ernabella Mission Station, *Turvey* NSW 117239, 20.7.1969 (NSW); 16 miles [26 km] SE. of Emu, *Forde* 439, 30.8.1956 (K ex CANB). **Lake Eyre Basin:** 'Allandale' Station, c. 20 km SE. of Oodnadatta, *Kuchel* 661, 5.8.1963 (BRI, dupl. of AD); 5 miles [8 km] N. of 'Mungeranie' Homestead, c. 190 km NNE. of Marree, *Lothian & Francis* 325, 24.8.1960 (BRI, dupl. of AD); 'Evelyn Downs', *Ising*, 16.9.1955 (ADW 19782, 19780, NSW 117022); 50 miles [80 km] S. of Coober Pedy, *Story* 7837, 8.9.1956 (CANB); N. of Irapatana, *Cleland* NSW 117017, 7.8.1931 (NSW); Wangianna, 40 km W. of Marree, *Cleland*, 4.9.1941 (AD); 'Commonwealth Hill' Station, 55 miles [88 km] W. of homestead, *Symon* 3371, 19.2.1965 (ADW). **Nullarbor:** 15 miles [24 km] N. of Maralinga, *Perry* 5559, 26.1.1956 (CANB); 15 miles [24 km] E. of Immarna, *Calaby*, 18.10.1947 (CANB 15007); Cook–Ooldea, *Hilton* 1744, 23.8.1955 (ADW); Cook, *Blake* 18162, 10.9.1947 (BRI); Hughes, *Hubbard* 8369, 26.4.1931 (K, NSW); Talloran Tank near 'Nullarbor' Station, NNW. of Fowlers Bay, *Cleland*, 17.10.1953 (ADW 44067, 44058). **Gairdner-Torrens Basin:** Wynbring, *Ising* 1216, 9.1920 (ADW, BRI, NSW); 'Purple Downs' Station, *Andrewartha*, 5.1938 (ADW 8291); 'Coondambo' Station, near Kingoonya, *Reid*, 28.8.1954 (ADW 28125, 28121); 'Wirraminna' Station, *Reid*, 28.8.1954 (ADW 28126); 10 miles [16 km] E. of Lake Hart, W. of Woomera, *Beaughole* 22713, 24.6.1967 (NSW); 'Arkoona' Homestead, c. 18 miles [29 km] NE. of Woomera, *Gauba* CBG 047568, 22.6.1955 (CBG). **Flinders Ranges:** lower slopes of hills below Paralana Springs, *Symon* 6082, 24.8.1968 (ADW, NSW); Mt Lyndhurst, *Koch* 371, 8.1899 (K, NSW); 22 km NE. of Lyndhurst, *Sikkis* 1138 & *Ollerenshaw*, 26.9.1973 (CBG); c. 3 km E. of Nepabunna Mission, *Lothian* 2579, 27.9.1963 (BRI, dupl. of AD); Parachilna, *Cleland* NSW 117032, 19.8.1921 (NSW). **Eastern:** Billeroo Creek area, c. 45 km ENE. of 'Frome Downs' Homestead, *Whibley* 3432, 25.7.1971 (AD, NSW); Koonamore [60 km N. of Yunta], *Carrick* 1798, 6.10.1968 (AD, NSW); 20 km S. of Yunta, *Carrick* 2111, 7.10.1968 (AD, NSW); White Well, *Cleland*, 19.10.1954 (ADW 43886). **Eyre Peninsula:** 49 miles [78 km] from Nundroo toward 'Nullarbor' Homestead, *Canning* CBG 039492, 3.9.1968 (CBG); 'Yudnapinna' Station, *Crocker*, 10.1939 (ADW 22959); Ceduna, *Canning* 2352, 3.9.1968 (NSW dupl. of CBG); near Yardea, 50 miles [80 km] NE. of Minnipa, *Cleland*, 12.10.1954 (ADW 43889); Minnipa–Wudinna, *French* 4, 10.1954 (ADW 43711, NSW); Whyalla, *Hilton*, 10.9.1952 (ADW 43905); towards Whyalla from Port

Augusta, beyond Iron Knob turnoff, *Phillips CBG 067216*, 15.9.1973 (CBG); between Kimba & Port Augusta, *Reeve 364*, 21.8.1972 (CANB); 2 miles [3 km] N. of Cowell, *Pearce*, 2.1965 (ADW 44115). *Murray*: 'Bunyung' Station, Morgan, *Reid*, 1.4.1954 (ADW 44131); Florieton, N. of Mount Mary, *Clarke*, 26.10.1936 (ADW 19779); 22 km from Morgan towards Burra, *Phillips CBG 059904*, 2.9.1962 (CBG); Stoney Pinch Dam, 'Calperum' Station, NE. of Overland Corner, *Symon 3845*, 11.10.1965 (ADW); Loveday, *Gauba CBG 006473*, 14.12.1944 (CBG).

NORTHERN TERRITORY: 120 miles [192 km] S. of Alice Springs, *Vasek*, 17.9.1968 (CANB); Erldunda, c. 125 miles [200 km] S. of Alice Springs, *Paige*, 12.11.1968 (CANB, dupl. of NT); 8 miles [13 km] WNW. of Ayers Rock, *Lazarides 6152*, 7.9.1956 (CANB); between 'Mt Cavenagh' & 'Victory Downs' Homesteads, *Beaglehole 22771*, 27.6.1967 (NSW).

WESTERN AUSTRALIA: **Eucla**: 74 miles [118 km] E. of Rawlinna, *Goodall 2708*, 19.8.1966 (PERTH); c. 100 miles [160 km] N. of Rawlinna, *George 8475*, 12.10.1966 (PERTH); Eucla, *Phillips CBG 042585*, 1.9.1968 (CBG, BRI); 25 miles [40 km] W. of Cocklebidy, *Main*, 29.11.1959 (PERTH). **Austin**: 11 miles [18 km] N. of Meekatharra, *Speck 1082*, 29.7.1958 (CANB, NSW); 6 miles [10 km] NW. of Mt Newman, *Severne 360978* (PERTH); 'Barnong' Station, *Humphries*, 17.9.1951 (PERTH); Leonora road, 38 km WSW. of Laverton, *Beaglehole 59801 & Errey*, 15.9.1978 (NSW); 18 miles [29 km] N. of Menzies, towards Leonora, *Phillips CBG 0417459*, 7.9.1968 (CBG, BRI); between Menzies & Comet Vale, *Blackall 4185*, 13.9.1939 (PERTH). **Carnarvon**: Hamelin Pool, *George 1484*, 1.9.1960 (PERTH). **Coolgardie**: 3 miles [5 km] E. of Coolgardie, *Phillips CBG 020680*, 13.9.1962 (CBG); Kalgoorlie, *Blake 18160*, 9.9.1947 (BRI). **Avon**: Walgoon, *O'Leary*, 3.4.1924 (K). **Giles**: Docker Mission Road, 171 km E. of Warburton Mission, *Beaglehole 60253 & Errey*, 20.9.1978 (NSW).

*S. nitida* is a very variable species. The population represented by the Holotype has woolly-hairy auricles. The auricles from other populations vary from glabrous to woolly, with no detectable pattern that we could correlate with variation in other characters. There is similar variation in other vegetative characters; for example, the following specimens all have broad leaves and sheaths:

SOUTH AUSTRALIA: Ooldea, *Cleland NSW 15100*, 25.8.1922 (NSW); Upper Arkaringa Vale, *Helms*, 29.6.1891 (NSW); Government NW. expedition, *Basedow 118, 508*, 1908 (NSW). WESTERN AUSTRALIA: NW. Australia, *Crawford 368*, 1909 (NSW 151497, 151498, 151499); 5 miles [8 km] S. of Yelma, *Speck 1342*, 1.9.1958 (NSW); c. 42 km SW. of Meekatharra, *Beaglehole 49060A*, 22.8.1974 (NSW); 65 km NE. of Laverton, *Beaglehole 59963 & Errey*, 16.9.1978 (NSW); 5 km N. of Kalgoorlie, *Hoble 6*, 10.8.1973 (NSW); Gindalbie, *Noble 242*, 10.8.1973 (NSW); Lawlers, *Fitzgerald*, 7.1899 (NSW); Fraser Range, *Helms*, 12.10.1891 (NSW).

Other such groups of specimens can be separated from *S. nitida* but we have been unable to detect any reliable pattern in the variability. Clearly this large species and its many forms would be worthy of further studies.

Hughes incorrectly determined specimens of *S. nitida*, 'without precise locality, Sinclair' (CANB 117325 received from BM) and 'Mt Lyndhurst, M. Koch no. 371, 8.1899' (K) as *S. scabra* Lindl. The Koch specimen was the basis for her figures 18 and 18A. We have not seen all the other sheets she cites from South Australia and Western Australia but it seems possible that they also may be *S. nitida*.

*S. nitida* is host to a previously unrecorded 'Cockle' infection caused by an apparently undescribed Anguinid (tribe Anguinieae) nematode (Dr. J. Southey, pers. comm.). This infection causes the inflorescence to become dense and compact, 'Barley-like' is used on one herbarium label. The shape of the floret changes, losing the characteristics of the genus *Stipa*. The lemma is only gently curved and barely overlaps the palea margins. The awn remains more or less straight and does not twist. The pseudo-caryopsis has neither embryo nor hilum and on breaking it open the coiled desiccation-resistant larval stage of the nematode can be seen. The following specimens are examples of this infection:

VICTORIA: Wyperfeld National Park, *Beaublehole* 28523, 19.9.1968 (NSW, IMI p.p.). SOUTH AUSTRALIA: 2 miles [3 km] E. of Maralinga, *Bown* 130, 9.1956 (K, IMI, ?AD); nr. Corunna Hill, Iron Knob, *Copley* 2317, 2.10.1968 (AD, IMI).

Further specimens may exist but the changed appearance of inflorescence and spikelet may have led to their being incorrectly identified.

***Stipa nivicola*** *J.H. Willis*, Victorian Naturalist 73: 149 (1957); Handb. Pl. Victoria 1: 188 (1962), edn 2: 188, 435 (1970); Burbidge & Gray, Fl. Austral. Cap. Terr.: 153 (1970).

HOLOTYPE: VICTORIA: Bogong High Plains, 1650 m, grassy slopes of Middle Creek, near Rover Scout Hut, *J.H. Willis*, 2.2.1949 (MEL; isotype NSW 116164).

Caespitose perennial to c. 0.5 metres high, shortly rhizomatous with a basal tuft of leaves c. half the height. Culms erect, or decumbent, c. 1 mm wide near the base, scarcely compressible, slightly ribbed or smooth, very shortly pubescent just below the lower nodes, minutely sericeous just below the upper nodes, glabrous elsewhere. Nodes 2–3,  $\pm$  exserted, not swollen; lower nodes glabrous to rarely sericeous with hairs 0.05 mm long; upper nodes sericeous with hairs 0.05–0.15 mm long. Leaf sheaths at first tightly enveloping the culm, later becoming slightly loose; basal sheath 4–5 mm wide, moderately ribbed at the base, very slightly ribbed elsewhere, glabrous to minutely scabrous between the nerves, margins glabrous; upper sheath 3–4 mm wide, strongly ribbed, centre glabrous, edges minutely scaberulous, inner margin glabrous to ciliate with hairs c. 0.15–0.2 mm long, outer margin ciliate with hairs 0.1–0.3 mm long to glabrous. Ligule truncate, firm, 0.4–1.5 mm long, ciliate with hairs 0.05–0.5 mm long; auricles absent. Leaf blade linear, tightly rolled, 1.5–3.5 mm wide, to 20 cm long; abaxial surface smooth to very slightly ribbed, glabrous; adaxial surface strongly ribbed, densely scaberulous with minute siliceous prickles; margins scabrous with hairs to 0.05 mm long or glabrous upwards. Panicle 5–20 cm long, exserted, sparse with 8–12 spikelets, with distant fascicles of unequal few-flowered branches, contracted, 1–2.5 cm wide (excluding awns); axis terete or slightly flattened, slightly scabrous with minute tubercles or hairs 0.1–0.2 mm long; branches 3–4 cm long, angular, scabrous with hairs 0.2 mm long; pedicels 1–3 cm long, angular, scabrous along the edges with hairs 0.05–0.15 mm long. Spikelets 20–25 mm long (excluding awn), gaping. Glumes subequal, purple, with prominent straw-coloured nerves, minutely scabrous on the margins and across the tip with hairs less than 0.5 mm long to glabrous; lower glume acute to acuminate, 20–25 mm long, lower 60–80% 4-nerved, upper 40–20% 2–1-nerved; upper glume acute, 15–20 mm long, lower 35–50% 5-nerved, upper 65–50% 4–1-nerved. Floret narrow-cylindrical, 12–15 mm long (including callus), without a neck. Lemma surface scabrous with minute tubercles, sericeous with hairs 0.5–1 mm long; coma and lobes absent. Callus c. 3.5 mm long, weakly bent at the tip, densely sericeous with hairs to 0.8 mm long, white to orange at maturity. Awn 85–130 mm long, twice bent, c. 0.5 mm wide at the base; column 55–70 mm long, 45–60 mm to the first bend, straw-coloured, sparsely scabrous with hairs 0.05–0.5 mm long; bristle delicate, straw-coloured, scabrous with hairs 0.1–0.15 mm long. Palea equal to the lemma, acute, glabrous. Lodicules 2, abaxial, oblong, 1–1.7 mm long. Caryopsis 6–7.5 mm long; embryo 20% the length; hilum equal to the length.

DISTRIBUTION: Southern New South Wales and northern Victoria on the Australian Alps and Bimberli Range.

SELECTED SPECIMENS: NEW SOUTH WALES: **Southern Tablelands:** Brindabella Range, 1.3 km ENE. of Mt Ginini, *Crisp* 2454, 28.1.1977 (CBG); Ginini Flats, *Solling* NSW 116183, 24.3.1972 (NSW); Snowy Flat, nr. Mt. Gingera, Bimberi Range, *Pullen* 3833, 27.2.1963 (CANB, NSW, BRI); Mt Gingera, *Gray* 6009, 10.2.1967 (CANB, BRI, MEL); plain N. of Kiandra, *Gauba* CBG 006095, (CBG, AD); 2 miles [3 km] W. of Kiandra, *Burbidge* 3907, 22.2.1955 (CANB); Kiandra, *Newman* NSW 116155, 8.2.1954 (NSW); S. of Kiandra, *Gauba* CBG 003942, 16.1.1950 (CBG, MEL, BRI); ridge above Happy Jacks township, *Vickery* NSW 42740, 20.1.1958 (NSW); McKeahnies Creek catchment, *Phillips* CBG 008884, 28.1.1965 (CBG); 8 km SSE. of Mt Selwyn, *Everett* 465, 3.1.1984 (NSW); Upper Tumut Catchment, nr. Doubtful River, *Newman* NSW 116163, 26.3.1954 (NSW); Perisher Creek, *Johnson* NSW 18686, 23.1.1951 (NSW); Kydra Peaks, *Willis* NSW 116705, 11.1.1970 (NSW, dupl. of MEL 501959); Mt Kosciusko, *Mueller* NSW 116156, 25.3.1953 (NSW); Doubtful River, *Mueller* NSW 116160, 23.2.1953 (NSW); Monaro, *Taylor* NSW 116161, 13.2.1953 (NSW).

VICTORIA: **Region R:** Mt Buffalo, *Willis*, 18.2.1963 (MEL). **Region S:** Snowy Range, Airstrip Plain, *Beaulehole* 40974, 5.1.1973 (NSW); Snowy Range, Buyee Plain, *Beaulehole* 40872 & *Chesterfield*, 31.12.1972 (NSW); Big Plain, NW. of Mt Wellington, *Willis* NSW 116702, 12.3.1966 (NSW, dupl. of MEL 503312). **Region V:** Buckety Plain, Bogong High Plains, *Beaulehole* NSW 116169, 28.1.1966 (NSW). **Region W:** Brumby Point, Nunniong Plateau, *Beaulehole* 36537 & *Finck*, 21.1.1971 (NSW).

Neither open florets nor exerted anthers have been observed amongst the material examined but anthers have been observed to be shedding pollen while totally enclosed by the lemma; it appears that the spikelets are normally cleistogamous.

***Stipa nodosa* S.T. Blake**, Proc. Roy. Soc. Queensland 62: 89 (1952); Black, Fl. S. Austral., rev. Jessop, edn 3, 1: 108 (1978).

HOLOTYPE: SOUTH AUSTRALIA: Flinders Ranges in Parachilna Gorge, between Blinman and Parachilna Spring, *S.T. Blake* 16914, 1.9.1946 (BRI 008016, 008017; isotype AD).

SYNONYMS: *S. effusa* Hughes, Kew Bull. 1922: 20 (1922), *non* Mez (1921); Black, Trans. & Proc. Roy. Soc. S. Austral. 63: 241 (1939). HOLOTYPE: NEW SOUTH WALES: Lachlan River, *Mueller*, Sept. 1878 (US 993696!; isotype K, also CANB photo 237023). The specimen at Kew consists of a pencil habit-drawing of a portion of the plant in the U.S. National Herbarium, which was lent to Kew in 1921, together with a packet containing a few spikelets and florets. The specimen at US is in good condition and bears the name '*Stipa effusa* Hughes' in Hughes' own handwriting.

*S. falcata* var. *minor* J. Black in Trans. & Roy. Soc. S. Austral. 65: 334 (1941); Fl. S. Austral. edn 2: 87 (1943). LECTOTYPE, **here designated:** Wilpena Pound, *J.B. Cleland* s.n., 10.11.1928 (AD 97424083). Black cited 'Flinders Range' without specifying any particular location. In his herbarium at AD there are several presumed syntypes from the Flinders Ranges on which he has written the name. They are all specimens of *S. nodosa* Blake. Presumed syntypes include specimens mounted on the sheets AD 97424083, 97424085, 97424084, 97424087, 97424086, 97424082.

[MISAPPLIED NAME: A specimen of *S. nodosa* from Ardlethan [New South Wales], *R.H. Cambage* NSW 117120, 1.10.1916 (NSW), formed the basis of the illustration over the caption '*Stipa scabra*' in Breakwell, Grasses and Fodder Plants of N.S.W.: 226, fig. 111 (1923).]

Caespitose perennial 0.5–1 metre high, without rhizomes, with a basal tuft of mainly extravaginal shoots about a third the height, and numerous culm leaves. Culms erect or slightly geniculate at the base, terete, 1–2 mm wide near the base, not compressible, slightly to moderately ribbed, glabrous or scabrous with minute tubercles; nodes 3–5(–8),  $\pm$  exerted, glabrous but sometimes with a band of sericeous hairs just below the node, c. 50% wider than the adjacent internodes. Leaf sheaths at first tightly enveloping the culm, later becoming loose; basal sheath 4.5–7 mm wide, slightly to moderately ribbed, glabrous to scaberulous with minute hairs or tubercles or, on the innovations minutely pubescent; inner margin glabrous; outer margin glabrous to sparsely ciliate with hairs 0.1–0.4 mm long, to 0.6 mm on the innovations; upper sheath 3–4.5 mm

wide, moderately to strongly ribbed, scaberulous with minute tubercles to glabrous, inner margin glabrous, outer margin ciliate with hairs (0.1–) 0.4–0.8 mm long or glabrous. Ligule truncate, membranous, 0.5–2 mm long, glabrous to sparsely ciliate, abaxial surface glabrous; auricles usually thickened and spreading, 0.7–1 mm long, ciliate at the base with hairs (0.5–) 1–2 mm long. Leaf blade expanded to inrolled, 1–3 mm wide, to 30 cm long; abaxial surface moderately to strongly ribbed, scaberulous with minute tubercles or hairs; adaxial surface strongly ribbed, pubescent, scaberulous or puberulous with hairs to 0.2 (–0.5) mm long; collar glabrous, margins glabrous or sparsely ciliate with hairs to 0.5 mm long. Panicle 15–50 cm long, exserted, with distant fascicles of unequal, few-flowered, compound branches, open or occasionally contracted, 1–7 cm wide (excluding awns); axis terete to slightly angled, glabrous to scabrous or scaberulous with minute hairs or tubercles; branches 1–8 cm long, slightly angled to flattened, scabrous to scaberulous along the edges; pedicels 2–15 mm long, flattened, scabrous along the edges. Spikelets 10–15 mm long (excluding awn), gaping after floret disarticulation, otherwise tightly closed. Glumes subequal to unequal, acute to acuminate, transparent, straw-coloured or purple-tinged; lower glume 10–15 mm long, glabrous to minutely scabrous, hairs sometimes longer along the midrib, lower 25 (–35)% 3-nerved; upper glume 7–14 mm long, minutely scaberulous to glabrous, lower (15–) 20 (–40)% 5-nerved, upper (60–) 80 (–85)% 3–1-nerved. Floret narrow-cylindrical without a neck, 4–7 mm long (including callus). Lemma surface slightly granular to smooth, sericeous with hairs 0.3–0.6 mm long; lobes absent or 2, 0.1–0.4 mm long, glabrous; coma obscure, of few hairs 0.4–1 mm long. Callus 1–3.5 mm long, sturdy, weakly bent at the tip, densely sericeous with white hairs to 0.8 mm long. Awn 45–100 mm long, falcate, c. 0.3 mm wide near the base; column 7–15 mm long, 5–10 mm to the end of the straight portion, straw-coloured to brown, scaberulous to scabrous with stiff hairs to 0.3 (–0.4) mm long; bristle scabrous with hairs to 0.2 mm long. Palea ± equal to the lemma, acute to obtuse, smooth to slightly granular down the centre, sericeous down the centre back. Lodicules 3; 2 abaxial membranous, 1–2 mm long, oblong; paleal c. 0.7 mm long, acute. Anthers penicillate, 2–3 mm long. Caryopsis (2–) 3–4 mm long; embryo 20–30% the length; hilum 50–80% the length.

DISTRIBUTION: Widespread in all southern mainland States including New South Wales.

SELECTED SPECIMENS: QUEENSLAND: **Darling Downs:** roadside at Wallangarra, Qld. border, *Hilton*, 4.2.1945 (ADW 4404).

NEW SOUTH WALES: **Southern Tablelands:** Charnwood, c. 15 km NW. of Canberra, *Crisp* 2294, 31.10.1976 (CBG, NSW); Acton, Canberra, *Beeton* CBG 064049, 23.11.1970 (CBG); Kambah Pool, *Boden* CBG 041941, 1.1969 (CBG); Molonglo & Murrumbidgee Rivers, *Gauba* CBG 057374, 8.12.1954 (CBG); Bredbo, *Murray* NSW 117138, 12.1913 (NSW); Eucumbene, *Phillips* CBG 018931, 27.1.1965 (CBG); Cooma, *Vickery* NSW 117139, 2.1930 (NSW); 13 miles [21 km] from Maffra towards Ando, *Carrol* CBG 024816, 5.12.1965 (CBG); Bibbenluke district, *Cleland* NSW 117140, 5.1913 (NSW). **South Western Slopes:** Grong Grong, *Johnson* NSW 117145, 25.5.1947 (NSW); 7 miles [11 km] N. of Wagga Wagga, *Phillips* CBG 025458, 20.10.1965 (CBG); 4 miles [6 km] E. of Henty, *Flynn* 62, 6.11.1970 (NSW); Comer Reserve, 6 miles [10 km] SW. of Henty, *McBarron* 5623, 25.10.1951 (NSW); Walbundrie, *McBarron* 3193, 29.3.1949 (NSW); Walla Walla, *McBarron* 5563, 4.10.1951 (NSW); Burrumbuttock, *McBarron* 2738, 3.12.1948 (NSW); Balldale, *McBarron* 4791, 25.8.1950 (NSW); Jindera, *McBarron* 2652, 24.11.1948 (NSW); Wymah, *McBarron* 5770, 29.11.1951 (NSW); Albury, *McBarron* 2633, 21.11.1948 (NSW).

SOUTH AUSTRALIA: **Lake Eyre Basin:** Wintinna Creek, 18 miles [29 km] N. of Mt Willoughby, *Beaulehole* 20201, 7.10.1966 (NSW); Mt Livingston, *Langley* NSW 116663, 10.1897 (NSW, K). **Gairdner-Torrens Basin:** 'Oakden Hills' Station, *Gill* NSW 117117, 2.1904 (NSW). **Flinders Ranges:** c. 1 km N. of Nudlamutana Well, *Whibley* 2167, 26.10.1967 (AD, NSW); nr. Blinman, *Blake* 16900, 31.8.1946 (BRI); Oraparinna National Park, *Symon* 7579, 9.10.1971 (ADW, CANB); Wilpena to Bunyeroo, *Blackburn*, 3.10.1954 (ADW 44154); Wilpena Pound, *Cleland*, 10.11.1928 (AD); *Crisp*

917, 22.10.1974 (CBG); 22 miles [35 km] S. of Hawker, *Hilton*, 8.4.1955 (ADW 44086); 'Portacoona' Station Homestead, c. 18 miles [29 km] SW. of Hawker, *Tindale NSW 117072*, 24.8.1969 (NSW); Boolcunda East, *Hilton NSW 116662*, 1.10.1954 (ADW, NSW); Pichi Richi Pass, *Blake 16863*, 29.8.1946 (BRI); Quorn, *Crocker*, 18.9.1939 (ADW 4594); 10 miles [16 km] N. of Carrieton, *Hilton*, 1.10.1954 (ADW 44146); Horrocks Pass, *Hilton*, 12.1951 (ADW 44046); 16 km W. of Peterborough, *Crisp 589*, 9.9.1963 (CBG). **Eastern:** 'Bilbliando' Station, c. 50 km E. of Hawker, *Crisp 888*, 19.10.1974 (BRI, CBG, NSW); Koonamore, *Crisp 594*, 15.9.1973 (CBG); Yunta to Koonamore, *Symon 19.12.1954* (ADW 28117); Winnininnie, near Manahill, *Reid*, 5.10.1954 (ADW 44160); 6 km NE. of Oodlawirra, *Lothian 1170*, 4.11.1962 (AD, NSW). **Eyre Peninsula:** Gawler Ranges nr. Waltinga Dam, *Symon 8176*, 5.10.1972 (ADW); 10 miles [15 km] N. of 'Nonning' Station, *Specht & Carrodus 27*, 14.11.1958 (AD); S. of Mt Gairdner, c. 55 km WNW. of Nonning, *Carrick 2382*, 29.9.1969 (BRI); Port Germein Gorge, *Burbidge*, 29.8.1946 (CANB 19551); *Cleland*, 20.10.1953 (ADW 44060); Port Germein, *Hilton*, 12.9.1951 (ADW 43990); Colton, *Crocker*, 11.10.1944 (CANB 11637); Cowell Flats, *French*, 12.1954 (ADW 28154); *Mittalie*, c. 10 miles [13 km] NW. of Cowell, *Pearce*, 28.1.1965 (ADW 44119); Cleve [as Cleeve], *Phillips 458*, 20.9.1965 (CBG); Port Lincoln, *Black NSW 117112, 117113*, 11.1903 (NSW). **Northern Lofty:** Port Pirie, *Koch NSW 116660*, 9.1901 (NSW); Deep Creek, 5 miles [8 km] E. of Burra, *Hilton*, 24.8.1946 (ADW 43928); 6 miles [10 km] N. of Bute on Wokurna road, *Tindale 408*, 10.9.1970 (NSW); Mortlock Experimental Station near Mintaro, *Symon 4447*, 9.11.1966 (ADW, CANB); 8 miles [13 km] S. of Port Wakefield at Inkerman, *Phillips CBG 043562*, 2.10.1965 (CBG); Oakley Hill, Owen, *Beck*, 2.1942 (ADW 4694); 2 miles [3 km] SW. of Mallala, *Moore*, 10.10.1969 (CANB 249734). **Murray:** Morgan, *Steward*, 16.10.1965 (ADW 37510); Black Hill, 18 miles [29 km] SE. of 'Sedan', *Hilton NSW 117076*, 22.9.1951 (ADW, NSW); 1 mile [1.6 km] E. of Kanmantoo, *Hilton*, 18.3.1954 (ADW 44053). **Yorke Peninsula:** Kadina, *Beck*, 2.1942 (ADW 4696); Melton, *Reid NSW 117075*, 30.9.1954 (ADW, NSW); Winulla Road, Artherton, *Beck*, 2.1942 (ADW 4704); 1 mile [1.6 km] N. of Artherton, *Phillips CBG 037669*, 17.10.1966 (CBG). **Southern Lofty:** Reeves Plain, *Beck*, 2.1942 (ADW 4701); Highbury, *Kraehenbuehl 822*, 22.10.1962 (BRI); Lockleys, c. 6 km W. of Adelaide, *Smith 1061*, 8.12.1967 (AD); 6 miles [10 km] SE. of Nairne, *Hilton*, 20.11.1953 (ADW 44037); Waterfall Gully, Adelaide Hills, *Hilton*, 12.10.1944 (ADW 37510); Belair Road, Adelaide Hills, *Hilton*, 13.10.1945 (ADW 43897); Plympton, *Hilton*, 5.9.1946 (ADW 43983); Torrens Gorge, *Hilton*, 8.10.1946 (ADW 44159); South Parklands, King William Road, Adelaide, *Cleland*, 25.10.1955 (ADW 13280); Brown Hill Creek, Adelaide Hills, *Hilton*, 13.10.1945 (ADW 43985); Forest Lodge, Verdun, 3 miles [5 km] SW. of Balhanna, *Hilton NSW 117073*, 5.12.1953 (ADW, NSW); N. of Willunga, *Hilton*, 20.10.1946 (ADW 43993); nr. Waterfall Creek, head of Yankalilla, *Hilton*, 25.11.1953 (ADW 44123). **South-eastern:** Devils Elbow, Mt Barker Road, E. of Glen Osmond, *Hilton* 8.10.1946 (ADW 44174).

***Stipa nullarborensis* J. Vickery, S.W.L. Jacobs & J. Everett, sp. nov.**

*S. breviglumi* affinis sed palea longitudine 4/5 lemmatis partes aequantia (*breviglumi*: 1/2–3/5), callo pungenti, lemmatibus usque ad apicem pilis relatis, collo lemmatis nullo, differt.

HOLOTYPE: WESTERN AUSTRALIA: Abrakurrie Cave, 18 miles [29 km] NW. of Eucla. Open depression near entrance to cave. *A.C. Beauglehole 13395*, 23.9.1965 (NSW; isotypes CANB, PERTH).

Perennial to c. 1 metre tall, with a short rhizome and usually with few basal leaves. Culms branched or simple, terete, 1(–3) mm wide near the base, not compressible, glabrous to scaberulous or scabrous, especially just below the nodes; nodes 4–5, glabrous, exserted. Leaf sheaths 5(–8) mm wide, loose, glabrous to pubescent, smooth to scaberulous or scabrous, upper sheaths generally less hairy; margins similar to adjacent surfaces. Ligule truncate, papery, easily torn, 2–3 mm long, glabrous; auricle glabrous. Leaf blade usually expanded, 2–5 mm wide, to 25 cm long; abaxial surface scaberulous, scabrous to sparsely pubescent; adaxial surface scabrous and/or sparsely pubescent; margins glabrous or with antrorsely hooked tubercles. Panicle to 30 cm long, to 3 cm wide (excluding awns), exserted, contracted, with distant fascicles of sparsely to densely flowered unequal compound branches; axis slightly angular, glabrous or scabrous; branches angular, 2–8 cm long, scabrous or pubescent; pedicels



flattened, 1–7 mm long, scabrous or pubescent. Spikelets gaping, 4–5.5 mm long (excluding awn). Glumes equal, obtuse to broad-acute, often purple-tinged, with stiff appressed hairs; tips ciliate, easily torn; lower glume 4–5.5 mm long, lower 50% 3-nerved; upper glume 4–5.5 mm long, lower 50% 5-nerved, the next 35% 3-nerved. Floret narrow-fusiform, 3–4 mm long (including callus), not tapering apically to a discernible neck. Lemma slightly granular, brown at maturity, with soft, spreading, white hairs right to and slightly overlapping the base of the awn; coma absent; lobes 2, c. 0.1 mm long, or absent. Callus sharp and strongly curved, 0.5–0.8 mm long, similarly hairy to the lemma. Awn c. 0.15 mm wide near the base, (14–) 20–30 mm long, slightly twice bent; column (6–) 9–13 mm long, (3–) 5–8 mm to the first and less-developed bend, light brown, scaberulous with hairs to 0.1 mm long; bristle scaberulous, often purple-tinged and darker than the column. Palea broad-acute, ciliate, 80% the length of the lemma with similar surface and indumentum. Lodicules 2–3, membranous; 2 abaxial, 0.7–0.9 mm long; obtuse; paleal acute, 0.3 mm long, or absent. Anthers 1.5–1.7 mm long, lightly penicillate. Mature caryopsis not seen, apparently 2 mm long.

DISTRIBUTION: Nullarbor Plain in Western Australia.

SPECIMENS EXAMINED: WESTERN AUSTRALIA: **Eucla**: Abrakurrie Cave, 18 miles [29 km] NW. of Eucla, *Beaglehole* 13395, 23.9.1965 (CANB, NSW, PERTH); 'Madura' Homestead, *Willis*, 30.8.1947 (BRI 229382, MEL 59887); 3.5 miles [5.5 km] E. of Eucla, *George* 8512, 15.10.1966 (PERTH, 2 sheets); c. 1 km N. of Eucla, Nullarbor Plain, *Beaglehole* 49443, 30.8.1974 (CANB, NSW).

The specific epithet refers to the Nullarbor Plain where this species occurs.

Similar to *S. breviglumis* but differing in the longer palea (relative to the lemma), the sharp callus, the hairs of the lemma continued to its apex and the absence of a neck to the lemma. Differs from *S. acrociliata* in the smaller spikelet and in the equal glumes.

***Stipa nullanulla* J. Everett & S.W.L. Jacobs**, *Telopea* 2(4): 398 (1983).

HOLOTYPE: NEW SOUTH WALES: 'Nulla Nulla', 2 km south of gate at northern end of Bluff paddock. Saltbush, mallee, *Myoporum* sp. *Everett* 133 & *Jacobs*, 25.11.1980 (NSW; isotype AD).

Small caespitose perennial 0.4–0.5 metres high with a loosely contracted rootstock. Culms erect, 1–2 mm wide near the base, terete, smooth, mostly glabrous but pubescent just below the nodes; nodes 2, glabrous, rarely exerted. Leaf sheaths broad, loose around the culm, glabrous or the lower sheaths scaberulous to pubescent between the nerves; outer margin densely woolly especially on lower sheaths; inner margin sparsely woolly. Ligule 1–5 (–10) mm long, membranous, lacinate, with woolly cilia to 9 mm long on tips and back. Leaf blades linear, usually rolled, rigid, to 30 cm long and 2–3 mm wide; abaxial surface unribbed, very finely scaberulous; adaxial surface strongly ribbed, the ribs covered with short hairs; margins strongly scabrous. Panicle 13–19 cm long, delicate and spreading, axis very sparsely scabrous with distant fascicles of unequal compound branches; branches 4–60 cm long, scabrous, scaberulous or shortly pubescent; pedicels similar to the branches, 3–15 mm long. Spikelets narrowly gaping at maturity, widely gaping after floret disarticulation, 9–11 mm long (excluding awn). Glumes subequal, green at the base, chartaceous at the tip, 3 nerves visible for much of the length, acute to shortly acuminate; lower glume 9–11 mm long, the lower 75% 3-nerved; upper glume 8–10 mm long, the lower 25% 5-nerved, the next 50% 3-nerved. Floret cylindrical to narrow-

fusiform, 5–6 mm long (including callus). Lemma at maturity tightly convolute, smooth with an antrorsely scabrous neck, glabrous to very sparsely scattered with slightly spreading yellow hairs, dark brown with the 5 nerves pale yellow; coma sparse, 1–1.5 mm long in 2 tufts; lobes absent. Callus straight, 2.0–2.7 mm long, sericeous with yellow-brown hairs. Awn 0.25 mm wide near the base, 50–70 mm long, gently twice bent; column 18–25 mm long, 10–15 mm to the first bend, shortly pubescent with hairs to 0.2 mm long; bristle scabrous. Palea acute to obtuse, subequal to the lemma, glabrous or with a sparse apical tuft. Lodicules 3, membranous, oblong; 2 abaxial c. 1 mm long; paleal minute or rarely equal in size to the palea and then similar in texture to the palea. Caryopsis 2.7–3.0 mm long; embryo 25–35% the length; hilum 65–75% the length.

DISTRIBUTION: South Far Western Plains of New South Wales and west into South Australia.

SPECIMENS EXAMINED: NEW SOUTH WALES: **South Far Western Plains**; 'Nulla Nulla' unit 37, *Stanley 1784*, 3.12.1975 (NSW).

SOUTH AUSTRALIA: **Murray**: c. 32 miles [50 km] N. of Overland Corner, *Symon 3728* (ADW).

Apparently restricted to gypseous rises. Palatable to sheep and rabbits and now confined to the shelter of shrubs and similar protected places.

***Stipa oligostachya* Hughes**, Kew Bull. 1921: 12 (1921).

HOLOTYPE: VICTORIA: Wando Vale [as Wendu Vale], growing in tussocks, *Robertson 534* (K!).

Caespitose perennial to 1 metre high with conspicuously extravaginal shoots and a short rhizome. Culms erect, 1 (–2) mm wide near the base, not compressible, scarcely ribbed, glabrous, scaberulous or puberulous, pubescent just below the nodes; nodes c. 3, just exerted or concealed, sericeous, to 25% wider than adjacent internodes. Leaf sheaths tightly enveloping the culms, 2 (–4) mm wide, ribbed, glabrous; basal sheaths lanate; outer margin shortly ciliate, densely ciliate near the orifice. Ligule ovate to truncate, coriaceous, 0.5–2 mm long, often continuous with the sheath margin, ciliate with long hairs, sericeous on the back; auricles thickened and spreading, with short hairs that usually continue as a line around the collar. Leaf blades usually tightly rolled, erect, to 20 cm long, 0.5–1.0 mm wide; abaxial surface unribbed or slightly ribbed, glabrous to minutely scaberulous, occasionally with widely scattered hairs; adaxial surface ribbed, minutely puberulous to hirsute. Panicle 10–25 cm long, exerted with distant fascicles of unequal few-flowered compound branches, spreading, 2–4 cm wide (excluding awns); axis terete, scaberulous to scabrous upwards; branches to 6 cm long, angled to flattened upwards, scabrous on the edges; pedicels 3–12 mm long, angled to flattened upwards, scabrous on the edges. Spikelets 11–17 mm long (excluding awn), gaping. Glumes slightly unequal, broad and slightly inflated at the middle (at least the lower), acuminate or acute, firm and purple-tinged at the base, hyaline at the tip, glabrous, or scaberulous towards the margins; lower glume 11–17 mm long, lower 50% 3-nerved; upper glume 10–15 mm long, lower 30% 5-nerved, next 20% 3-nerved. Floret 7–9 mm long (including callus), fusiform to cylindrical, with a well-defined neck, deep reddish brown at maturity, the surface glistening with translucent antrorsely hooked tubercles, the midrib thickened, glabrous on the upper half, but with sparse, stiff, spreading yellow hairs over the nerves and on the lower half; coma absent; lobes 1–2, 0.1–0.35 (–0.6) mm long. Callus sturdy, straight, 2–3 mm long, sericeous with hairs darker than the lemma. Awn 55–70 mm long, twice bent, 0.3–0.5 mm wide near the base; column 18–25 mm

long, 9–12 mm to the first and stronger bend, pubescent with hairs 0.25–0.4 (–0.8) mm long; bristle scabrous, very slightly curved. Palea  $\pm$  equal to the lemma, acute, coriaceous, hyaline on the edges, granular down the centre, glabrous or with sparse hairs down the centre and at the tip. Lodicules 3, membranous; 2 abaxial oblong to narrow-cuneate, 1.5–1.8 mm long; paleal oblong to triangular, 0.8–1.0 mm long. Anthers 2.5 mm long, penicillate. Mature caryopsis not observed, apparently 3–4 mm long.

DISTRIBUTION: South-western Victoria and the Southern Lofty Region of South Australia.

SPECIMENS EXAMINED: VICTORIA: **Region C:** Mt Arapiles, *Corrick 1407*, 24.11.1968 (NSW), *Beaglehole 7448*, 23.11.1964 (NSW). **Region D:** Northern end, E. of Dundas Range, *Beaglehole 29934*, 5.12.1968 (NSW, MEL); nr. Hamilton, *Corrick 1552*, 8.12.1968 (Corrick herb.). **Region J:** Creswick, c. 4 miles [6 km] NW. of township, *Willis*, late Nov. 1930 (MEL 59926); Cockajemmy Lakes, *Beaglehole 61605*, 17.11.1978 (NSW); Narrapumelap, *Beaglehole 61632* (NSW).

SOUTH AUSTRALIA: **Southern Lofty:** Belair, *Cleland*, 26.11.1932 (AD 97421208); Mt Barker, *Liebelt*, 1936 (AD 97420218); Myponga, *Hilton*, 10.10.1946 (ADW 44013); Callawonga Creek, *Hilton*, 25.11.1953 (ADW 44121, 44125, 44128).

### *Stipa petraea* J. Vickery, *Telopea* 2: 15 (1980).

HOLOTYPE: SOUTH AUSTRALIA: **Flinders Ranges:** Brachina Gorge, Oraparinna National Park, western portion, *J.Z. Weber 2577*, 18.9.1971 (AD).

Caespitose perennial 0.5–1 metre high, shortly rhizomatous with a basal tuft to c. 60% the height. Culms erect, terete, 1.5–2 mm wide near the base,  $\pm$  compressible, slightly ribbed, blabrous; nodes 3–5, exserted with age, sericeous with hairs 0.2–0.5 mm long, 25–75% wider than the adjacent internodes. Leaf sheaths not inflated, slightly ribbed, glabrous; basal sheath c. 10 mm wide; upper sheath c. 5 mm wide; margins glabrous; collar glabrous. Ligule truncate, 0.1–1 mm long, membranous, densely ciliate with hairs 0.5–2 mm long; auricle absent. Leaf blade weakly rolled to folded, c. 1.5 mm wide, to 50 cm long; abaxial surface moderately ribbed, glabrous but strongly ribbed on the innovations with minute tubercles in the grooves; adaxial surface strongly ribbed, pubescent at the base with hairs 0.1–0.5 mm long, minutely scaberulous upwards. Panicle c. 25 cm long with distant fascicles of few-flowered branches (only immature specimens seen); axis slightly flattened with sparse hairs 0.05–0.1 mm long along the edges; branches 3–7 cm long, angled, scabrous along the edges with hairs 0.1–0.2 mm long; pedicels 1–2.5 cm long, angled, scabrous with hairs 0.1–0.3 mm long. Spikelets 11–15 mm long (excluding awn), gaping at maturity. Glumes equal to unequal, acute to acuminate, minutely scabrous; lower glume 11–15 mm long, lower 20–40% (4–) 6-nerved, upper 60–80% 5–1-nerved; upper glume 11–13 mm long, lower (25–) 35–50% 5 (–6)-nerved, upper 50–65 (–75)% (5–) 3–1-nerved. Floret fusiform, 7–9.5 mm long (including callus), without a neck. Lemma surface smooth to granular, densely sericeous with orange hairs 0.5–1.5 mm long; lobes 2, 1.5–2.5 mm long, acute, sericeous; coma to 2.5 mm long. Callus 1–1.5 mm long, weakly bent at the tip, densely sericeous with orange hairs 0.3–0.8 mm long. Awn 40–55 mm long, twice bent, 0.3 mm wide near the base; column 20–25 mm long, 10–15 mm to the first bend, straw-coloured, scabrous with hairs to 0.3 mm long; bristle straw-coloured, scabrous with hairs to 0.1 mm long. Palea equal to the lemma, bilobed, slightly depressed between the nerves, granular to smooth, densely sericeous with orange hairs 1–1.5 mm long, margins glabrous. Lodicules 3; 2 abaxial membranous, 1–1.3 mm long, obtuse; paleal membranous, 1–1.2 mm long, acute. Anthers 4.5–5 mm long, penicillate. Caryopsis not seen.

DISTRIBUTION: Apparently endemic to the Flinders Ranges and the Eastern Region close to the Ranges in South Australia.

SPECIMENS EXAMINED: SOUTH AUSTRALIA: **Eastern:** Mt Chambers Gorge, *Filson* 3476, 7.10.1960 (MEL). **Flinders Ranges:** Oratunga Ck., NNW. of Blinman, *Ising*, 1.10.1918 (AD); Oraparinna National Park, Brachina Gorge, *Symon* 2558, 8.10.1971 (ADW, CANB); Bunyerroo Gorge, *Everett* 262, 263, 16.9.1981 (NSW); Horrocks Pass, *Hilton*, 12.9.1951 (ADW 44045, 44044).

Very similar to *S. juncifolia* but differs in the slightly less rigid leaves; the shorter plants; the shorter, obtuse, densely ciliate ligule; the axis, branches and pedicels scabrous, the glumes lightly scabrous on the nerves; the rather longer and rather more broadly fusiform lemma covered with hairs that become distinctly orange.

***Stipa pilata* S.W.L. Jacobs & J. Everett, sp. nov.**

Differt a *S. trichophylla* foliis latoribus pungentibusque, arista et gluma inferiore brevior.

HOLOTYPE: SOUTH AUSTRALIA: **Murray:** Monarto City Centre site, Lake site area, growing under mallee, *D.E. Symon* 9072, 26.11.1974 (NSW; isotype ADW).

Caespitose perennial to 0.85 metres high with a sparse basal tuft of extravaginal shoots. Culms erect, scarcely compressible, terete, 0.8–1 mm wide near the base, smooth to slightly ribbed, densely pubescent to pilose just below the nodes; nodes 2–3, exserted, to 30% broader than adjacent internodes, pubescent to almost glabrous. Leaf sheaths tightly enveloping the culms, 2–4 mm wide; lowermost sheaths densely pubescent with long and short hairs with upper sheaths pubescent, finely scabrous or glabrous; inner margin glabrous; outer margin long-ciliate. Ligule 1–2 mm long, truncate or shortly laciniate, membranous, ciliate, densely pubescent on the back, auricles thickened and pilose with a tuft of long straight hairs 1–2 mm long. Leaf blades to 12 cm long, erect, pungent or almost so, tightly inrolled, coarse, 0.8–2 mm diameter; abaxial surface scarcely ribbed, densely scabrous with short stiff hairs and occasionally with longer stiff hairs; adaxial surface ribbed, densely pubescent with short hairs. Panicle to 20 cm long, exserted, contracted, 2–3 cm wide (excluding awns), moderately dense with close fascicles of few, many-flowered branches; axis terete, minutely scabrous to almost glabrous; pedicels to 8 mm long, very slender, flattened, scabrous to almost glabrous. Spikelets 8–10 mm long (excluding awn), slightly gaping after floret disarticulation. Glumes subequal, acuminate, yellow-cream, transparent and membranous; lower glume 8–10 mm long, the lower 30% 3-nerved; upper glume 7–9 mm long, the lower 30% 5-nerved, the next 20% 3-nerved. Floret linear to fusiform, 4–5 mm long (including callus). Lemma finely tuberculate, gold-brown at maturity, the nerves slightly paler, with white, erect hairs, sparse especially at the apex; coma in 2 tufts c. 1 mm long, although obscured by hairs on the awn; lobes absent. Callus 1–1.5 mm long, straight and fine, with dense white hairs. Awn 40–50 mm long, 0.2–0.25 mm wide near the base, falcate; column 7–11 mm long, densely pubescent with spreading hairs 0.2–0.5 mm long; bristle scaberulous. Palea c. 0.5 mm shorter than the lemma, obtuse, coriaceous down the centre with a line of white hairs; margins and tip hyaline and glabrous. Lodicules 2, abaxial, membranous, 1–1.5 mm long, slightly spatulate. Anthers not reliably observed. Caryopsis 2.7–3 mm long; embryo c. 30% the length; hilum c. 60% the length.

DISTRIBUTION: Flinders Ranges, Northern Lofty and Murray Regions of South Australia.

SPECIMENS EXAMINED: SOUTH AUSTRALIA: **Flinders Ranges**: 2 miles [3 km] E. of Parachilna, *Beaglehole* 20903 p.p., 18.10.1966 (NSW); Brachina Gorge, *Symon* 7569, 8.10.1971 (NSW, dupl. of ADW 47740). **Northern Lofty**: Bundaleer Hills, *Black*, 3.11.1925 (AD 97422275). **Murray**: Monarto, *Symon* 9077, 26.11.1974 (NSW, ADW).

The specific epithet refers to the long hairs present on the leaves and awns.

Differs from other *Stipa* species with falcate awns in the pungent leaves. Differs from *S. trichophylla* in the broader, pungent leaves and in the shorter awn and lower glume.

***Stipa platychaeta* Hughes**, Kew Bull. 1921: 16 (1921), *ibid.* 1922: 17 (1922); *Black*, Fl. S. Austral. edn 2: 89 (1943); *Gardner*, Fl. W. Austral. 1, Gram.: 177–8 (1952); *Willis*, Handb. Pl. Victoria 1: 183 (1962), edn 2: 183 (1970).

HOLOTYPE: WESTERN AUSTRALIA: Lake Cowcowing, *Koch* 1133 p.p. (K!). The specimen at K is undated. There are two specimens at PERTH dated 9.1904, and two specimens at NSW bearing the same number but dated respectively 9.1904 and 10.1904 (NSW 116298, 116299) both having been separated from collections of *S. elegantissima* bearing the same number. All specimens match the Holotype at K but they cannot all be duplicates of the Type.

[*S. acrociliata* var. *minor* Reader, Victorian Naturalist 23: 25 (1906), *nomen nudum*. A specimen (MEL 60037) is so named in Reader's handwriting from 'mallee, Borung, F. M. Reader, 25.10.1901'.]

Diffuse or caespitose, wiry perennial 0.5–2 metres high, shortly rhizomatous, without a basal tuft of leaves. Culms erect or slightly geniculate at the base, occasionally branched, terete, 1–2.5 mm wide near the base, not compressible, smooth to strongly ribbed, glabrous; nodes 2–10, exserted, if swollen then to 50% larger than the adjacent internodes. Leaf sheaths not inflated, 3–10 mm wide; basal sheath slightly to strongly ribbed, glabrous to scabrous with minute tubercles; upper sheath strongly to moderately ribbed, glabrous to scabrous with minute tubercles or hairs to 0.2 mm long; margins glabrous; collar glabrous. Ligule membranous, obtuse to broadly lacinate, 1–6 mm long, glabrous; abaxial surface glabrous; auricles thickened, 1–1.5 mm long, glabrous. Leaf blade expanded or weakly rolled, 1–8 mm wide, to 25 cm long, linear to narrow-triangular; abaxial surface strongly ribbed, scabrous with minute tubercles to glabrous; adaxial surface strongly to moderately ribbed, glabrous or with sparse hairs 0.1 mm long; margins glabrous to minutely scabrous. Panicle 10–40 cm long, exserted at maturity, spreading, to 20 cm wide (excluding awns) at maturity with distant fascicles of unequal, few-flowered, compound branches, 1–2.5 cm wide (excluding awns); axis terete, strongly ribbed, glabrous; branches 3–10 cm long, angled, with sparse hairs minute–0.2 (–0.6) mm long to glabrous; pedicels 2–10 mm long, angled, with sparse hairs minute–0.2 mm long. Spikelets 7.5–15 mm long, gaping at maturity. Glumes unequal, acuminate, glabrous to minutely scabrous, straw-coloured; lower glume 7.5–15 mm long, lower 5–30% 3-nerved; upper glume 6–10 (–12) mm long, lower 45–60% 3-nerved. Floret cylindrical, 4.5–6 mm long (including callus), without a neck. Lemma granular, sericeous with hairs 0.05–0.3 mm long; lobes 2, 0.1–0.2 mm long or absent; coma absent. Callus 0.5–1 mm long, almost straight, densely sericeous with hairs (0.1–) 0.3–0.5 (–0.7) mm long. Awn 60–80 (–90) mm long, falcate, 0.1–0.2 mm wide near the base; column 10–15 mm long, brown, scabrous along the edges with hairs to 0.1 mm long; bristle delicate, strongly flattened, scabrous along the edges with hairs minute–0.2 mm long. Palea 60–80% the length of the lemma, acute, granular with hairs 0.2–0.4 mm long down the centre, margins glabrous.

Lodicules 3; 2 abaxial membranous, 0.5–2.5 mm long, acute; paleal membranous, 1–2 mm long, acute. Anthers 1.5–2 mm long, not penicillate. Caryopsis 3–3.5 mm long; embryo 20–25% the length; hilum 50–70% the length.

**DISTRIBUTION:** Plains of New South Wales and north-western Victoria, across all but the far north of South Australia to just into Western Australia. Usually on sandy soils in woodland or mallee.

**SELECTED SPECIMENS:** NEW SOUTH WALES: **Central Western Slopes:** 19 km from Bogan Gate towards Forbes, *Dunlop 1590*, 2.9.1969 (CBG). **North Western Plains:** Nyngan, *Blakely NSW 116239*, 10.1912 (NSW). **South Western Plains:** Mount Hope, *Holland*, 10.1964 (CANB 176853); 1 mile [1.6 km] W. of Condobolin on North Euabalong road, *Cunningham NSW 116233*, 12.12.1971 (NSW); 30 km N. of Garoolgan, *Mulham 1246*, 10.11.1977 (NSW); c. 17 km E. of Griffith, Binya State Forest, *Crisp 1637*, 20.11.1975 (CBG). **South Far Western Plains:** 56 km N. of Wentworth on road to Broken Hill, *Rodd NSW 116232*, 29.8.1969 (NSW); 8 km NW. of Bidura Homestead, *Crisp 1788*, 26.11.1975 (CBG, NSW); 'Nulla Nulla', *Stanley 1795*, 3.12.1975 (NSW).

**VICTORIA:** **Region A:** Mildura, *Williamson*, 10.1928 (MEL); Parish of Japaroo, c. 5 miles [8 km] S. of the 65-mile post on Sturt Highway, W. of Mildura, *Willis*, 3.9.1948 (MEL). **Region B:** Wyperfeld National Park, *Beaughteole 29446 & Finck*, 11.11.1968 (NSW). **Region C:** Little Desert, *Reader*, 27.10.1891 (MEL 60766, p.p.); Wimmera, N. of Mt Arapiles, *Dallachy*, (MEL). **Region F:** c. 25 km SSW. of Robinvale, *Beaughteole 56056*, 2.5.1977 (MEL); 9 km SSE. of Robinvale, *Beaughteole 56195*, 5.5.1977 (MEL). **Region G:** c. 12 km N. of Manangatang, *Beaughteole 55986*, 30.4.1977 (MEL); Leaghur Forest, 15 miles [24 km] SSW. of Kerang, *Beaughteole 40670*, 1.10.1972 (NSW, MEL).

**SOUTH AUSTRALIA:** **Lake Eyre Basin:** Upper Arkaringa Valley, *Helms NSW 116238*, 6.1891 (NSW). **Nullarbor:** Maralinga, *Hill 598*, 13.8.1956 (NSW); Knowles Cave, *Symon 4658*, 19.2.1967 (ADW, NSW). **Gairdner-Torrens Basin:** Bon Bon – Mount Eba netting on Stuart Highway, c. 80 km N. of Kingoonya, *Lay 466*, 21.9.1971 (AD). **Eastern:** Koonamore, *Osborn NSW 116314*, 19.5.1923 (NSW). **Eyre Peninsula:** Reserve near Ceduna, *Cleland*, 7.9.1968 (AD); S. side of Salt Lake on Chaunceys Line, *Cleland*, 9.1962 (AD). **Northern Lofty:** Kulpara, *Blaylock 779*, 1.10.1967 (AD). **Murray:** Morgan to Burra Road, nr. Morgan, *Cleland*, 12.11.1964 (AD); c. 3.5 km S. of Monash, *Eichler 13729*, 19.4.1957 (AD); Swan Reach, Murray River, *Cleland NSW 116310*, 28.11.1913 (NSW); c. 8 km W. of Mannum, *Spooner 2721*, 24.2.1973 (AD). **Yorke Peninsula:** c. 6 km from Bute on Alford Road, *Copley 774*, 15.10.1966 (AD). **Southern Lofty:** 1 mile [1.6 km] from Kangaroo Flat on Kangaroo Flat-Mallala Road, *Harris 42*, 1.10.1959 (AD); c. 2.5 miles [4 km] WNW. of Gawler, *Smith 957*, 23.10.1967 (AD); Dry Creek, E. of Yatala Prison Farm, *Kraehenbuehl 469*, 13.9.1961 (AD); Northfield, *Smith 1057*, 3.12.1967 (AD).

**WESTERN AUSTRALIA:** **Austin:** Menzies, *Andrews*, 9.1902 (PERTH). **Coolgardie:** c. 80 km N. of Kalgoorlie, *Cleland*, 30.8.1948 (AD 97219052); Broad Arrow, *Fitzgerald*, 9.1898 (NSW 116312); near Paddington, *Gardner & Blackall*, 9.1927 (PERTH); Kalgoorlie, *Maiden*, 1909 (NSW 116313); 6 miles [10 km] W. of Southern Cross, *Aplin 1975*, 12.9.1962 (PERTH, K); 4 miles [6 km] W. of Eyre Hwy, on Hyden to Norseman Road, *George 4349*, 6.2.1968 (PERTH); 14 miles [24 km] N. of Norseman on Coolgardie Road, *Beaughteole 13519*, 21.9.1965 (PERTH). **Roe:** c. 23 miles [38 km] E. of Fraser Range, *Willis*, 6.9.1963 (PERTH, duplicate of MEL 515037). **Avon:** Cowcowing, *Koch 1133 p.p.*, 9.1904 (NSW 116299), 10.1904 (NSW 116298).

***Stipa plumigera* Hughes**, Kew Bull. 1921: 20 (1921); Black, Fl. S. Austral. edn 2: 89 (1943).

**HOLOTYPE:** SOUTH AUSTRALIA: Elder Exploring Expedition, Camp 10 (c. 130°4'E, 27°16'S), R. *Helms*, 29.6.1891 (K!); probable isotypes NSW 151321, 16019, 16020, 16021, MEL 59969, AD 97434003, 97424088 in packet).

**SYNONYM:** *S. eremophila* var. *dodrantaria* J. Black, Trans. & Proc. Roy. Soc. S. Austral. 46: 565 (1922); Fl. S. Austral. 1: 66 (1922). **HOLOTYPE:** SOUTH AUSTRALIA: Camp 10, Birksgate Range, R. *Helms*, 29.6.1891 (AD 97424088 in part).

Caespitose perennial 0.4–0.6 metres high, with conspicuously extravaginal shoots and a short rhizome. Culms erect, terete, 1–1.5 mm wide near the base, scarcely compressible, unribbed, smooth, glabrous or puberulous; nodes 2–3, seldom exserted, sparsely pubescent, to 30% broader than adjacent internodes.

Leaf sheaths tightly enveloping culms. Ligule coriaceous, 0.5–2.5 mm long, broad-acute to truncate, densely ciliate; abaxial surface sericeous; auricles densely ciliate with 1 mm long straight hairs. Leaf blades to 35 cm long, usually expanded, 2–3 mm wide; abaxial surface slightly ribbed, glabrous to shortly pubescent with hairs to 0.5 mm long; adaxial surface deeply ribbed, pubescent with hairs 0.5–1 mm long; margin strongly antrorsely scabrous. Panicle sparse with close fascicles of uneven, few-flowered, compound branches, contracted to spreading, 15–20 cm long, 1.5–4 cm wide (excluding awns), exerted late; axis slender, terete, scabrous-pubescent; branches 3.5–7 cm long, angled, scaberulous; pedicels 4–18 mm long, angled to flattened, scaberulous. Spikelets 18–23 mm long (excluding awn), slightly gaping. Glumes pale yellow to purple, unequal, acuminate, membranous; lower glume 18–23 mm long, the lower 50% 3-nerved; upper glume 12–15 mm long, lower 30–50% 5-nerved, the next 10–30% 3-nerved. Floret narrow-cylindrical with a slightly narrowed neck, 7.5–8.5 mm long (including callus). Lemma granular to almost smooth, with golden hairs to within 1–0.5 mm of the apex, the upper 1–0.5 mm scabrous; coma 0.5–0.8 mm long; lobes 2, less than 0.1 mm long. Callus 2–3 mm long, with hairs similar to those of the lemma. Awn 70–110 mm long, 0.3–0.35 mm wide near the base, weakly twice bent, pale yellow; column 20–26 mm long, 15–20 mm to the first bend, densely pubescent with hairs 0.5–1 mm long; bristle often gently curved, villous for most of its length with hairs c. 1 mm long. Palea acute, 90% the length of the lemma, granular, ciliate, the very outer margin hyaline and glabrous. Lodicules 2, abaxial, membranous, narrow-oblong, 1 mm long. Anthers unequal, one 1.1 mm, and the other two 0.5 mm long; florets cleistogamous. Caryopsis 3.5–4 mm long; embryo 30% the length; hilum 60–75% the length.

DISTRIBUTION: North-western South Australia and the Nullarbor Plain, extending into Western Australia.

SPECIMENS EXAMINED: SOUTH AUSTRALIA: **North-western:** Elder Exploring Expedition, Camp 10, Helms, 29.6.1891 (K, NSW 151321, 16019, 16020, 16021; MEL 59969; AD 97434003, 97424088 in part); 10 miles [16 km] N. of Maralinga, *Forde* 592, 9.10.1956 (CANB); 69 miles [110 km] S. of Emu, *Forde* 528, 11.9.1956 (MEL, CANB, AD). **Nullarbor:** Maralinga, *Forde* 641, 12.10.1956 (CANB); within a mile [1 km] of Ooldea, *Caulfield* 130, 25.9.1955 (AD); limestone ridge behind Ooldea, *Hilton*, 24.8.1955 (ADW 19783); Ceduna, *Canning* 2339, 1.9.1968 (AD, CBG); Laura Bay, *Rogers* NSW 9323, 9.1907 (NSW).

WESTERN AUSTRALIA: **Eucla:** between Eucla & Fowlers Bay, *Richards* (MEL 60925).

***Stipa puberula* Steudel**, Syn. Pl. Glum. 1: 128 (1854); Gardner, Fl. W. Austral. 1, Gram.: 183 (1952), excl. synonym.

HOLOTYPE: 'Hrb. Drummond coll. IV nr. 379, N. Holl.' in Steudel's herbarium (P!); duplicates of the Type Number at K and MEL (MEL 59971, 59972 and 59973). The Holotype sheet at P also bears a packet containing loose florets of an entirely different, large-fruited species of *Stipa*, possibly *S. pubescens* R. Br. The foliage of the Type specimen is minutely puberulous in a manner more or less matched by only two or three of the specimens cited below, but we are convinced that this difference must be accepted as within the variability of indumentum of the species. The inflorescence of the Type is rather immature, and the hairs on the lemma are all white, whereas in the material here accepted as being conspecific the hairs on the lemma soon change to a characteristic tawny to dark brown. The size and shape of the lemma, however, with its characteristic scabrous neck, the delicate, rather short, twice bent awn, and the relatively short glumes, scarcely leave any doubt that these specimens must bear the name *S. puberula* however unsuitable the epithet may appear.

SYNONYM: *S. arachnopus* Pilger in Diels & Pritzel, Bot. Jahrb. Syst. 35: 70 (1904); Hughes, Kew Bull. 1921: 15 (1921); Gardner, Fl. W. Austral. 1, Gram.: 179 (1952) excluding synonymy.

**LECTOTYPE:** WESTERN AUSTRALIA: Cited in the protologue as 'Hab. in distr. Coolgardie pr. Bullabulling in silvis apertis lapidoso-lutosis fl. m. Oct. (D [Diels] 5954)'. Prof. H. Scholz of the Botanischer Garten und Botanisches Museum, Berlin-Dahlem, has advised us that the Holotype is no longer in existence at B. There is a duplicate specimen labelled 'W. Australia: Dist. Coolgardie, Bullabulling, Diels n. 5954' in Diels' handwriting in MEL (MEL 59877) and we here designate this specimen as the **Lectotype** of *S. arachnopus* Pilger.

Caespitose perennial to c. 0.8 metres high with a sparse basal tuft of leaves to half the total height. Culms erect, c. 2 mm wide near the base, simple or occasionally branching, terete, compressible, ribbed, glabrous and smooth to puberulous, especially on the upper internodes and just below the nodes; nodes c. 3, densely to sparsely pubescent, exserted, to 50% wider than adjacent internodes. Leaf sheaths tight around the culms, c. 5 mm wide (although the uppermost a little broader), densely hirsute or puberulous to glabrous upwards; inner margin glabrous; outer margin densely woolly. Ligule firm, 0.2–0.5 mm long, truncate, ciliate; abaxial surface pubescent; auricles thickened, densely woolly. Leaf blades mostly rolled, flexuose, 1–2 mm wide, to 25 cm long; abaxial surface not ribbed, scaberulous, densely pubescent and sparsely to densely hirsute; adaxial surface strongly ribbed, sparsely hirsute to glabrous. Panicle spreading, exserted with distant fascicles of uneven branches bearing spikelets mainly at the ends, 15–30 cm long, 1.5–3 cm wide (excluding awns); axis terete, scaberulous; branches angular, to 8 cm long, scaberulous; pedicels 1.5–8 mm long, flattened, scaberulous. Spikelets 8–14 mm long (excluding awn), gaping. Glumes subequal, broad and inflated in the middle, firm and green to purple at the base, membranous and hyaline at the tip, glabrous or scaberulous on the nerves; lower glume 8–14 mm long, acuminate, lower 50% 3-nerved; upper glume 6–12 mm long, acute, lower 30% 5-nerved, the next 10–30% 3-nerved. Floret turbinate to oblong-cylindrical, 4–6 (–6.5) mm long (including callus), usually with a neck. Lemma deep brown at maturity, the surface smooth, sericeous with dense fulvous hairs, the upper 0.5 mm glabrous to scabrous, hairy on the margins; coma of sparse stiff hairs 0.4–0.7 mm long; lobes less than 0.1 mm long. Callus 0.7–1.5 (–1.8) mm long, curved. Awn 0.2–0.25 mm wide near the base, 25–65 mm long, twice bent, pale throughout its length; column 15–20 mm long, 8–10 mm to the first bend, scabrous with hairs 0.05–0.10 mm long; bristle scabrous. Palea acute, subequal to the lemma (to 0.05 mm shorter), granular, sericeous with fulvous hairs down the centre. Lodicules 2, abaxial, membranous, oblong, 0.6 mm long. Anthers 0.6–2.0 mm long, penicillate. Caryopsis 2–5 mm long; embryo 30% the length; hilum 90% the length.

**DISTRIBUTION:** South-western New South Wales and north-western Victoria, the Eyre Peninsula and Nullarbor Plain in South Australia, extending into Western Australia.

**SELECTED SPECIMENS:** NEW SOUTH WALES: **South Far Western Plains:** E. of Balranald, Moulamein road, *Henderson* 422, 5.10.1947 (NSW); NE. of Lake Tooim, *Henderson*, 5.11.1947 (NSW 116973); Merran Ck., between Swan Hill & Moulamein, *Henderson* 434, 16.11.1947 (NSW); Mellool, *Henderson* 433, 28.10.1947 (NSW).

**VICTORIA:** **Region A:** 5 miles [8 km] S. of 65-mile post on Sturt Hwy, *Willis*, 3.9.1948 (MEL 60693). **Region H:** County of Borung, *Reader*, 30.10.1904 (MEL 60712).

**SOUTH AUSTRALIA:** **Nullarbor:** Hughes National Park, *Ising* 1636, 9.1920 (MEL, NSW, ADW, AD, BRI); nr. Koonalda Cave, *Symon* 4490, 16.2.1967 (K, CANB); 15 miles [24 km] from 'Nullarbor', Nundroo road, *Phillips* CBG 039487, 31.8.1968 (CBG). **Eyre Peninsula:** c. 20 km WNW. of 'Nonning', *Carrick* 2310, 26.9.1969 (AD); 1 mile [1.5 km] N. of 'Nonning', *Specht & Carrodus* 18, 20, 14.11.1958 (AD). **Murray:** Mt Mary, 22 miles [35 km] E. of Eudunda, *Ising*, 4.10.1922 (ADW 43881).



WESTERN AUSTRALIA: **Eucla**: c. 115 miles [185 km] NW. of Reid, *George* 8478, 13.10.1966 (PERTH); 60 miles [96 km] N. of Loongana, *Mitchell* 86, 5.10.1974 (PERTH); 7 miles [11 km] W. of Deakin, *Calaby*, 24.10.1947 (CANB 15001); Reid, *McCrumm*, 7.1959 (PERTH); 8 km SW. of Loongana, *Mitchell* 68, 11.9.1974 (PERTH); 19 km W. of Eucla, *Beaublehole* 49420, 30.8.1974 (CANB); Eucla, *Batt*, 1899 (MEL 60713). **Coolgardie**: c. 81 km W. of Cocklebidly, Eyre Hwy., *Willis*, 6.9.1963 (PERTH). **Roe**: SE. of Lake King (33°13'S, 119°50'E), *George* 10494, 12.11.1970 (PERTH, NSW).

*S. puberula* is closely related to *S. eremophila* but can generally be readily distinguished by its shorter floret, shorter and finer awn and shorter glumes.

***Stipa pubescens* R. Br.**, Prodr.: 174 (1810); Bentham, Fl. Austral. 7: 569 (1878); Moore & Betche, Handb. Fl. N.S.W.: 484 (1893); Hughes, Kew Bull. 1921: 21 (1921), at least in part; *ibid.* 1922: 18 (1922); Willis, Handb. Pl. Victoria 1: 187 (1962), edn 2: 187 (1970); Beadle, Evans & Carolin, Fl. Sydney Region: 657 (1972).

LECTOTYPE, **here designated**: NEW SOUTH WALES: Port Jackson, *R. Brown*, 1802–5 (BM!, sheet II). The Type collection consists of three sheets. Sheets I and III contain mixtures of *S. rudis* and *S. pubescens*. Sheet II bears a good unmixed specimen that matches the description of *S. pubescens*; isolecotype (Iter Australiense 1802–5, *R. Brown*, no. 6203) at K.

SYNONYM: *S. commutata* Trin. & Ruprecht, Mém. Acad. Imp. Sci. Saint-Pétersbourg, ser. 6, Sci., Math., Seconde Pt. Sci. Nat. 5: 49 (1842). HOLOTYPE: 'Nova Hollandia ad Portum Jackson, Sieber Agrostoth. n. 59' (LE, not seen). There is a duplicate of *Sieber* no. 59 in MEL (MEL 59974); it lacks fertile florets, but the long glumes, together with the stated locality, leave no doubt that it is a specimen of *S. pubescens* R. Br. Another duplicate of *Sieber* no. 59 is at K: it agrees completely with *S. pubescens* in glume length and foliage characteristics but lacks lemmas except for an imperfect one.

Caespitose perennial to 1.5 metres high with conspicuously extravaginal shoots from a short rhizome forming a loose tuft to half the height. Culms erect or occasionally geniculate near the base, not compressible, terete, 1–4 mm wide near the base, scarcely ribbed, finely pubescent for varying lengths below the nodes or the upper internodes glabrous to just below the nodes; nodes 2–3, exserted, to 60% broader than adjacent internodes, densely sericeous. Leaf sheaths often purple-tinged, tight around the culms, c. 4 mm wide (occasionally the uppermost slightly inflated and to 8 mm wide), slightly ribbed, densely and finely pubescent or upper sheaths almost glabrous, the collar often hirsute; inner margin glabrous; outer margin densely ciliate with long hairs to sparsely ciliate especially on upper sheaths. Ligule coriaceous, 0.4–1 (–1.5) mm long, truncate or occasionally slightly obtuse, glabrous or ciliolate; auricles scarcely thickened, similar in pubescence to the sheath. Leaf blades tightly rolled or expanded, to 4 mm wide, to 50 cm long; abaxial surface scarcely ribbed, pubescent with minute hairs, or glabrous; adaxial surface ribbed, scarcely to densely pubescent with minute hairs; margins similar to adjacent surfaces. Panicle to 30 cm long, to 4 cm wide (excluding awns), exserted, loosely contracted to spreading, sparse with distant fascicles of few-flowered branches; axis slightly angular, densely and shortly scabrous; branches to 7 cm long, angular, scabrous to pubescent, especially on the angles, pedicels to 30 mm long, angular, scabrous to pubescent, especially on the angles. Spikelets (15–) 17–24 mm long (excluding awn), gaping widely. Glumes unequal, linear, often inrolled, firm, with nerves heavily overlaid with sclerenchyma, usually purple-tinged, occasionally pale green, pubescent overall or glabrous between the nerves and scabrous on the nerves, the margins ciliate; lower glume 17–24 mm long, the lower 95% 3-nerved, the tip narrowly truncate and firm or occasionally slightly acute and

chartaceous; upper glume 15–20 mm long, the lower 30–60% 5-nerved, the next 65–35% 3-nerved, the tip narrowly truncate and firm, rarely slightly acute and chartaceous. Floret cylindrical with a slight neck, (9.5–) 11–15 mm long (including callus). Lemma reddish brown at maturity, finely tuberculate, especially upwards, with sparse slightly fulvous hairs on the lower 50–60%, glabrous upwards; coma absent; lobes absent. Callus (2.5–) 3–4.5 mm long, straight, the tip weakly bent with slightly fulvous hairs. Awn (60–) 70–100 mm long, 0.5–0.6 mm wide near the base, twice bent; column 45–70 mm long, 30–55 mm to the first bend, scaberulous to softly pubescent with dense hairs 0.05–0.15 mm long; bristle scabrous. Palea 50–70% the length of the lemma, obtuse or rarely acute, glabrous, granular down the centre, margins and apex hyaline to pale and chartaceous. Lodicules 2–3, membranous; 2 abaxial 1.5–2 mm long, oblong; paleal acute, c. 1 mm long, or absent. Anthers 2–6 mm long, not penicillate. Caryopsis 5–8 mm long; embryo 15–20% the length; hilum c. 90% the length.

DISTRIBUTION: Sandstone areas of south-eastern Queensland and eastern New South Wales.

SELECTED SPECIMENS: QUEENSLAND: **Moreton:** Mt Gravatt, *Henderson* 147, 20.11.1966 (BRI, CANB), *Smith* 316, 15.2.1938 (BRI); nr. Moggill, *Hubbard* 8596, 3.4.1931 (K, NSW); 4 km SW. of Victoria Point, *Stanton*, 10.11.1971 (BRI); 3 km E. of Plunkett, *Simon & Sharpe* NSW 117038, 18.11.1974 (NSW, BRI); Sunnybank, *Blake* 5108, 20.1.1934 (BRI, K); *Bailey & White*, 12.1916 (BRI). **Darling Downs:** Wyberba, *Blake* 4638, 23.1.1933 (BRI).

NEW SOUTH WALES: **North Coast:** Clarence River, *Wilcox*, s.d. (MEL); Woolgoolga, *Vickery* NSW 8552, 1.1.1935 (NSW); c. 5 miles [8 km] N. of Wingham, *Salasoo* 2744, 31.12.1963 (NSW). **Central Coast:** Morisset, *Boorman* NSW 8544, 11.1914 (NSW, BRI, MEL, CANB); Silverwater, Lake Macquarie, *Jacobs* 637, 10.11.1973 (NSW); Awaba, *Boorman* NSW 8554, 11.1914 (NSW, BRI, AD, CANB); Putty Road, between Colo River & Howes Valley, *Phillips & Vickery* CBG 001266, 20.2.1961 (CBG); Kulnurra, *White* 0241, 5.12.1935 (NSW); Calga & Mooney, *Goode* 261, 27.12.1954 (NSW); Narrabeen, *Mair*, 20.11.1952 (BRI); Hornsby, *Blakely* NSW 8549, 4.1914 (NSW); 1–2 miles [1–3 km] W. of Wahroonga, *Salasoo* 604, 10.12.1950 (NSW); Epping, *Johnson* NSW 116175, 10.11.1946 (NSW); Cheltenham, *Vickery* NSW 8551, 4.6.1929, NSW 4772, 23.12.1949 (NSW); Middle Head, Sydney, *Bryant* 11617, 15.11.1974 (NSW); Lane Cove, *Crisp* 2409, 13.12.1976 (CBG); Gladsville, *Deane* NSW 8564, 7.1884 (NSW); Parramatta, *Woolfs*, s.d. (MEL); Long Bay, *Hilton*, 22.11.1944 (ADW 43952); Rookwood, *Cheal* NSW 8553, 25.12.1900 (NSW); Kogarah, *Camfield* NSW 8534, 12.1896 (NSW), *Cheal* NSW 8555, 28.10.1899 (NSW); Peakhurst, *Cheal* NSW 8546, 1.1900 (NSW); Hurstville to Tom Uglys Point, *Camfield* NSW 8535, 1.1.1903 (NSW); National Park, *Betche* NSW 8542, 11.1889 (NSW), *Hilton*, 11.1944 (ADW 43953); between Stanwell Park & Otford, *Salasoo* 1268, 27.12.1954 (NSW); Casula, *Coveny* 5354, 30.11.1974 (NSW); 3 miles [5 km] NW. of Nowra, *Rodway* NSW 116178, 12.11.1934 (NSW); Nowra North, *Constable* NSW 16577, 8.12.1950 (NSW). **South Coast:** Nowra Hill, *Rodway* NSW 116192, 1.1921 (NSW); 9 miles [14 km] S. of Nowra, *Rodway* NSW 116176, 1.12.1929 (NSW); 10 miles [15 km] SW. of Nowra, *Rodway* NSW 116180, 7.2.1943 (NSW), *Salasoo* 3118, 9.1.1966 (NSW); Jervis Bay, *Rodway* NSW 116177, 12.1919 (NSW); S. of Milton, *Hadley* NSW 116181, 13.11.1937 (NSW); Wadbilliga Fire Trail, 4 km ENE. of Tuross River, *Tindale* 4036, *Pariss & Wimbush*, 18.1.1975 (NSW). **Northern Tablelands:** New England, *Stuart* NSW 8537, s.d. (NSW); Gibraltar Range, *Jessup & Gray*, 4.12.1953 (CANB 97472); Glen Elgin, *Boorman* NSW 8539, 12.1913 (NSW); 4.5 miles [8 km] W. of Tingha, *Jessup & Gray*, 8.12.1953 (CANB 97460). **Central Tablelands:** Blue Mountains, *Betche* NSW 8543, 12.1882 (NSW), *Woolfs*, s.d. (K); Hassans Walls *McKie* NSW 8561, 12.2.1940 (NSW); Mt Victoria, *Cheal* NSW 8548, 12.1900 (NSW); Blackheath, *Constable* NSW 11412, 17.1.1950 (NSW, K); Mt Boyce, *Constable* 4160, 6.2.1963 (NSW, BRI, CANB); Medlow, *Griffith* NSW 8545, 10.12.1914 (NSW); Narrow Neck road, *Crisp* 4002, 12.5.1978 (CBG); Edith Falls, *Coveny* 4072 & *Bisby*, 25.3.1972 (NSW); Woodford, *Henderson* NSW 116195, 3.1945 (NSW); Lawson, *Carne* NSW 8541, 3.1912 (NSW); Wentworth Falls, *Coveny* 40462 & *Bisby*, 24.3.1972 (NSW, CANB); Hill Top, *Cheal* NSW 8594, 6.1.1912 (NSW); Fitzroy Falls, *Gauba* CBG 003943, 7.1.1953 (MEL). **Southern Tablelands:** c. 5 miles [8 km] E. of Nerriga, *Pullen* 2033, 8.12.1959 (CANB).

In the occasional occurrences of slightly obtuse ligules 1–1.5 mm long, and of acute paleas, some specimens of *S. pubescens* approach *S. pubinodis*. However, the distributions are quite disjunct and the palea of *S. pubescens* is always much shorter than the lemma, whereas in *S. pubinodis* it is equal or subequal.

***Stipa pubinodis* Trin. & Rupr.**, Mém. Acad. Imp. Sci. Saint-Petersbourg, ser. 6, Sci., Math., Seconde Pt. Sci. Nat. 5: 50 (1842); Townrow, Pap. & Proc. Roy. Soc. Tasmania 107: 26 (1974).

HOLOTYPE: 'Tasmania: Hooker' (LE!; isotype K [negative no. Kew 11758]). In K(!) there is a specimen 'Van diemens Land, *Gunn* no. 588' (also CANB photo 237005) derived from the herbarium of General W.M. Munro. The sheet was annotated by C.E. Hubbard in July 1939, 'Represents the same species as the type of *Stipa pubinodis* Trin. et Rupr. (V.D.L. 11) in the Leningrad Herbarium'. The specimen accords well with the description provided by Trinius and Ruprecht. Hughes, Kew Bull. 1921: 21 (1921), refers to this specimen under *S. pubescens* R. Br. but notes the more acuminate, hyaline tips of the glumes, and again, on p. 28, under *S. pubinodis* Trin. et Rupr., which she places amongst 'Species Dubiae vel Excludendae'. There is a further sheet at K — Tasmania, Mt Direction, *Gunn*, 6.12.1841 — that has been similarly annotated by Hubbard.

SYNONYM: *S. pubescens* var. *semiglabra* Reader, Victorian Naturalist 17: 155 (1901). HOLOTYPE: VICTORIA: 'Dec. 1899. Billabong of Wimmera [River], Lowan, F.M. Reader'. There are two sheets in MEL, 'Banks of 'Billabong', Antwerp, 10.12.1899, F.M. Reader' (MEL 59981) and 'Billabong, Lowan, F.M. Reader 10.12.1899' (MEL 60788); the latter is presumably the Holotype.

Caespitose perennial c. 0.5–1 metre high, with conspicuously extravaginal shoots from a short rhizome forming a loose tuft of leaves quarter to half the height. Culms erect, slightly compressible, 1–2 mm wide near the base, scarcely ribbed, sparsely pubescent just below the upper nodes with hairs 0.1–0.3 mm long, glabrous elsewhere; nodes 2–3, exserted, to 50% wider than adjacent internodes, densely sericeous with hairs 0.1–0.4 mm long. Leaf sheaths at first tightly enveloping the culm, later slightly loose, glabrous to scaberulous, 5–10 mm wide, smooth to strongly ribbed on upper sheaths; inner margin glabrous; outer margin ciliate with hairs 0.1–0.4 mm long to glabrous, especially on the lower sheaths. Ligule coriaceous, 0.6–2 mm long, obtuse, ciliate; auricles absent. Leaf blade tightly rolled, 1–2 mm wide, to 35 cm long; abaxial surface smooth to slightly ribbed, glabrous or on the innovations sparsely scabrous; adaxial surface strongly ribbed, densely pubescent with hairs minute–0.3 mm long; margins minutely scabrous. Panicle (11–) 15–25 cm long, contracted, 1.5–2 cm wide (excluding awns), exserted, with distant fascicles of unequal, few-flowered, compound branches; axis terete to slightly angular, scabrous with hairs minute–0.4 mm long; branches 2.5–4 cm long, slightly flattened, scabrous with hairs 0.1–0.3 mm long; pedicels 7–20 mm long, slightly flattened, scabrous with hairs 0.15–0.3 mm long. Spikelets 18–26 (–29) mm long (excluding awn), gaping widely. Glumes unequal, acute, tip hyaline, nerves heavily overlaid with sclerenchyma, margins ciliate; lower glume 18–26 (–29) mm long, lower 70–80% 3-nerved, scabrous on the nerves with hairs minute–0.1 mm long; upper glume 15–20 mm long, lower 30–50% 5-nerved, the next 50–70% 4–1-nerved, scabrous with hairs minute–0.2 mm long. Floret cylindrical with a slight neck, 10–13 mm long (including callus). Lemma pale reddish brown at maturity, smooth to finely tuberculate upwards, with sparse white hairs (0.4–) 0.6–0.9 (–1.3) mm long on the lower 50–60%, glabrous upwards; lobes absent; coma absent. Callus 2.7–3.5 mm long,  $\pm$  straight, the tip weakly bent, with hairs 0.2–1 mm long, white to slightly fulvous at maturity. Awn 55–95 mm long, with 2 (–3) bends, c. 0.5 mm wide near the base; column 30–60 mm long, 25–40 mm to the first bend, scabrous with hairs 0.1–0.2 mm long; bristle scabrous with hairs minute–0.2 mm long. Palea  $\pm$  equal to the lemma, acute, smooth and glabrous, hyaline on the margins. Lodicules 2, abaxial, membranous, oblong, 1.5–2 mm long. Anthers 4.5–6 mm long, not penicillate. Caryopsis 6–7.5 mm long; embryo c. 30% the length; hilum equal to the length.

DISTRIBUTION: Sandstone and sandy areas of Tasmania and southern Victoria, extending into South Australia.

SELECTED SPECIMENS: VICTORIA: **Region C:** Billabong, Antwerp, *Reader*, 10.12.1899 (MEL 59975). **Region D:** Grampians, track from The Sundial to Macheys Peak, *Corrick* 1624, 28.12.1968 (Corrick herb.); Grampians, S. side of Major Mitchell Plateau, *Beaulehole* 16530, 10.12.1967 (NSW); c. 3 km WNW. of Hamilton, *Milne* 331, 13.11.1979 (NSW). **Region E:** Hawkesdale, *Williamson*, 2.5.1899 (MEL 60776). **Region J:** Moyston, *Sullivan*, 12.1880 (MEL 60849); 4 km SSE. of Creswick, *Beaulehole* 61721, 22.11.1979 (NSW). **Region N:** proposed Warrandyte State Park, *Corrick* 3722, 3.12.1973 (Corrick herb.); Ringwood, *Morrison* NSW 150583, 21.10.1891 (NSW); c. 1 mile [1.5 km] SE. of Montrose, *Muir* 308, 28.12.1957 (MEL); Mt Dandenong, *Muir* 283, 8.12.1957 (MEL, CANB). **Region P:** French I., *Ramsay*, 25.11.1904 (MEL); 10 km NNW. of Anglessea, *Beaulehole* 63347, 17.1.1979 (NSW). **Region R:** Mt Buffalo, *Blake* 7369, 25.1.1935 (BRI). **Region S:** c. 6 miles [10 km] ENE. of Mallacoota, *Beaulehole* 31572 & *Willis*, 6.11.1969 (NSW).

TASMANIA: Waterhouse Estate, W. of Tomahawk, *Townrow* 111, 12.1967 (JEST); Devonport, *Curtis*, 20.2.1948 (BRI); 4 miles [6 km] NW. of St Helens, Goshen rd., *Townrow* 193, 1.1968 (NSW); 10 miles [15 km] E. of Launceston, *Burbidge* 2945, 8.1.1949 (CANB); Mathinna, *Phillips* CBG 001268, 29.1.1962 (CBG); 1.5 miles [2 km] SE. of Pouranna, *Townrow* 130, 12.1967 (JEST); Pieman River bridge, *Davis* NSW 116231, 7.1.1937 (NSW); East Coast Highway at Coles Bay turnoff, *Townrow* 178, 1.1968 (JEST); 3 miles [5 km] N. of Triabunna, *Burbidge*, 19.1.1949 (CANB) (JEST); 5 miles [8 km] E. of Buckland, *Townrow* 67, 11.1967 (JEST); 3.5 miles [6 km] W. of Runnymede, *Townrow* 62, 11.1967 (JEST); New Norfolk, *Gunn* 996, 18.11.1840 (K, NSW 116229); Copping, *Blake* 18278, 15.1.1949 (BRI, CANB, NSW); *Vickery* NSW 116226, 15.1.1949 (NSW); W. side of Dunally bridge, *Townrow* 102, 12.1967 (JEST); Mt Wellington, *Burbidge*, 19.1.1949 (CANB 25116); Huon Hwy., c. 10 miles [16 km] S. of Mt Wellington, *Vickery* NSW 116223, 19.1.1962 (NSW); Mt Nelson, *Cleland*, 17.1.1928 (AD 96805112, 96805122); Taroona, *Townrow* 5A, 11.1966 (JEST); nr. Longley, *Phillips & Vickery* CBG 001267, NSW 116228, 19.1.1962 (CBG, NSW); Kingston Beach, *Rodway* NSW 116232, 23.11.1935 (NSW); Eaglehawk Neck, *Vickery* NSW 8565, 15.1.1949 (NSW); Margate to Snug Plains, *Vickery* NSW 116224, 21.1.1962 (NSW); South Arm, *Townrow* 58, 11.1967 (JEST); North Bruny I., *Townrow* 135, 138, 146, 1.1968 (JEST, NSW); nr. Police Point, *Phillips* CBG 032260, 25.11.1965 (CBG); nr. Randalls Bay, *Phillips* CBG 032272, 27.11.1965 (CBG); Channel Hwy. opp. Allonah, *Townrow* 27, 1.1967 (JEST).

SOUTH AUSTRALIA: **Southern Lofty:** Lenswood, *Cleland*, 16.11.1946 (AD 96324026); *Spooner* 4330, 6.11.1975, 4372, 16.11.1975 (AD); Mt Lofty Range, *Ising*, 13.10.1924 (AD 966081490); Swanport, no collector, no. 1555 [?] 12.1855 (MEL 60802). **South-eastern:** Penola, *Tate*, s.d. (AD 97742568); Carpenter Rocks, S. end of Lake Bonney (37°56'S, 140°26'E), *Spooner* 5514, 5.11.1977 (AD).

Hooker, Fl. Tasman. 2: 110 (1856), treated *S. pubinodis* as a synonym of *S. pubescens* R. Br., as noted by Bentham, Fl. Austral. 7: 570 (1878).

Rodway, Tasman. Fl.: 262 (1903), doubtless placed *S. pubinodis* (probably together with other species) under *S. pubescens* R. Br.

Townrow, Pap. & Proc. Roy. Soc. Tasmania 107: 26 (1974), recognized *S. pubinodis* as the species she had previously (*ibid.* 104: 81–96 (1970)) misidentified as *S. pubescens* R. Br.

*Stipa pycnostachya* Benth., Fl. Austral. 7: 568 (1878); Hughes, Kew Bull. 1921: 18 (1921); Gardner, Fl. W. Austral. 1, Gram.: 177 (1952).

HOLOTYPE: WESTERN AUSTRALIA: Int. S.W. Australia, *Drummond* No. 121, 1849 (K!; isotypes MEL 59978, CANB 237004).

Caespitose perennial to c. 0.6 metres high, with a short rhizome and with conspicuously extravaginal shoots from a third to almost the total height. Culms erect, not compressible, terete, 0.7–2 mm wide, unribbed, puberulous to pubescent just below the nodes; nodes 2–3, up to 25% wider than adjacent internodes, exserted, sericeous. Leaf sheaths tightly enveloping culm; basal sheaths and cataphylls very woolly; upper sheaths puberulous to scaberulous; margins glabrous. Ligule firmly membranous, 3–5 (–7) mm long (but much shorter in leaves of the basal tuft), acute or laciniate, continuous with sheath margin, glabrous; auricles glabrous. Leaf blade strongly rolled or folded, c. 1 mm diameter, stiff; abaxial surface unribbed, minutely sparsely scaberulous to

glabrous and smooth; adaxial surface deeply ribbed, densely pubescent and hirsute; margins glabrous or scabrous. Panicle exserted, short, 6–14 cm long, contracted, c. 1 cm wide (excluding awns), very dense and spike-like, with very close fascicles of unequal, compound, densely-flowered branches; axis terete, scabrous; branches to 40 mm long, angular, scaberulous; pedicels 2–7 mm long, angular, scaberulous. Spikelets 11–15 mm long (excluding awn), scarcely gaping. Glumes subequal, acuminate, purple at the base, hyaline at the tip, glabrous, scabrous on the nerves; lower glume 11–15 mm long, the lower 30% 3-nerved; upper glume 10–14 mm long, the lower 25% 5-nerved, the next 25% 3-nerved. Floret turbinate, 4–6 mm long (including callus). Lemma granular, brown, with hairs to the apex, the hairs white and slightly spreading at maturity; coma absent; lobes 2, to 0.2 mm long. Callus straight, 1.3–2 mm long, with white hairs. Awn 35–50 mm long, delicate, 0.1–0.2 mm wide near the base,  $\pm$  falcate; column 8–15 mm long, scaberulous, with hairs to 0.05 mm long; bristle scaberulous, straight or slightly curved. Palea subequal to the lemma (to 0.3 mm shorter), acute, with a band of white hairs down the middle. Lodicules 3, membranous; 2 abaxial 1.0–1.2 mm long, broadly spathulate; paleal 0.25–0.6 mm long, acute. Anthers c. 1.5–1.75 mm long, not penicillate. Caryopsis 2–2.7 mm long; embryo 25–30% the length; hilum 60–80% the length.

**DISTRIBUTION:** Confined to the south-west of Western Australia in the Coolgardie, Roe, Eyre and Darling districts.

**SPECIMENS EXAMINED:** WESTERN AUSTRALIA: **Coolgardie:** Shire of Oldfield, *Orchard 1719*, 21.10.1968 (AD). **Roe:** Lake King (c. 33°05'S, 119°33'E), *George 10467*, p.p. 11.11.1970 (PERTH, NSW). **Eyre:** c. 8 km NNW. of Young River crossing, Ravensthorpe–Esperance road, *Jackson 1463*, 18.10.1968 (PERTH); Desmond nr. Ravensthorpe, *Maiden NSW 116842*, 11.1909 (NSW, K); 10 km N. of Needilup, *Newbey 4890*, 29.10.1975 (PERTH); Fitzgerald River Reserve, *Royce 9190*, 21.10.1920 (PERTH). **Darling:** Upper Kalgan, *Mueller*, 10.1867 (MEL 60774).

A Lake King collection (*A.S. George 10467*) consists of one plant of *S. pycnostachya* as described, and another plant that differs from typical *S. pycnostachya* in having slightly shorter, broader and denser panicles, in a more cylindrical lemma, and in a thicker column that is pubescent to villous with hairs 0.40–0.75 mm long. In these characters it is reminiscent of *S. hemipogon* (which also occurs in the area) but differs in the narrow, thick and folded leaves, long ligule, shorter inflorescence, short column hairs and slightly shorter lemma. The atypical specimen from Lake King is intermediate between *S. pycnostachya* and *S. hemipogon* and is of possible hybrid origin despite having fully developed caryopses.

***Stipa ramosissima* (Trin.) Trin.**, Mém. Acad. Imp. Sci. St.-Pétersbourg, ser. 6, Sci., Math. 1: 74 (1830); Vickery, Contrib. New South Wales Natl. Herb. 2: 77 (1953); Beadle, Evans & Carolin, Handb. Vasc. Pl. Sydney Distr.: 532 (1963), Fl. Sydney Region: 657 (1972); Veldkamp, Blumea 22: 10 (1974). Based on *Urachne ramosissima* Trin., Gram. Unifl.: 173 (1824) (Trinius cites it as Diss 1: 173).

**HOLOTYPE:** Cited as: 'V sp. e Nov. Holl.' (LE?, not seen). We have been unable to obtain the Type of *Urachne ramosissima* on loan from LE. There is a specimen at K, '*Sieber Agrostotheca* No. 82', that C.E. Hubbard has compared with the Type of *U. ramosissima* at LE that he regarded as a good match. The only species likely to be confused with *S. ramosissima* is *S. verticillata*; Hubbard, from his determinations of the specimens at K, was well aware of the distinction between these two species. Consequently we are using the *Sieber Agrostotheca* no. 82 specimen at K as the basis for our concept of this species.

SYNONYMS: *Stipa micrantha* Sieber ex Trin., Mém. Acad. Imp. Sci. St.-Pétersbourg, ser. 6, Sci. Math. 1: 74 (1830); *non* Cav. 1799. HOLOTYPE: Cited as 'Sieb. Agrostoth. No. 82 V spp. nov. Holl.' The duplicate at K(!) is our basis for the application of this name as well as for *Urachne ramosissima*.

*Stipa rugulosa* Mez, Feddes Repert. Spec. Nov. Regni Veg. 17: 207 (1921). HOLOTYPE: Cited as [New South Wales:] 'Blue Mts. Herb. Hort. Sydney' (not seen). The Type is no longer extant at Berlin-Dahlem (B). The description of this reed-like perennial 1.5 metres high with the characters of the glumes, lemma and awn as given by Mez, from the Blue Mountains of New South Wales, leaves no doubt as to the identity of the plant Mez named.

[MISAPPLIED NAMES: Bentham, Fl. Austral. 7: 566 (1878) incorrectly treated *S. ramosissima* as a synonym of *S. micrantha* Cav. (= *Dichelachne micrantha* (Cav.) Domin) and cited specimens of it under that name. F.M. Bailey, Queensland Fl. 6: 1876 (1902), did likewise. Maiden, Manual Grasses N.S.W.: 112 (1898), appears to have identified both *S. ramosissima* and *S. verticillata* as *S. micrantha* Cav. *S. ramosissima* was tentatively regarded as *S. micrantha* Cav. by Hughes, Kew Bull. 1921: 28 (1921).]

Caespitose perennial to c. 2.5 metres high, shortly rhizomatous, without a basal tuft of leaves. Culms erect, with numerous branches at each node, 0.5–7 mm wide near the base, terete, scarcely compressible, weakly ribbed, glabrous; nodes (3–) 6–9, exserted, glabrous, c. 50% wider than the adjacent internodes. Leaf sheaths at first tightly enveloping the culm, later becoming loose, 3–3.5 mm wide, glabrous; margins glabrous. Ligule membranous, erose, 0.25–0.5 mm long, glabrous; auricles absent. Leaf blade expanded, linear, 1–10 mm wide, 35–40 (–80) cm long, readily deciduous; both surfaces scabrous, slightly ribbed, margins scabrous. Panicle 8–20 (–50) cm long, exserted, spreading, 2–4 (–5.5) cm wide (excluding awns); axis, branches and pedicels terete, scabrous; branches (0.3–) 3.5–5.5 (–10) cm long; pedicels 2–10 mm long. Spikelets 2.3–5 mm long (excluding awn), gaping at maturity. Glumes subequal, acute, erose, inflated, straw-coloured; lower glume 2.3–3.0 (–4.0) mm long, scabrous, lower 95% 3-nerved; upper glume 2.4–2.8 mm long, glabrous, lower 60% 3-nerved, the next 40% 3–2-nerved. Floret broad-cylindrical without a neck, 1.8–2.5 mm long (including callus). Lemma very dark brown at maturity, tuberculate, glabrous or with few white hairs at the very base; lobes and coma absent. Callus 0.2 mm long, bent, with white hairs 0.25–0.5 mm long. Awn (14–) 17–30 mm long, strongly once bent, 0.05–0.1 mm wide near the base, scabrous with minute hairs; column 4–7 mm long; bristle darker than the column. Palea c.  $\frac{1}{3}$  the length of the lemma, acute, scabrous with minute hairs, margins glabrous. Lodicules 2, abaxial, membranous, 0.3 mm long, oblong. Anthers 1.0–1.3 mm long, penicillate. Caryopsis (1.2–) 1.5–1.6 mm long; embryo 25% the length; hilum 30% the length.

DISTRIBUTION: Usually in moist, well-drained gullies, near forest or woodland margins in eastern mainland States.

SELECTED SPECIMENS: QUEENSLAND: **Burke**: Mt Mistake, *Simmonds* 649, 6.1887 (BRI). **North Kennedy**: Ravenshoe, *Blake* 9870, 14.10.1935 (NSW, BRI); near The Crater on Atherton – Ravenshoe Road, *Webb & Tracey* 6444, 6.12.1962 (BRI). **Leichhardt**: c. 15 miles [22 km] N. of Wandoan, *Johnson* 757, 15.4.1949 (BRI); Hillview, 3 miles [5 km] W. of Injune, *Johnson* 2122, 16.4.1961 (BRI). **Port Curtis**: Mt Dromedary, *Craven* 2590, 30.3.1974 (CANB). **Burnett**: Kingaroy, *Smith* 3031, 15.4.1947 (BRI, CANB); Taalbinga, *White* NSW 116667, 6.1912 (NSW). **Maranoa**: 20 miles [32 km] W. of Mitchell, *Blake* 10954, 31.3.1936 (BRI). **Darling Downs**: Toowoomba, *Maiden* NSW 116668, 1.1909 (NSW); Mt Ballow, McPherson Range, *Blake* 13095, 25.7.1937 (NSW, BRI); Palardo, W. of Miles, *Blake* 5831, 9.5.1934 (NSW, BRI); near Yarraman, *Phillips* CBG 001276, 6.6.1961 (CBG); South Durong, *Smith*, 12.1932 (BRI); Wooroolin, *Simmons*, 4.1914 (BRI); Bunya Mts, *White*, 10.1919 (BRI); Mt Mitchell, *White*, 19.7.1930 (BRI); Laidley Hills, *Clemens*, 25.1.1944 (BRI); Chinchilla, *Beasley*, 12.1930 (BRI); Lapunya, 42 miles [66 km] NW. of Goondiwindi, *Johnson* 515, 27.7.1958 (BRI); Ballandean, *Blake* 13229, 30.1.1938 (BRI); Forest Reserve 400, a little S. of E. of Warwick, *Smith* 11472, 12.4.1962 (BRI); Wilsons Peak, Qld/NSW border, *Telford* 487, 15.5.1969 (CBG); Canungra, *White*, 5.1917 (BRI); Morans Creek, Robert Plateau, *Goy & Smith* 95, 6.1.1938 (BRI).

NEW SOUTH WALES: **Lord Howe Island:** Anderson Road, *Pickard 1409*, 16.9.1970 (NSW). **North Coast:** Toonumbar S.F., *Jones 3377*, 12.1966 (CANB); Grafton, *Squire NSW 115887*, 4.1947 (NSW); Grafton to Dalmorton, *Maiden & Boorman NSW 115901*, 11.1903 (NSW); Nymboida River between Grafton & Dorrigo, *Melville 3350, Smith & Moore*, 19.3.1953 (NSW); Brushy Mtn, *Maiden NSW 115927*, 9.1897 (NSW); Chapmans Plain, c. 15 miles [24 km] NNW. of Dorrigo, *Hayes & McGillivray 2512*, 10.1966 (NSW); Thora to Dorrigo, *Salasoo 1911*, 1.1960 (NSW); top of Dorrigo Mtn., *Jessup & Gray*, 17.9.1954 (CANB 97470); Port Macquarie, *no collector NSW 115898*, 4.1845 (NSW); Dyers crossing via Nabiac, *Noonan NSW 115896*, 9.1950 (NSW); Allyn River, *Boorman NSW 115903*, 8.1906 (NSW); Upper Wallis Creek, Brunkerville district, *Earp NSW 115900*, 7.1953 (NSW). **Central Coast:** Horse-Shoe Bend, Grose Vale, *Carne NSW 115926*, 3.1910 (NSW); Eastwood, *Johnson NSW 115905*, 4.1949 (NSW); Gordon, *Blakely NSW 115909*, 4.1914 (NSW); Nepean River, *Maiden NSW 115916*, 9.1906 (NSW); Cabramatta, *Woolfs NSW 115911*, (NSW); Georges River, Casula, *McBarron 12546*, 6.1966 (NSW); Central Burrigorang Valley, *Holford NSW 115907*, 2.1957 (NSW); Bargo district, *Price NSW 115906*, 10.1947 (NSW); Rocky Creek, Hill Top, *Cheel NSW 115915*, 1.1912 (NSW); Lake Illawarra, *Carne NSW 115910*, 5.1912 (NSW); Broughton Creek on Coolangatta road, Shoalhaven, *Rodway NSW 115920*, 5.1929 (NSW). **South Coast:** Yalwal Creek between Yalwal & Burri, *Rodway NSW 115922*, 12.1933 (NSW); Yalwal, c. 15 miles [24 km] WSW. of Nowra, *Coveny 3991 & Bisby*, 3.1972 (NSW, CANB); Shoalhaven River, *Monaghan NSW 115919*, 12.1927 (NSW); Clyde River, *Anderson & Harasymiw 22*, 7.12.1976 (CANB 261856). **Northern Tableland:** Armidale district, *Ingram NSW 115892*, 12.1939 (NSW). **Central Tablelands:** Upper Colo River, *Vickery NSW 11001*, 29.3.1950 (NSW, CANB, K); Kowmung River, *Johnson NSW 115893*, 3.1951 (NSW); Barbers Creek, *Rumsey NSW 115894*, 3.1899 (NSW). **North Western Slopes:** Warrumbungle National Park, *Dunlop 539*, 21.8.1969 (CBG). **Central Western Slopes:** Mt Dangar, Gungal, *Boorman NSW 115932*, 10.1904. **North Western Plains:** Pallamallawa, *Gall NSW 115929*, 1916 (NSW); Coolabah, *Maiden & Boorman NSW 115928*, 8.1910 (NSW); Boppy Mtn, near Cobar, *Boorman NSW 115930*, 7.1903 (NSW).

Very similar to *S. verticillata* but often rather more robust and with glabrous lemmas.

***Stipa rudis* Sprengel**, Syst. Veg. Cur. Post 4: 31 (1827); Everett & Jacobs, *Telopea* 2(4): 394 (1983).

HOLOTYPE: AUSTRALIA: 'Nov. Holl., Sieber, Agrost. n. 66'. There are two sheets of *Sieber no. 66* in MEL (MEL 59980, 59982) and we have used these as our basis for typification. Another sheet of *Sieber, Agrost. no. 66*, is at K but lacks lemmas.

Mueller (Fragm. 8: 104 (1873)) and Bentham (Fl. Austral. 7: 570 (1878)) treated *S. rudis* as a synonym of *S. pubescens* R. Br. Hughes (Kew Bull. 1921: 21 (1921)) reinstated the name *S. rudis* Sprengel and provided an amended description. However, in addition to the Type (from New South Wales) and a specimen from Victoria (not seen), she cites four specimens from Western Australia that are unlikely to be *S. rudis* Sprengel and may be *S. eremophila* (vel aff.). It appears that her amended description was substantially based on the Western Australian specimens and hence does not apply to *S. rudis* Sprengel (notably in respect of the fulvous hairs of the lemma).

Caespitose perennial to 1.2 metres high with conspicuously extravaginal shoots, often from a short rhizome. Culms usually geniculate near the base, slightly compressible, terete, (1-) 2-4 mm wide near the base, slightly ribbed, mainly glabrous or finely scaberulous, but finely pubescent for varying lengths below the nodes; nodes 2-4 exserted, to 50% broader than adjacent internodes, sericeous. Leaf sheaths inflated and falling loose from the culms, slightly ribbed, glabrous to finely and sparsely pubescent, more densely pubescent on the margins just below the orifice, hirsute around the collar; inner margin glabrous; outer margin ciliate just below the orifice of lower sheaths; uppermost sheaths glabrous; cataphylls glabrous, pubescent or shortly villous. Ligule coriaceous, 0.5-2 mm long, ovate to ovate-truncate, slightly lacinate, long- to short-ciliate, abaxial surface pubescent; auricles slightly thickened, with tufts of long to short spreading hairs. Leaf blades to 40 cm long, 2-5 mm wide near the base, erect, usually inrolled, the basal leaves more tightly rolled; abaxial surface scarcely

ribbed or smooth, very densely to sparsely scabrous with minute rigid tubercles or hairs, or almost glabrous; adaxial surface ribbed, densely pubescent or hirsute to sparsely scabrous with minute short hairs; margins similar to abaxial surface. Panicle to 50 cm long, 1.5–5 cm wide (excluding awns), exerted or the base concealed, loosely contracted to spreading with distant fascicles of few, few-flowered branches; axis terete, almost glabrous at the base to scabrous upwards; branches to 15 cm long, terete, scabrous with short to long hairs; pedicels to 15 mm long, angular, scabrous. Spikelets 8–15 mm long (excluding awn), gaping. Glumes unequal to subequal, linear to broadly oblong, with nerves heavily overlain with sclerenchyma, pale green to yellow or purple-tinged, glabrous between the nerves, scaberulous over the nerves and the margins often ciliate, or pubescent overall; lower glume 8–15 mm long, the lower 85–90% 3-nerved, the tip narrowly truncate and firm or broadly obtuse, membranous and erose; upper glume 7–14.5 mm long, the lower 75–90% 3-nerved or 4–5 nerves present in the lower 25–75%, the tip truncate and firm to membranous, or broadly obtuse, membranous and erose. Floret linear or lanceolate, 5.0–11.5 mm long (including callus). Lemma brown to purple-brown at maturity, granular at the base, tuberculate upwards, with sparse fulvous to white hairs at the base, thinning to usually glabrous at the apex; coma obscure, of few hairs to 1 mm long, or absent; 1 lobe 0.05–0.25 mm long, obtuse, or absent. Callus 0.8–3.2 mm long, gently curved with fulvous to white hairs, darker than those of the lemma. Awn 20–90 mm long, 0.15–0.4 mm wide near the base, gently to strongly twice bent; column 8–45 mm long, 4.5–30 mm to the first bend, scabrous to pubescent with hairs 0.05–0.3 mm long; bristle scabrous. Palea 0.5–1.2 mm shorter than the lemma, acute to broadly acute, granular down the centre with hairs similar to those of the lemma, or almost glabrous; margins firm, smooth and glabrous. Lodicules 2–3, membranous; 2 abaxial 0.8–1.7 mm long, oblong to spatulate; paleal acute, c. 1 mm long, or absent. Anthers 2.0–4.0 mm long, pencillate. Caryopsis 3–6 mm long; embryo 20–25% the length; hilum 70–80% the length.

### Key to the Subspecies

1. Awn 60–90 mm long, column 32–45 mm long; both glumes broadly obtuse with 1–2 mm of delicately membranous tip, upper glume 11–14.5 mm long  
**S. rudis** subsp. **australis**
- 1\*. Awn usually <60 mm long, occasionally to 65 mm long, column usually <25 mm long, occasionally to 30 mm long; glumes firm to the tip or, especially the upper, membranous at the very tip ..... 2
2. Callus 1.5–2.5 mm long, usually >20% the length of the floret (excluding awn); column 20–25 mm long; lower glume narrowly truncate and firm or membranous at the tip, upper glume membranous at the tip, 9–12.5 mm long ..... **S. rudis** subsp. **rudis**
- 2\*. Callus 0.8–1.7 mm long, usually <20% the length of the floret (excluding awn); column <20 mm long; glumes narrowly truncate, firm at the tip, the upper glume 7–10 mm long ..... **S. rudis** subsp. **nervosa**

### **Stipa rudis** subsp. **rudis**.

SYNONYM: *S. nervosa* var. *neutralis* J. Vickery, Contrib. N.S.W. Natl. Herb. 1: 335 (1951).  
HOLOTYPE: NEW SOUTH WALES: Katoomba, S.T. Blake NSW 13915, 22.1.1939 (NSW).

Nodes to 50% broader than internodes. Cataphylls glabrous or pubescent. Leaf blades to 40 cm long; adaxial surface pubescent to sparsely scabrous with



minute hairs. Panicle to 40 cm long, 1.5–4 cm wide (excluding awns); pedicels to 10 mm long. Spikelets 10–15 mm long (excluding awn). Glumes unequal, glabrous with minute scabrous hairs over the nerves, the margins often ciliate; lower glume 10–15 mm long, the lower 90% 3-nerved, the tip narrowly truncate and firm or membranous; upper glume 9–12.5 mm long, the lower 90% 3-nerved, 4–5-nerved in the lower 25–50%, the tip obtuse and membranous. Floret 7.2–10 mm long (including callus). Coma absent. Callus 1.5–2.5 mm long. Awn (35–) 40–60 (–65) mm long, 0.15–0.4 mm wide, gently to strongly twice bent; column 20–25 mm long, 10–20 mm to the first bend. Caryopsis 3–3.5 mm long.

**DISTRIBUTION:** On sandstone in higher areas of south-eastern Queensland and eastern New South Wales and Victoria.

**SELECTED SPECIMENS:** QUEENSLAND: **Darling Downs:** Wallangarra, *Smith* 757, 29.1.1940 (BRI); Wyberba, *Blake* 4638A, 23.1.1933 (NSW). **Moreton:** Moggill nr. Brisbane, *White* 7590, 3.4.1931 (BRI).

**NEW SOUTH WALES:** **Central Coast:** Blue Mountains, *Calvert*, s.d. (MEL 60678); Woodford, *Henderson* 419, 10.1.1948 (NSW); Pennant Hills, *Vickery* NSW 26351, 6.12.1953 (NSW); Milperra, Georges River, *Vickery*, 26.10.1930 (BRI 250632). **South Coast:** 5 km NE. of NSW/Vic. border on Princes Hwy, *Everett* 442 & *Jacobs*, 22.10.1981 (NSW); Lyons Road, Currowan State Forest, *Pullen* 3968, 6.12.1963 (CANB). **Northern Tablelands:** Yooroonah, *McKie* NSW 8584, 12.1.1940 (NSW); Glen Elgin, *Paltridge* 211, 3.12.1931 (CANB). **Central Tablelands:** Wentworth Falls, *Henderson* f55, 3.1945 (NSW); Blackheath, *Constable* NSW 16356, 22.1.1948 (NSW). **Southern Tablelands:** Crookwell, *Hewitt* NSW 8566, 9.2.1948 (NSW).

**VICTORIA:** **Region N:** 8 miles [13 km] from Anakie Junction towards Ballan, *Carroll* CBG 024810, 4.1.1966 (CBG); Christmas Hills, *Aston* 457, 2.12.1959 (MEL, NSW); Heatherdale, *Muir* 583, 11.12.1958 (MEL). **Region P:** c. 5 km NW. of Aireys Inlet, *Carr & Adair* 7428, 6.1.1977 (NSW). **Region T:** 4 miles [6 km] SE. of Willow Grove, toward Moe, *Carroll* CBG 024809, 20.12.1965 (CBG). **Region Z:** Bidwell, *Hunter*, 1.1941 (MEL); Warburton, *Blake* 7219, 19.1.1935 (NSW, BRI); c. 5 miles [8 km] NE. of Mallacoota, *Beaulehole* 32495 & *Finck*, 16.12.1969 (NSW); 4 miles [6 km] E. of Marlo, *Henshall*, 3.1.1968 (NT 43327).

See Everett & Jacobs (*loc. cit.*) for reasons for recognising this and the other two taxa as subspecies.

***Stipa rudis* subsp. *australis* J. Everett & S.W.L. Jacobs**, *Telopea* 2(4): 396 (1983).

**HOLOTYPE:** TASMANIA: Risdon Vale, *J. Vickery* NSW 108620, 18.1.1949. Robust coarse grass, spreading panicle. Abundant (NSW).

Cataphylls glabrous or pubescent. Nodes to 40% broader than internodes. Ligule 0.5–2 mm long. Leaf blades to 20 cm long; adaxial surface densely pubescent or hirsute. Panicle to 40 cm long, 4–5 cm wide (excluding awns); pedicels to 15 mm long. Spikelets 12–15 mm long (excluding awn). Glumes subequal, glabrous between the nerves, scaberulous over the nerves, the margins ciliate, or pubescent overall; lower glume 12–15 mm long, the lower 85% 3-nerved, the tip broadly obtuse, membranous and erose; upper glume 11–14.5 mm long, the lower 75–90% 3-nerved, 4–5-nerved in the lower 50–75%, the tip broadly obtuse, membranous and erose. Floret 8.6–11.5 mm long (including callus). Coma absent. Lobes absent. Callus 2.0–3.2 mm long. Awn 60–90 mm long, 0.3–0.4 mm wide, gently to strongly twice bent; column 32–45 mm long, 20–30 mm to the first bend. Caryopsis c. 6 mm long.

**DISTRIBUTION:** Sandstone in higher areas of eastern Victoria, and Tasmania.

**SELECTED SPECIMENS:** VICTORIA: **Region E:** 22 km N. of Nelson, *Beaulehole* 55344, 6.12.1976 (NSW, ACB). **Region N:** Heatherdale, *Muir* 582, 11.12.1958 (MEL). **Region P:** Cranbourne, *Ross*

2660 & Corrick, 15.12.1981 (NSW); Frankston, Corrick 6182, 28.11.1978 (NSW). **Region S:** Healesville, Willis, 27.2.1972 (MEL). **Region V:** Berrima River, Calvert 23, s.d. (MEL 60677). **Region W:** 3 km NE. of Metung, Everett 428 & Jacobs, 21.10.1981 (NSW). **Region Z:** Buchan, Verdon 493, 21.11.1970 (CBG); 2.5 miles [4 km] W. of Genoa, Beaglehole 32767, 24.12.1968 (NSW).

TASMANIA: Launceston, Cheel NSW 108621, 1.1928 (NSW); Risdon Vale, Vickery NSW 108620, 18.1.1949 (NSW); Kingston, junction of main road with Leslevale Road, Townrow 165, 1.1968 (JEST); 1 mile [2 km] W. of Dunalley Bridge, Townrow 103, 1.1967 (JEST); Hobart, Black 290, 8.10.1921 (AD); Mt Wellington, Martin NSW 108622, 3.1933 (NSW); Mathinna, Phillips, 29.1.1962 (NSW 108619, duplicate of CBG 001268); Evandale, beside South Esk Bridge, Townrow 114, 19.12.1967 (UTAS); c. 10 miles [16 km] W. of Copping, Vickery NSW 117311, 15.1.1949 (NSW); 0.5 mile [1 km] E. of O'Connors Peak/Campbelltown road Junction, Townrow 124, 12.1967 (JEST).

***Stipa rudis* subsp. *nervosa* (J. Vickery) J. Everett & S.W.L. Jacobs**, *Telopea* 2(4): 396 (1983). Based on *S. nervosa* var. *nervosa* J. Vickery, *Contrib. N.S.W. Natl. Herb.* 1: 335 (1951).

HOLOTYPE: NEW SOUTH WALES: **Central Coast:** Epping, W.F. Blakely NSW 8491, 10.1913 (NSW).

Nodes to 25% broader than internodes. Cataphylls pubescent, shortly villous or glabrous. Ligule 0.5–1.5 mm long. Leaf blades to 40 cm long; adaxial surface pubescent to sparsely scabrous with minute hairs. Panicle to 50 cm long, 1.5–3 cm wide (excluding awns); pedicels to 10 mm long. Spikelets 8–12 mm long (excluding awn). Glumes unequal, glabrous between the nerves, scaberulous over the nerves, the margins often ciliate; lower glume 8–12 mm long, the lower 90% 3-nerved, the tip narrowly truncate and firm; upper glume 7–10 mm long, the lower 90% 3-nerved or 4–5-nerved in the lower 50–60%, the tip truncate and firm. Floret 5–7.5 (–8.5) mm long (including callus), with white hairs. Coma usually present but obscure, of few hairs up to 1 mm long. Callus 0.8–1.7 mm long. Awn 20–45 mm long, 0.15–0.25 mm wide, gently twice bent; column (8–) 11–18 (–20) mm long, 4.5–11 mm to the first bend. Caryopsis 3–4.5 mm long.

DISTRIBUTION: Sandstone in higher areas of south-eastern Queensland, eastern New South Wales and Victoria.

SELECTED SPECIMENS: QUEENSLAND: **Darling Downs:** between Bald Mountain & Wyberba, Blake 4522, 16.1.1933 (BRI); Wallangarra, Hilton NSW 11691, 22.12.1944 (NSW, dupl. AD).

NEW SOUTH WALES: **Central Coast:** Epping, Blakely NSW 8491, 10.1913; Nepean River, c. 4 miles [6 km] S. of Wallacia, Salasoo 2678, 1.12.1963 (NSW). **South Coast:** Yalwal, Rodway NSW 116189, 2.1.1933 (NSW); Milton, Cambage NSW 8499, 23.12.1908 (NSW); c. 7 km WNW. of Cobargo, Austin 265, 14.4.1973 (CANB). **Northern Tablelands:** 3 miles [5 km] towards Glencoe from Yarrow Creek, Jessup & Gray 2622, 6.1954 (CANB); Moredun Creek Dam, McKie NSW 8494, 30.12.1947 (NSW); The Devils Pinch, Armidale to Guyra, McKie W126, 6.12.1931 (BRI); SW. of Guyra, Youman NSW 116200, 24.12.1931 (NSW). **Central Tablelands:** 15 miles [24 km] ENE. of Capertee, Vickery NSW 116204, 6.1.1975; Katoomba, Blake 13932, 23.1.1934 (NSW). **Southern Tablelands:** Conder Creek, A.C.T., Gauba NSW 116187, 11.1.1959 (NSW).

VICTORIA: **Region R:** Little Paradise Falls, c. 27 miles [43 km] SW. of Myrtleford, Beaglehole 43767 & Cameron, 5.12.1973 (NSW). **Region V:** Suggan Buggan, Willis, 16.1.1948 (MEL 1509510). **Region W:** c. 20 km NNW. of Omeo, Beaglehole 68689, 19.1.1981 (NSW); Orbost, Prove, 1904 (MEL 60745); Tostaree, Hunter, 12.1951 (MEL 60746); 6 km NE. of Lakes Entrance, Everett 435 & Jacobs, 21.10.1981 (NSW); c. 6 miles [9 km] W. Lakes Entrance, Metung road, Muir 1957, 27.11.1960 (MEL). **Region X:** Sale, Vickery NSW 8530, 26.1.1935 (NSW). **Region Z:** Mt Drummer, Willis, 25.1.1947 (MEL 60718).

***Stipa scabra* Lindley** in Mitchell, Journ. Trop. Australia: 31 (1848); Bentham, Fl. Austral. 7: 570 (1876), in part; Hughes, Kew Bull. 1921: 18 (1921) in part, *ibid.* 1922: 17 (1922).

HOLOTYPE: 'Moora, on the Bogan R., 1846, Mitchell 125' (CGE!). The holotype was collected by Mitchell in New South Wales 'Along the Bogan River'. The specimen label cites 'Moora, on the Bogan R., 1846, Mitchell 125' and also bears Lindley's handwriting. A specimen at NSW (NSW 116442) is a duplicate of the Holotype collection. At K there is a drawing plus fragments of spikelets identified by D.K. Hughes as *Stipa scabra* Lindl., which bears the locality '32°S 147°E', which is south of Nyngan and close to the Bogan River; the sheet also bears a further attached drawing of the spikelet and lemma with annotations by Hughes and the label 'Mitchell 125, Bogan River' (see CANB photo 237002).

Caespitose perennial to c. 0.5 metres high, without rhizomes, with a basal tuft of fine leaves about half the height. Culms erect or slightly geniculate at the base, terete, 0.6–1.2 (–1.6) mm wide near the base,  $\pm$  compressible, smooth to moderately ribbed upwards, glabrous, scaberulous or pubescent with hairs minute–0.1 mm, densely and shortly pubescent just below the nodes; nodes 2–3 (–5), exserted, glabrous, slightly swollen. Leaf sheaths at first tightly enveloping the culm, later becoming slightly loose, (2.5–) 3.5–5 (–6) mm wide, (smooth–) slightly to moderately (or on the upper sheath strongly) ribbed, glabrous, scabrous or scaberulous or pubescent; inner margin glabrous; outer margin glabrous or ciliate with hairs to 0.2 (–0.5) mm long. Ligule truncate, membranous, 0.3–1 (–1.5) mm long, ciliate with hairs minute–0.1 (–0.3) mm long (upper ligules may be asymmetrical with one lobe to 4 mm or more long); abaxial surface glabrous; auricles, when present, c. 0.2 mm, glabrous, or with hair tufts to 1 mm long. Leaf blade folded or inrolled, 0.7–1.5 (–2) mm wide, to 25 cm long; abaxial surface smooth to strongly ribbed, with minute tubercles and/or hairs to 0.15 (–0.5) mm long; adaxial surface strongly ribbed, puberulous with hairs minute (–0.3 mm) long; margins glabrous, scabrous or ciliate. Panicle to 30 cm long, exserted, with moderately distant fascicles of few to many few-flowered branches, contracted or expanded, (0.5–) 1–2 (–3) cm wide (excluding awns); axis terete to slightly angular, glabrous or scabrous with hairs minute (–0.1 mm) long; branches (0.5–) 1.5–3.5 (–7) cm long, angular, scabrous or pubescent along the edge with hairs minute–0.1 (–0.2) mm long; pedicels (1.5–) 3.5 (–8) mm long, angular, scabrous or scaberulous with hairs minute–0.1 mm long, sometimes only along the edges. Spikelets (8–) 9–15 mm long (excluding awn), scarcely to moderately gaping at maturity. Glumes unequal, acute to acuminate, glabrous to scabrous upwards; lower glume (8–) 9–10 (–15) mm long, lower (10–) 20–30% (1–) 3 (–5)-nerved; upper glume (6–) 9–13 mm long, lower (10–) 20–25 (–30)% 5–3 (–1)-nerved glabrous to scabrous upwards. Floret narrow-turbinate, without a neck, (4–) 5–6 (–6.5) mm long (including callus). Lemma smooth to granular upwards, densely sericeous with white hairs 0.2–0.4 (–0.6) mm long; lobes (minute–) 0.2–0.25 (–0.5) mm long, ciliate with hairs minute–0.1 mm long; coma obscure, of few hairs (0.1–) 0.2–0.4 (–0.6) mm long or absent. Callus (1–) 1.4–2 mm long, straight, weakly bent at the tip, densely sericeous with white hairs 0.1–0.5 (–0.8) mm long. Awn 30–70 mm long, falcate, with 2 bends, c. 0.2 mm wide near the base, straw-coloured to brown; column (5.5–) 8–15 mm long, (2.5–) 4–7 mm to the first bend, scabrous with hairs (minute–) 0.1–0.2 (–0.3) mm long; bristle scabrous to scaberulous with hairs minute–0.15 mm long. Palea (75–) 90–95% the length of the lemma, obtuse (–acute), often erose, granular along the centre, smooth at the edges, sericeous along the centre back with hairs (0.1–) 0.2–0.3 (–0.4) mm long; margins glabrous. Lodicules 2, abaxial, membranous, (0.7–) 1.2 mm long, oblong. Anthers (0.5–) 1 (–2.5) mm long, penicillate. Caryopsis (2.5–) 3 (–4.5) mm long; embryo 20–35% the length; hilum (55–) 70 (–80)% the length.

The identity and circumscription of *S. falcata*, treated here as *S. scabra* subsp. *falcata*, have been a source of considerable confusion in Australian herbaria where many other species have been misdetermined under this name, a confusion doubtless initiated by Hughes in her citation (Kew Bull. 1922: 16 (1922)) of a Western Australian specimen with her description, by her citation of three additional specimens that we suspect (but have been unable to verify) may be *S. scabra* Lindl., and by her comments (*loc. cit.*) under *S. variabilis*. J.M. Black, Fl. S. Austral. edn 2: 87 (1943), certainly included other species of the Falcatae group under this name, including *S. nodosa* S.T. Blake. It seems certain that Bentham, Fl. Austral. 7: 568 (1878), incorrectly referred specimens of *S. falcata* and other species of the Falcatae group to *S. setacea* R. Br.

Discrimination between *S. scabra* and *S. falcata* is difficult and their distributions overlap. Because of their similarity and the tendency for the distributions to polarize, we feel that it is best to regard *S. falcata* as a subspecies of *S. scabra*. Subspecies *scabra* reaches its maximum abundance in the predominantly summer rainfall zone of northern New South Wales, extending into Queensland and northern South Australia, but scattered plants may be found over a wider area. Subspecies *falcata* reaches its maximum abundance in the winter rainfall zones of southern New South Wales, Victoria and southern South Australia, but plants occur as far north as Dubbo and the New England region.

In foliage, appearance of the rootstock, glumes, indumentum and dimensions of the lemma and column, the two subspecies are much alike. In subsp. *scabra* the ligule is membranous, long (especially in uppermost leaves) and more or less glabrous. The inflorescence is narrow with more or less erect branches and spikelets. In subsp. *falcata* the membranous ligule is shorter and has few to many erect cilia on the back of the auricular lobe. The inflorescence tends to be rather more spreading with more divergent branches and spikelets.

### Key to subspecies

Inflorescence narrow; ligules (0.3–) 0.6–1 (–1.5) mm long, asymmetrical auricular lobe of upper leaves to 4 mm or more long, usually glabrous .....	subsp. <i>scabra</i>
Inflorescence spreading; ligules 0.3–0.6 mm long, asymmetrical lobe of upper nodes usually <1 mm long, usually with a row of hairs .....	subsp. <i>falcata</i>

### *Stipa scabra* subsp. *scabra*

Caespitose perennial c. 0.5 metres high. Upper leaf sheaths 2–4 mm wide. Ligule truncate, membranous, (0.3–) 0.6–1 (–1.5) mm long, ciliate; auricular lobes on upper culm leaves usually asymmetrical with one lobe to 4 mm long or more, glabrous. Leaf blades folded or inrolled, 0.6–1.2 mm wide, to 25 cm long; abaxial surface smooth to slightly ribbed. Panicle to 30 cm long, contracted, 1–2 cm wide. Lower glume (8–) 9–10 (–15) mm long; upper glume (6–) 9–13 mm long. Callus (1–) 1.4–1.7 mm long. Awn 30–70 mm long. Anthers (0.5–) 1 (–2.5) mm long; penicillate. Caryopsis (2.5–) 3 (–3.5) mm long.

DISTRIBUTION: Widespread through southern Queensland, New South Wales and South Australia; extending into Victoria, Western Australia and Tasmania.

SELECTED SPECIMENS: QUEENSLAND: **Burnett:** South Durong, *Smith*, 12.1932 (BRI). **Warrego:** Chesterton, *Blake* 11097, 7.4.1936 (NSW); Gilruth Plains, *Mackerras*, 11.1939 (CANB 1254). **Maranoa:** 130 km SE. of Charleville, *Pressland*, 11.3.1976 (BRI); Morven, *McComb*, 4.1918 (BRI); Hodgson, near Roma, *Lewington*, 11.1933 (BRI); Roma, *Blake* 10836, 29.3.1936 (BRI); Coolibah, *Haywood* 1930 (BRI); 60 miles [96 km] W. of St George, *Whitehouse*, 12.1933 (BRI); 35 miles [56 km] SW. of Eulo, *Law* 49, 8.1967 (BRI); Cashel Vale, S. of Bollon, *Everist* 3669, 28.4.1949 (BRI); Nindingully, *Allen* 641, 21.10.1944 (CANB 10953). **Darling Downs:** Palardo, W. of Miles, *Blake* 5832, 9.5.1934 (NSW); Bunya Mts., *White*, 10.1919 (BRI); Hampton, *Scattine*, 5.11.1975 (BRI); 2 miles [3 km] S. of Pittsworth, *Everist & Webb* 1222, 20.11.1946 (CANB, BRI); Pittsworth, *White*, 4.2.1930 (K, BRI); 'Kindon' Station, 54 miles [86 km] NNE. of Goondiwindi, *Smith* 513, 5.12.1938 (BRI); 20 km from Warwick on Stanthorpe road, *Simon & Henderson* 2511, 9.12.1974, (CANB, BRI, NSW); Warwick, *Beckler* (MEL 60855); Bybera, *White* 12223, 3.9.1934 (BRI); 46 km from Inglewood on Warwick road, *Simon, Pedley & McDonald* 2861, 3.9.1975 (BRI, NSW); Goondiwindi, *Blake* 10505, 25.2.1936 (NSW); 30 miles [48 km] from Goondiwindi on Millmerran road, *Johnson* 505, 12.7.1958 (BRI, CANB); 'Ballandean' Cattle Station, *Smith* 720, 28.1.1940 (BRI); near Wallangarra, *Clemens*, 10.1944 (BRI). **Moreton:** Brisbane, *Bailey*, 3.1873 (MEL 60853); Mt Cordeaux, *Blake* 13869, 20.11.1938 (NSW).

NEW SOUTH WALES: **North Coast:** Singleton, *Boorman* NSW 116407, 11.1914 (NSW, BRI); Rutherford, *Hilton*, 19.10.1944 (ADW 43981, 43917, 43911, NSW 116441). **Central Coast:** Concord, *Coveny* NSW 116419, 7.9.1966 (NSW); Menangle Park, *McBarron* 16208, 8.1.1969 (NSW); Nepean River, *McBarron* 12376, 12.4.1966 (NSW). **Northern Tablelands:** 16 miles [26 km] W. of Guyra, *McKie*, 2.1.1947 (BRI); Kelso, 30 miles [48 km] NW. of Guyra, *McKie* NSW 116414, 4.4.1930 (NSW); Dundee, *Bellert* NSW 116415, 7.2.1966 (NSW); 9.6 miles [15 km] W. of Yarrowyck, *Jessup & Gray* 2249, 3.11.1953 (CANB); Chiswick, c. 10 miles [16 km] S. of Armidale, *Jessup & Gray* 1711, 23.10.1952 (CANB); Blue Hole, *Davis* NSW 116401, 31.4.1949 (NSW); Rimbanda, New England, *Jessup & Gray* 2324, 10.11.1953 (CANB); Timor, 15 miles [24 km] E. of Murrurundi, *Story* 7482, 9.10.1960 (BRI). **Central Tablelands:** Lucknow, *Henderson* NSW 116848, 4.1.1948 (NSW); Bathurst, *Ingram* NSW 116409, 28.2.1942 (NSW); Gap Creek, Mittagong, *De Nardi* 471, 2.11.1970 (NSW). **Southern Tablelands:** Lake George, *Blake* 7560, 3.2.1935 (NSW); Molonglo R., *Gauba* CBG 003571, 6.12.1949 (CBG); Lake Burley Griffin, *Solling* 73, 18.2.1972 (NSW); Canberra, *Mair* 10, 11.1932 (BRI). **North Western Slopes:** 30 miles [48 km] S. of Yetman, *Jessup & Gray* 1634, 4.10.1952 (CANB); Warialda, *Vickery* NSW 18447, 1.1932 (NSW); 6 miles [10 km] from Warialda, Moree road, *Roe* 204, 8.10.1949 (CANB); 10 miles [16 km] W. of Inverell, *Hely* NSW 116382, 9.11.1949 (NSW); Inverell, *Thomas* NSW 116435, 11.1912 (NSW); Pilliga district, *Eastburn* NSW 116434, 11.1948 (NSW); Razorback Range, *Pickard & Coveny* 1125, 4.6.1969 (NSW); Woods Reef, *Rupp* NSW 116383, 6.1913 (NSW); Barraba, *Hay* NSW 116396, 9.1903 (NSW); Crow Mt road, *Rupp* NSW 116413, 4.1914 (NSW); Boggabri, *Cambage* 2449, 11.1909 (NSW); between Somerton & Manilla, *Hely* NSW 116412, 6.11.1949 (NSW); nr. Baradine, *Forsyth* NSW 116427, 10.1899 (NSW); 7 miles [11 km] E. of Gunnedah, *Hely* NSW 116375, 29.10.1949 (NSW); Tamworth, *Rodway* NSW 116420, 10.1924 (NSW); 13 miles [21 km] ENE. of Tambar Springs, *De Nardi* 180, 29.9.1968 (NSW); Loomberah district, c. 20 miles [32 km] S. of Tamworth, *Goode* 170, 17.11.1954 (NSW); 10 miles [16 km] NW. of Girilambone, *Thompson* NSW 116847, 8.9.1959 (NSW); Burrumbuckle Rock, Warrumbungle Range, *Crisp* 3236 & *Verdon*, 4.10.1977 (CBG). **Central Western Slopes:** 8 miles [13 km] SE. of Murrurundi, *Story* 6911, 25.11.1959 (CANB, NSW); above Murrurundi railway tunnel, Hunter Valley, *Story* 6919, 25.11.1959 (CANB, BRI); Wingen, *Cambage* 2502, 30.10.1909 (NSW); Belltrees via Scone, *White* NSW 116417, 2.1920 (NSW, BRI); 2 miles [3 km] N. of Burroway, *Biddiscombe* NSW 116398, 13.3.1954 (NSW); 9 miles [14 km] SE. of Merriwa, *Story* 6788, 8.10.1959 (CANB, NSW); Upper Hunter River, *Jackson*, 4.1913 (CANB 1239); 8 miles [13 km] NE. of Dubbo, *Coveny* 2479, 26.11.1969 (NSW); c. 3 miles [5 km] from Dubbo, *Phillips* CBG 067325, 13.9.1963 (CBG); Dubbo, *Vickery* NSW 116625, 13.1.1934 (NSW); Gungal, *Boorman* NSW 116426, 9.1904 (NSW); Denman, *Braithwaite* NSW 116425, 11.1949 (NSW); Burrendong, nr. Wellington, *Herrington* NSW 116405, 1950 (NSW); Mudgee, Wollar road, *Constable* NSW 11493, 5.6.1950 (NSW); Young, *Paterson* NSW 116432, 12.1917 (NSW); Temora, *Dwyer* NSW 116623, 11.1915 (NSW). **South Western Slopes:** Galong, *Murphy* NSW 116399, 2.1962 (NSW); Wagga Wagga, *Wenholz* NSW 116424, 1.1913 (NSW). **North Western Plains:** Bulli Ridge, Collarenebri, *Waterhouse* NSW 116385, 29.10.1950 (NSW); Collarenebri to Walgett, *Vickery* NSW 116438, 21.12.1934 (NSW); Burragillo, Merrywinebone, *Waterhouse* NSW 116403, 2.11.1956 (NSW); Mt Oxley, nr. Bourke, *Ingram* NSW 116386, 13.7.1958 (NSW); Tarcoon, *Keane* NSW 116446, 10.1972 (NSW); S. of Coolabah, *Jacobs* 7, 2.11.1971 (NSW); 29 miles [46 km] NNW. of Wilcannia, *De Nardi* 255, 20.5.1969 (NSW); 18 miles [29 km] NW. of Nyngan, *Thompson* NSW 116846, 8.9.1969 (NSW); Nyngan, *Forbes* NSW 116411, 21.4.1947 (NSW); Collie to Gilgandra, *Vickery* NSW 116429, 5.1.1936 (NSW). **South Western Plains:** 'Bundure' Station, N. of Mt Hope, *Martensz* 141, 21.5.1969 (NSW); Waranary Hill, W. of Roto, *Jacobs* 509, 25.10.1972 (NSW); Condobolin, *Kidston* NSW 116380, 9.1894 (NSW); 1.5 km W. of Mt Binya, c. 25 km NE. of Griffith, *Crisp* 1424, 12.1.1975

(CBG, NSW); Griffith, *Giltinan NSW 116655*, 27.8.1939 (NSW). **South Far Western Plains:** spur of Manfred Mountain, *Fox 8006051*, 8.6.1980 (NSW).

**VICTORIA: Region D:** 8.75 miles [14 km] NNW. of Dergholm, *Beaulehole 37950*, 25.11.1971 (ACB). **Region J:** Stawell, *Williams 380*, 2.1955 (AD). **Region M:** c. 50 km NW. of Bendigo, *Beaulehole 69411*, 23.10.1981 (NSW). **Region V:** NE. of Bendigo, *Beaulehole 33210*, *Rogers & Finck*, 6.1.1970 (NSW). **Region W:** Monument Ridge, *Beaulehole 37241 & Rogers*, 6.3.1971 (ACB); Jingallala R., *Beaulehole 35747*, 3.1.1971 (NSW); Devils Backbone, *Beaulehole 37270*, 8.3.1971 (NSW); between Ensay North & Ensay South, *Beaulehole 37032*, 24.2.1971 (NSW); Bairnsdale district, *Hart*, 20.10.1933 (MEL 60022). **Region Z:** 8 miles [13 km] from Tubbitt towards McKillops Bridge, *Carroll NSW 116439*, 17.12.1965 (NSW, CBG); N. of Wulgulmerang, *Beaulehole 36151 & Rogers*, 6.1.1971 (NSW).

**TASMANIA:** 2 miles [3 km] W. of Sorrell–Orielson road along road to Richmond, *Townrow 72*, 11.1967 (JEST).

**NORTHERN TERRITORY:** Central Australia, *Forde 1575*, 1960 (CANB).

**SOUTH AUSTRALIA: North-western:** Piltardi, Mann Ranges, *Cleland*, 21.8.1954 (ADW 44135); Watarunya Rockhole, Mt Lindsay 27°02'S, 129°52'E, *Barker 3076*, 31.8.1978 (AD); Everard Ranges, c. 25 km WSW. of 'Everard Park', *Eichler 17527*, 15.9.1963 (AD); Cheesman Peak summit, *Weber 5316*, 28.8.1978 (AD). **Flinders Ranges:** Mt Lyndhurst, *Hilton 1398*, 9.4.1955 (ADW); Gammon Ranges, *Eichler 12683*, 17.9.1956 (ADW); Wilpena Pound, 31°31'S, 138°34'E, *Everett 270*, 17.9.1981 (NSW); Central Chase Range, *Crisp 836*, 1.9.1974 (AD). **Eastern:** 'Mt Victor', *Crisp 440*, 4.9.1971 (AD). **Eyre Peninsula:** Red Rock, 'Roopena', *Cleland*, 5.11.1936 (AD 96323285); Iron Knob, *Copley 2308*, 12.10.1968 (AD); Whyalla West, *Hilton 160*, 6.9.1952 (ADW). **Southern Lofty:** Highbury, *Kraehenbuehl 823*, 22.10.1962 (AD); Manningham, *Cleland*, 9.1946 (AD 96323269); Encounter Bay, *Cleland*, 15.8.1940 (AD 95713076).

**WESTERN AUSTRALIA: Giles:** NE. of Cavanagh Ranges, *George 12164*, 26.7.1974 (PERTH). **Austin:** 154 km from Mt Magnet, Geraldton road, *Goodall 2204*, 2.11.1963 (PERTH); nr. Hampton Hill, *Lipinski 206*, 10.1975 (PERTH). **Helms:** 65 km NE. of Laverton, *Beaulehole 59950 & Ertz*, 16.9.1978 (NSW).

***Stipa scabra* subsp. *falcata* (Hughes) J. Vickery, S.W.L. Jacobs & J. Everett, comb. et stat. nov.**

**BAIONYM:** *Stipa falcata* Hughes, Kew Bull. 1921: 14 (1921).

**HOLOTYPE:** NEW SOUTH WALES: 'Murrumbidgee, McArthur 141\*' (K!), the asterisk indicating its status as Type. 'Murrumbidgee' [River] is a rather indefinite locality name encompassing a wide range of habitats; however, it is known that other plant collections by McArthur from the Murrumbidgee were obtained from the vicinity of Yass, about 1850 (McGillivray, pers. com.).

Caespitose perennial c. 0.5 metres high. Upper leaf sheaths 2.5–4.5 mm wide. Ligule truncate, membranous, 0.3–0.6 mm long, minutely ciliate; auricular lobes usually less than 1 mm long with a row of ciliate hairs (0.1–) 0.5–0.9 mm long at the base. Leaf blade expanded, folded or inrolled, 0.6–1.2 mm wide, to 15 cm long; abaxial surface strongly ribbed. Panicle 10–25 cm long, usually open, 2–3 cm wide. Lower glume 10–13 (–15) mm long, upper glume 8–10 (–13) mm long. Callus 1.5–2 mm long. Awn 55–65 mm long. Anthers 2–3 mm long, ± penicillate. Caryopsis 3–3.5 mm.

**DISTRIBUTION:** Mainly Tableland and southern areas of N.S.W., Victoria and South Australia.

**SELECTED SPECIMENS:** QUEENSLAND: **Darling Downs:** Stanthorpe, *Blake 4412*, 12.1.1933 (BRI, NSW).

**NEW SOUTH WALES: North Coast:** Rutherford Camp, *Hilton*, 10.1944 (ADW 43910). **Central Coast:** Homebush, *Vickery NSW 116647*, 3.11.1929 (NSW); Rookwood, *Vickery NSW 116646*, 21.9.1930 (NSW). **Central Tablelands:** Little Bald Hill, c. 4 miles [6 km] N. of Hill End, *Pickard 479*, 23.10.1969 (NSW); Peel via Bathurst, *Constable NSW 16573*, 11.10.1950 (NSW); Rydal, *Boorman*, 12.1900 (NSW). **Southern Tablelands:** Goulburn, *Phillips CBG 001273*, 18.4.1961 (CBG); ESE. of Murrumbateman, *De Nardi 486*, 3.11.1970 (NSW); 8 miles [13 km] SW. of Bungendore, *Story 7897*, 17.4.1967 (CANB); Black Mountain, Canberra, A.C.T., *Pullen 2310*, 3.11.1960 (CANB,

NSW); Mt Ainslie, A.C.T., *Gauba* CBG 003569, 29.10.1949 (CBG); Mt McDonald, Uriarra area, A.C.T., *Pullen* 2343, 15.11.1960 (NSW); Uriarra Crossing, Murrumbidgee River, A.C.T., *Burbidge* 1817, 13.1.1948 (CANB); Kambah Pool, A.C.T., *Gauba* CBG 046361, 2.12.1954 (CBG, BRI); Tinderry Mountains, *Hartley*, 21.11.1971 (CANB 243679, NSW); Tumbarumba district, *Morland* NSW 116642, 4.3.1948 (NSW); on Snowy Mountains Highway near Rhine Falls, *Muir* 2419, 26.10.1961 (NSW, MEL); Cooma, *Mueller* NSW 116606, 10.11.1952 (NSW). **Central Western Slopes:** Dubbo, *Boorman* NSW 116614, 10.1907 (NSW); 1 mile [1.6 km] E. of Cooyal, *Coveny* 2461, 9.11.1969 (NSW); South Mudgee, *Tindale* NSW 116640, 16.10.1953 (NSW); Bowan Park near Cudal, *Blakely* NSW 116612, 10.1906 (NSW); Cowra, *Breakwell* NSW 116615, 9.1913 (NSW); Maimura, *Robinson* NSW 116644, 6.11.1934 (NSW); Young, *Maiden* NSW 116638, 12.1899 (NSW); Ardlethan, *Boorman* NSW 116628, 12.1917 (NSW); Temora, *Elliot* NSW 116608 10.1912 (NSW); Wallendbeen, *Breakwell* NSW 116629, 11.1913 (NSW). **South Western Slopes:** Demondrille, *Cheel* NSW 116618, 13.11.1925 (NSW); Cootamundra, per *Glenfield Veterinary Research Station* NSW 116611, 5.10.1932 (NSW); S. of Wagga Wagga, *Phillips* CBG 054399, 18.10.1971 (CBG); The Rock, *Phillips* CBG 024977, 19.10.1965 (CBG); 4 miles [6 km] E. of Henty, *Flynn* 63, 6.11.1970 (NSW); Howell Reserve, 4 miles [6 km] W. of Burrumbuttock, *McBarron* 4733, 3.8.1950 (NSW); Corowa, *Moore* 474, 5.12.1946 (CANB); Albury, *Blake* 7416, 27.1.1935 (NSW). **South Western Plains:** Milewa State Forest, 25 miles [40 km] S. of Deniliquin, *Leigh* NSW 151532, 3.12.1964 (NSW).

VICTORIA: **Region H:** 5 miles [8 km] from Wedderburn towards Inglewood, *Phillips* CBG 003139, 31.10.1963 (CBG); Inglewood, *Williamson* (MEL 60911). **Region M:** Eaglehawk, *Canning* 3009, 14.11.1969 (CBG). **Region N:** Port Phillip, *Mueller* (CANB 249744). **Region R:** Warby Range, *Canning* 4163, 28.12.1976 (CBG); Yarrowonga Road, 6 miles [10 km] north of Wangaratta, *Muir* 1691, 1.11.1960 (MEL); Mount Pilot Scenic Reserve, c. 8 miles [13 km] N. of Beechworth, *Beaughlehole* 43819 & *Cameron*, 8.12.1973 (NSW); Euroa, *Meebold* 21577, 11.1936 (NSW).

SOUTH AUSTRALIA: **Flinders Ranges:** Wilpena, *Symon* 635, 15.9.1960 (ADW); Mt Remarkable National Park, *Donner* 4907, 6.8.1974 (AD). **Eyre Peninsula:** Mt Wudinna, *Ising*, 7.9.1938 (AD 97650093). **Northern Lofty:** nr. Burra, *Field*, 10.1894 (AD 95811205); Tothill Range, *Kraehenbuehl* 1152, 27.10.1963 (AD). **Murray:** Peebinga, c. 80 km SSE. of Renmark, *Cleland*, 14.10.1960 (AD 968061297); 3 miles [5 km] W. of Murray Bridge, *Crocker*, 23.10.1943 (CANB 12174); c. 5 km S. of Monarto South, *Spooner* 3120, 21.10.1973 (AD). **Southern Lofty:** Saddleworth, *Symon* 788, 27.10.1960 (ADW); c. 16 km N. of Nuriootpa, *Kraehenbuehl* 1689, 23.10.1966 (AD); Altona via Lyndock, *Hilton* 188, 22.10.1952 (ADW); Highbury, *Smith* 720, 1.10.1967 (AD); Waite Institute, *Hilton*, 20.9.1944 (ADW 43907); Sleeps Hill, *Hilton*, 20.9.1944 (ADW 43901); Belair, *Koch* 934, 10.1902 (PERTH); Kinchina, *Cleland*, 15.10.1955 (AD 95705079); Hackham, *Ising*, 10.10.1928 (ADW 43914); c. 5 km W. of Victor Harbor, *Cleland*, 16.8.1940 (AD 95713077); Encounter Bay, *Cleland*, 9.1927 (AD 96324033). **Kangaroo Island:** nr. Harriet River, *Symon*, 8.1954 (ADW 4405). **South-eastern:** Scorpion Spring National Park, c. 15–40 km S. of Pinaroo, *Simon* 8640, 22.10.1973 (ADW); nr. Narrung, *Cleland*, 17.11.1953 (AD 96323314); Box Flat, 34 km SSW. of Lamerook, 35°37'S, 14°24'E, *West* 2452, 9.10.1977 (AD); Tintinara, *Hilton*, 12.11.1935 (ADW 43900); c. 10 km SE. of Naracoorte, *Alcock* 28, 12.1976 (AD); Big Heath National Park, *Alcock* 3120, 11.11.1969 (AD); Carpenter Rocks, *Spooner* 5513, 5.11.1977 (AD).

There are some intermediates between the subspecies that have the inflorescence type of one subspecies but the ligule type of the other. Some examples are:

QUEENSLAND: Goodiwindi, *Blake* 1050, 25.2.1936 (NSW). NEW SOUTH WALES: Warialda, *Vickery* NSW 18447, 1.1932 (NSW); N. of Gunnedah, *Hely* NSW 117372, 30.10.1949 (NSW); 'Iolanthe', 26 km W. of Garah, *Solling* NSW 117374, 21.2.1971 (NSW); Collarenebri, *Waterhouse* NSW 116385, 29.10.1950 (NSW); Girilambone, *Thompson* NSW 116847, 8.9.1969 (NSW). VICTORIA: Suggan Buggan, *Willis* NSW 117373, 16.1.1948 (NSW); Keilor, *Meebold* 21812, 12.1936 (NSW). SOUTH AUSTRALIA: Sandergrove, *Menzel* NSW 117375, 10.1896 (NSW).

*Stipa semibarbata* R. Br., Prodr.: 174 (1910); Hook. f., Fl. Tasman. 2: 110 (1860), in part; Kunth, Enum. Pl. 1: 183 (1833); Bentham, Fl. Austral. 7: 568 (1878), in part but excluding at least the N.S.W. citations; Hughes, Kew Bull. 1921: 20 (1921), at least as to the Tasmanian citations; Rodway, Tasmanian Fl.: 262 (1903); Black, Fl. S. Austral. 1: 66 (1922), probably only in part, edn 2: 89, fig. 109 (1943); Gardner, Fl. W. Austral. 1, Gram.: 179 (1952), probably only in part.

HOLOTYPE: TASMANIA: Port Dalrymple, *R. Brown* 6204 (BM!)

Caespitose perennial to c. 1 metre high, not rhizomatous, with a basal tuft of leaves to about half the height. Culms erect or geniculate at the base, terete, 1–3 mm wide near the base, not compressible, smooth, pubescent to scaberulous or glabrous upwards but pubescent near the nodes; nodes 2–3, exserted, sericeous with hairs 0.3–0.5 mm long, 25–50% wider than the adjacent internodes. Leaf sheaths at first tightly enveloping the culm, later becoming slightly free, 5–10 mm wide, slightly to strongly ribbed, minutely pubescent to glabrous or scaberulous with minute tubercles; inner margin glabrous; outer margin ciliate with hairs minute–0.7 mm long to glabrous; collar ciliate with hairs (0.2–) 0.5–0.8 mm long. Ligule truncate, coriaceous, 1–1.5 mm long, ciliate with hairs 0.2–0.5 mm long; abaxial surface sericeous with hairs c. 0.5 mm long; auricles thickened, 0.5–1 mm long. Leaf blade loosely rolled, 1–3 (–7) mm wide, to 30 cm long; abaxial surface moderately ribbed, slightly scabrous with minute tubercles, to glabrous; adaxial surface strongly ribbed, pubescent with hairs minute–0.2 (–0.5) mm long; margins glabrous to scaberulous. Panicle 5–30 cm long, exserted, with moderately distant fascicles of unequal, few- to many-flowered, compound branches, contracted, 2–4 cm wide (excluding awns); axis, branches and pedicels terete, scabrous or pubescent with hairs minute–0.6 mm long; branches 2–6 cm long; pedicels 5–15 mm long. Spikelets 20–25 mm (excluding awn), gaping. Glumes unequal, acuminate, straw-coloured, hyaline at the edges, scabrous with hairs to 0.1 mm long along the nerves, scaberulous between the nerves; lower glume 18–25 (–27) mm long, lower 60–75% 3-nerved, upper 25–40% 2-nerved, upper glume 15–25 mm long, lower 20–45% 5–7-nerved, upper 55–80% 6-nerved. Floret cylindrical without a neck, 9–11.5 mm long (including callus). Lemma almost black at maturity, the surface smooth to granular upwards, sericeous with white hairs 0.6–0.8 mm long; coma absent; lobes absent. Callus 3–3.5 mm long, weakly bent at the tip, densely sericeous with white hairs 0.2–1 mm long. Awn 70–110 mm long, twice bent, c. 0.5 mm wide near the base; column 30–40 mm long, 20–30 mm to the first bend, brown, pubescent with hairs 0.3–1 mm long; bristle brown, scabrous with hairs 0.1 mm long. Palea  $\pm$  equal to the lemma, acute, granular down the centre, smooth on the edges, sericeous down the centre with hairs 0.4–0.7 mm long. Lodicules 3; 2 abaxial membranous, 1.5–2.5 mm long, obtuse; paleal membranous, c. 0.7 mm long, obtuse. Anthers 3.5–5 mm long,  $\pm$  penicillate. Caryopsis 5.5–6.5 mm long; embryo 20% the length; hilum 90% the length.

DISTRIBUTION: Widespread in Victoria, Tasmania and South Australia, extending into southern Western Australia.

SELECTED SPECIMENS: NEW SOUTH WALES: **Southern Tablelands:** nr. Delegate, *Phillips* CBG 018003, 14.11.1961 (CBG).

VICTORIA: **Region C:** 35 miles [56 km] SW. of Horsham, *Beaughtole* 30958, 25.9.1969 (NSW). **Region D:** on Coleraine railway line, c. 3 km WNW. of Hamilton, *Milne* 331, (MEL); Wannon, *Corrick* 1560, 8.12.1968 (*Corrick* herb.). **Region H:** Campbells Creek, *Mason*, 12.1886 (MEL 59991). **Region J:** Ararat, *Beaughtole* 21726, 15.11.1966 (NSW); Ben Major State Forest, *Farrington* 2, 17.12.1963 (MEL 59993). **Region M:** 7 miles [11 km] S. of Axedale, *Young*, spring 1974 (MEL 1509524). **Region N:** Studley Park, Melbourne, *Melville* 2081, *Willis & Chattaway*, 20.11.1952 (MEL); Port Phillip, *Luehmann* NSW 116472 (NSW). **Region P:** Frankston, 145°10'E, 38°10'S, *Corrick* 6192, 28.11.1978 (MEL). **Region W:** c. 6 miles [10 km] W. of Lakes Entrance on the Metung rd., *Muir* 1956, 27.11.1960 (NSW).

TASMANIA: 1 mile [1.6 km] NW. of St Helens, Goshen road, *Townrow* 190, 19.1.1968 (JEST); 1 mile [1.6 km] S. of Scamander, *Townrow* 185, 1.1968 (JEST); 10 miles [16 km] N. of Orford, *Townrow* 175, 1.1968 (JEST); New Norfolk, *Gunn* 996, 15.11.1840 (NSW); 1 mile [1.6 km] W. of Sorrel on Orielton road, *Townrow* 59, 11.1967 (JEST); Risdon, *Burbidge* 3184, 18.1.1949 (CANB);



Hobart, *Lucas NSW 116468*, 12.1923 (NSW); Mt Wellington, *Martin NSW 116471*, 3.1933 (NSW); North Bruny I., *Townrow 134*, 1.1968 (JEST).

**SOUTH AUSTRALIA:** **Eyre Peninsula:** Marble Range, *Weber 6025*, 30.9.1979 (AD). **Murray:** Braendlers Scrub, 139°07'E, 35°10'S, *Spooner 4324*, 2.11.1975 (AD); Monarto, *Spooner 4303*, 25.10.1975 (AD). **Yorke Peninsula:** Hundred of Ramsay, *Blaylock 1610*, 10.10.1970 (AD). **Southern Lofty:** c. 8 km E. of Tanunda, 34°32'S, 138°58'E, *Kraehenbuehl 2853*, 29.10.1978 (AD); Mt Crawford Flora Reserve, 34°42'S, 138°58'E, *Boomsma*, 11.12.1976 (AD 97702520); Chain of Ponds, 34°49'S, 138°48'E, *Penning 102*, 27.11.1976 (AD); Torrens Gorge West, *Spooner 530*, 8.10.1969 (AD); nr. Tea Tree Gully Quarry, 34°50'S, 138°44'E, *Penning 21*, 13.10.1975 (AD); c. 12 km ENE. of Adelaide, *Whibley 2801*, 21.11.1968 (AD); Morialta Conservation Park, *Clarke 19*, 11.11.1977 (AD); c. 6 km E. of Adelaide, *Smith 1999*, 27.10.1970 (AD); Stonyfell, *Preiss 122*, 14.10.1972 (AD); between Basket Range & Uraidla, *Cleland*, 20.11.1943 (AD 98140420); Glenelg Golf Course, *Smith 552*, 3.10.1967 (AD); Loftian Park, Adelaide Hills, *Hilton*, 26.10.1953 (ADW 43956); Mt Lofty, *Ising*, 7.10.1924 (AD 97421225); nr. Blackwood, *Black*, 20.10.1913 (AD 97420208); Belair, *Koch NSW 15066*, 8.1902 (PERTH); 2 miles [3 km] S. of Mt Barker, *Crisp 4711*, 24.12.1978 (CBG); Hardys Scrub, McLaren Vale, *Boomsma*, 30.11.1978 (AD 97911351); 2 km S. of Meadows, *Czornij 55*, 27.10.1966 (AD); Kuitpo, *Cleland*, 3.1932 (AD 97421225); Mt Moon, Nangkita, *Tindale 7.11.1941* (AD 97739142); Myponga, *Whibley 442*, 10.12.1958 (AD); Finiss Scrub, *Spooner 962*, 18.11.1970 (AD); Fleurieu Peninsula, *Cleland*, 11.11.1967 (AD 93315073). **South-eastern:** Lake Albert, on Coorong, *Cleland*, 8.11.1958 (AD 96806198).

**WESTERN AUSTRALIA:** **Darling:** Midland Junction, *Roe*, 20.10.1934 (CANB 1248); Glen Forrest, *Aplin 1034*, 10.10.1961 (PERTH); Lake Banganup, *Weston 9790*, 2.11.1974 (PERTH); Hamel, *Blake 18043*, 31.8.1947 (PERTH); Harvey to Waroona, *Aplin 1196*, 30.10.1961 (PERTH); Harvey, *Gardner*, 10.1931 (PERTH); Boyanup, *Carne*, 27.11.1923 (PERTH); 12 miles [19 km] NE. of Busselton, *Beauglehole 12449*, 6.9.1965 (NSW, PERTH); Augusta, *Galbraith*, 28.9.1965 (MEL 59936); between Augusta & Nannup, *Phillips CBG 027108*, 18.10.1962 (CBG); Big Brook, Pemberton, *Hart 33*, 14.11.1962 (PERTH); Mt Barker, *Hay*, 12.1924 (PERTH); 3 miles [4 km] W. of Mt Barker, *Fairall 2238*, 5.10.1967 (PERTH).

*S. semibarbata* has been confused with *S. mollis*, *S. densiflora* and *S. hemipogon*, and references to *S. semibarbata* may be to any of the above species.

***Stipa setacea* R. Br.**, Prodr.: 174 (1810); Bentham, Fl. Austral. 1: 568 (1878), in part; Vickery, Contrib. New South Wales Natl. Herb. 2: 78 (1953); Beadle, Evans & Carolin, Handb. Vasc. Pl. Sydney Dist.: 532 (1963), Fl. Sydney Region: 656 (1972); Hughes, Kew Bull. 1921: 25 (1921).

**LECTOTYPE, here designated:** NEW SOUTH WALES: Port Jackson, *R. Brown*, 1802-1805 (BM!). Brown cites regions J and D (i.e. Port Jackson and Tasmania) in the protologue. Townrow (Pap. & Proc. Roy. Soc. Tasmania 104: 85 (1970)) suggests that *S. setacea* does not occur in Tasmania and we have seen no specimens from that State. We therefore here designate the Port Jackson specimen as Lectotype. The plant described and figured as *S. setacea* by Hooker (Fl. Tasman. 2: 110, pl. 157 (1860)) with 'a silky, short, membranous ligule' is a different species not in accord with Brown's description of *S. setacea*.

**SYNONYMS:** *Dichelachne setacea* (R. Br.) Nees in Lehmann, Pl. Preiss. 2: 98 (1846). **TYPIFICATION:** Nees cites *Stipa setacea* R. Br. as the basionym. Nees also cites the collection *Preiss 1854*. Veldkamp (Blumea 22: 11 (1974)) considers a specimen of *Preiss 1854* at BM to be the Holotype of *D. setacea*. Nees and identifies it as *Stipa stipoides* (Hook. f.) Veldk. We have not been able to locate the specimen at BM, but a specimen of *Preiss 1854* at MEL is not *S. stipoides*, differing in the shorter glumes and lemmas, but is entirely consistent with *S. juncifolia* Hughes (see notes under *S. stipoides*).

*S. setacea* var. *latiglumis* J. Black, Trans. & Proc. Roy. Soc. S. Austral. 46: 565 (1922), Fl. S. Austral. 1: 65 (1922). **LECTOTYPE, here designated:** In AD there are three syntypes from Black's herbarium mounted together on one sheet, from Belair, Minnipa and Telowie Gorge (see also CANB photo 237003). The specimen from Minnipa bears a single very long inflorescence scarcely emerging from the sheath. The specimen from Belair bears one panicle, and that from Telowie Gorge two panicles, all in an old condition with the glumes expanded. We here designate the Telowie Gorge specimen as **Lectotype**. We can find no justification for maintaining var. *latiglumis*.

The glumes of *S. setacea* are hyaline and long-acute when complete but they are susceptible to damage. When the glumes are damaged at the apex they expand and flatten, causing the appearance that caused Black to name the variety. Repeated sorting has revealed no characters correlated with this appearance.

*Stipa brachystephana* S. T. Blake, Proc. Roy. Soc. Queensland 62: 90, pl. 6 (1952). HOLOTYPE: SOUTH AUSTRALIA: Flinders Ranges: Port Germein Pass, S.T. Blake 16858, 29.8.1946 (BRI!; isotype ADW). In this specimen, though the spikelets are well developed, they are still relatively young and the glumes appear firmer than they do in more mature specimens.

Caespitose perennial to c. 0.8 metres high, with a basal tuft of leaves to about half the height, without rhizomes. Culms erect or geniculate at the base, terete, c. 1 mm wide near the base,  $\pm$  compressible, moderately to slightly ribbed, glabrous to puberulous, sometimes scaberulous upwards; nodes 2–4, exserted, glabrous, if swollen then to 50% wider than the adjacent internodes. Leaf sheaths tight around the culm, 3–7 mm wide, strongly to slightly ribbed, glabrous to scaberulous; margins glabrous. Ligule obtuse, membranous, 2–9 mm long, not ciliate; abaxial surface glabrous to sparsely puberulous; auricles mostly on lower leaves, thickened, c. 1 mm long, glabrous. Leaf blade firmly folded to inrolled, 0.5–1.5 mm wide, linear, to 30 cm long; abaxial surface strongly ribbed on innovations, smooth to moderately ribbed elsewhere, glabrous to scabrous with minute tubercles; adaxial surface strongly ribbed, densely pubescent with hairs minute–0.1 mm long; margins glabrous to scabrous with minute tubercles. Panicle 10–20 cm long, exserted, with distant fascicles of unequal, few-flowered branches, contracted, 1.5–3 cm wide (excluding awns); axis, branches and pedicels scabrous along the edges with hairs minute–0.1 mm long; branches 1.5–4.5 cm long; pedicels 1.5–7.5 mm long. Spikelets 9–15 (–16) mm long (excluding awn), gaping at maturity. Glumes unequal, acuminate, straw-coloured, hyaline and often erose at the tip, margins glabrous; lower glume glabrous to scaberulous at the tip, 9–15 (–16) mm long, lower 15–50% 3-nerved; upper glume glabrous to scaberulous at the tip, 7–10 mm long, lower 30–50% 5-nerved, upper 50–70% (3–)1-nerved. Floret turbinate with a neck, slightly gibbous, with the awn eccentric, 5.5–7 mm long (including callus). Lemma black at maturity, the surface scaberulous with minute tubercles, not convolute, the margins tightly incurved into a groove down the palea, densely sericeous with white hairs 0.4–0.8 mm long; lobes absent; coma obscure, to 0.8 mm long. Callus 1.7–2.5 mm long, straight, weakly bent at the tip, densely sericeous with white hairs 0.1–1 mm long. Awn 25–40 mm long, twice bent, 0.3–0.5 mm wide near the base; column 10–15 mm long, 5–8 mm to the first bend, dark brown, scabrous with hairs minute–0.1 mm long; bristle paler than the column, scaberulous. Palea subequal to the lemma, obtuse to acuminate, smooth, deeply grooved down the adaxial surface, glabrous to sericeous in the groove with hairs minute–0.5 mm long, margins glabrous. Lodicules 3; 2 abaxial membranous, 0.5–1.5 mm long, oblong to acute; paleal membranous, 0.4–0.8 mm long, oblong. Anthers 2.1–2.3 mm long, not penicillate. Caryopsis 2.5–3 mm long; embryo 20–40% the length; hilum 70–80% the length along the centre of the wide groove corresponding to the groove on the palea.

DISTRIBUTION: Widespread but not common in southern Queensland, New South Wales, southern Victoria and southern South Australia.

SELECTED SPECIMENS: QUEENSLAND: **Maranoa:** 20 miles [32 km] W. of Mitchell, Blake 10953, 31.3.1936 (NSW); nr. Amby, Smith 6307, 22.5.1955 (BRI); Chinchilla, Beasley 156, 4.1931 (BRI). **Darling Downs:** nr. Meandarra, Blake 13277, 13.2.1938 (BRI); Killawarra, Moonie River, Everist 1792, 30.4.1939 (BRI); between Inglewood & Milmerran, White, 20.1.1934 (BRI, K); Inglewood, Wicks, 11.1933 (BRI, K); Kingsford Ridge, Hermitage Research Station, Simon & Henderson 2500, 9.12.1974 (BRI); nr. Wyberba, Blake 4641, 23.1.1933 (BRI); Bald Mt, nr. Wallangarra, Blake 4481, 14.1.1933 (BRI).

NEW SOUTH WALES: **North Coast:** Maitland, *Hilton*, 10.1944 (ADW 43968); Rutherford Camp, 1 mile [1.6 km] from West Maitland, *Hilton*, 9.1944 (ADW 43969). **Central Coast:** Hillview, 3 miles [5 km] SW. of Liverpool, *Coveny NSW 116039*, 19.3.1967 (NSW); Glenfield, *McBarron 13699*, 14.2.1966 (NSW, BRI, CANB, MEL); Cobbitty, *Vickery NSW 116038*, 6.10.1930 (NSW); Camden, *Price NSW 1876*, 7.1946 (NSW); Picton, *McBarron 10087*, 6.12.1964 (NSW). **Northern Tablelands:** New England, *Stuart, s.d.* (MEL); Green Valley, via Guyra, *no collector*, 21.12.1934 (NSW 116036); Crow Mountain, E. of Barraba, *Williams NSW 127933*, 21.12.1972 (NSW). **Central Tablelands:** 2 miles [3 km] N. of Burrawang, *Biddiscombe NSW 116030*, 13.4.1954 (NSW). **North Western Slopes:** Warialda district, *no collector*, 5.12.1952 (NSW 116031); Gunnedah, *Bridge NSW 116028*, 2.11.1956 (NSW); Warrumbungle National Park, *Dunlop 636*, 21.8.1969 (CBG); Binnaway, *Little NSW 116033*, 12.1950 (NSW). **Central Western Slopes:** 8 miles [13 km] SW. of Cassilis, *Story 7025*, 5.12.1959 (CANB); Trangie, *Hutchins*, 3.1947 (CANB 13229, K); Gulgong, *Williardt NSW 116048*, 23.11.1956 (NSW); Forbes, *Crosby NSW 116032*, 16.7.1952 (NSW). **South Western Slopes:** Wagga, *Newman NSW 116042*, 1955 (NSW); Howlong, *McBarron 2602*, 19.11.1948 (NSW). **North Western Plains:** Coolabah, *Cunningham NSW 116041*, 15.7.1968 (NSW); Cobar Reserve, 5 miles [8 km] N. of Cobar, *Dumbleton NSW 116040*, 15.6.1969 (NSW); Boppy Mt, nr. Cobar, *Boorman NSW 116035*, 7.1903 (NSW); Mt Grenfell, Cobar, *Cunningham & Milthorpe 2916*, 26.10.1974 (NSW). **South Western Plains:** Mt Binya, c. 25 km ENE. of Griffith, *Crisp 1476*, 12.11.1975 (CBG, NSW).

VICTORIA: **Region C:** Mt Arapiles, *Beaughole 7446* (in part), 23.11.1964 (NSW), 29689, 21.11.1968 (NSW). **Region M:** c. 50 km NW. of Bendigo, *Beaughole 69435*, 24.10.1981 (NSW), **Region N:** 3.5 miles [6 km] N. of Sunbury, *Pitt 17.1.1974* (MEL).

SOUTH AUSTRALIA: **Flinders Ranges:** Oraparinna National Park, *Symon 7570*, 8.10.1971 (ADW); Mt Brown, *Cooper*, 21.9.1954 (AD 968020459); Melrose, *Hilton*, 12.9.1951 (ADW 44047); Gammon Range (30°25'S, 139°05'E) *Williams 11634*, 30.10.1980 (AD). **Northern Lofty:** Upper Telowie Gorge, *Spooner 6613*, 7.10.1979 (NSW); Tothill Range, *Kraehenbuehl 1083*, 27.10.1963 (AD). **Murray:** Kinchina, *Cleland*, (AD 97420190). **Southern Lofty:** Anstey Hill, *Cleland*, 14.9.1946 (AD 96324083); Hope Valley, nr. reservoir, *Spooner 1517*, 9.9.1971 (AD); Torrens Gorge West, *Spooner 535*, 537, 4.10.1969 (AD); Highbury, *Smith 1975*, 13.10.1969 (AD); c. 11 km NE. of Adelaide, *Spooner 324*, 27.9.1968 (AD); Holden Hill, *Spooner 2749*, 2.3.1973 (AD); Stonyfell Hills, *Cleland*, 21.9.1952 (AD 95705073); Mitcham, *Harris 30*, 26.9.1959 (AD); Eden Hills, *Purdie 92*, 11.9.1966 (AD); Blair, *Cleland*, 20.10.1935 (AD 96324081, 96324084); 42 km SE. of Adelaide (35°12'S, 139°00'E), *Williams 189*, 13.10.1952 (AD); Finnis River, *Black*, 10.1929 (AD 97420190); Halls Creek, *Cleland* 16.11.1930 (AD 98110407), 5.1.1940 (AD 96324082); Encounter Bay, *Cleland* 1.1924 (AD 96324080, 97420192). **South-eastern:** Bordertown, *Black* 25.11.1917 (AD 97420190).

*S. setacea* appears to be closely related to species of the genus *Piptochaetium* and resembles them in having: (i) the palea grooved on the adaxial surface between the two nerves (Fig. 4d); (ii) the floret  $\pm$  turbinate and slightly gibbous high up on the back; and (iii) the sulcate fruit with insertion of stigmas at one side of the obtuse to truncate apex, above the furrow.

We are retaining *S. setacea* (and the closely related *S. feresetacea*) in *Stipa* because of: (i) the membranous palea (rigid, crustaceous or coriaceous in *Piptochaetium*); (ii) the fully enclosed palea tip (exposed and projecting in *Piptochaetium*); and (iii) the lack of a corona (usually present in *Piptochaetium*).

The grooved back of the palea is also developed to a much lesser degree in *S. juncifolia*, *S. petraea* and *S. stipoides*, none of which possesses any other features of *Piptochaetium*, and also in *S. gibbosa*, which has as well, a turbinate, gibbous floret and a projecting palea tip.

On balance, the morphological characters appear slightly to favour the retention of *S. setacea* and *S. feresetacea* in *Stipa*. Biogeographic arguments would also favour the retention of these two species in *Stipa*. Species of *Piptochaetium* s. str. are otherwise confined to the American Continent.

***Stipa stipoides* (Hook. f.) Veldkamp**, *Blumea* 22: 11 (1974); Townrow, Pap. & Proc. Roy. Soc. Tasmania 112: 261 (1978). Based on *Dichelachne stipoides* Hook. f., *Fl. Nov.-Zel.* 1: 294, t. 66 (December 1853).

LECTOTYPE (Townrow 1978): NEW ZEALAND: Bay of Islands, Hooker (K!). Veldkamp (*ibid.*) cites a Banks and Solander specimen from Mercury Bay and Bay of Islands (BM) as the Holotype. Townrow (*ibid.*) stated that, as Hooker's citation included three specimens, the selection of a lectotype was required and, following the recommendations of the Code, the most appropriate specimen was the Hooker specimen from the Bay of Islands (K). We have followed her lectotypification.

SYNONYM: *S. teretifolia* Steudel, *Syn. Pl. Glum.* 1: 128 (March 1854); Bentham, *Fl. Austral.* 7: 567 (1878); Rodway, *Tasman. Fl.*: 262 (1903); Hughes, *Kew Bull.* 1921: 12 (1921); Black, *Fl. S. Austral.* 1: 65 (1922), edn 2: 86 (1943); Willis, *Handb. Pl. Victoria* 1: 182 (1962), edn 2, 1: 182 (1970). HOLOTYPE: cited in the protologue as 'Legit Urville ad Western Port' (Victoria). The Holotype from the Steudel Herbarium (P!) bears a ticket annotated 'Stipa teretifolia Steudel! Port Western (Australia) 9bre 1826. Chauvin 49.' We are therefore unable to understand why Veldkamp (*ibid.*) has cited the Holotype as being: 'Lesson s.n. (P)' which can surely not be the same specimen.

Caespitose perennial to c. 1.2 metres high with an erect basal tuft of pungent-tipped leaves. Culms erect, 0.6–1 mm wide near the base,  $\pm$  compressible, smooth and shiny; nodes c. 3, not exserted. Leaf sheaths  $\pm$  inflated at the base, the upper sheaths not inflated, weakly ribbed, glabrous to shortly pubescent between the nerves with hairs 0.05–1 mm long; margins glabrous, lower sheaths 4–10 mm wide, upper sheaths 2.4–5 mm wide. Ligule obtuse, membranous, papery, 4–9 mm long, glabrous; auricles absent. Leaf blade subterete, permanently folded, 0.6–1.1 mm wide, to c. 70 cm long with a needle-like point; abaxial surface smooth and shiny; adaxial surface slightly ribbed, with hairs 0.05–0.2 mm long; margins glabrous or scabrous with stiff hairs 0.1–0.2 mm long. Panicle 10–25 cm long, exserted, 1–3.5 cm wide (excluding awns); axis slightly flattened, smooth, glabrous; branches to c. 4.5 cm long, glabrous or with a few scattered hairs c. 0.7 mm long; pedicels to 1 cm long, glabrous. Spikelets (12–) 15–20 mm long (excluding awn), laterally compressed, gaping. Glumes equal to subequal, rounded on the back, acute, straw-coloured, sometimes purplish at the base, glabrous; lower glume (12–) 14–20 mm long, lower 50% 1–3-nerved; upper glume (12–) 14–18 mm long, lower 60% 3–5 (–6)-nerved, remainder 1–2-nerved. Floret cylindrical, 8–13 mm long (including callus). Lemma very faintly granular, pilose with hairs 0.5–2.5 mm long; lobes 2, (0.5–) 1.5–2.0 (–3.0) mm long, ciliate; coma obscure, of few hairs 2–3.5 mm long. Callus 1.0–2.5 mm long,  $\pm$  straight, with dense white to light brown hairs to c. 1.2 mm long. Awn 20–40 mm long, weakly twice bent, (0.1–) 0.2 mm wide at the base; column 10–15 mm long, 4–10 mm to the first bend, scabrous with hairs 0.05–0.25 mm long; bristle scabrous with hairs less than 0.1 mm long. Palea equal to the lemma, slightly depressed between the nerves, acute, pilose down the centre with hairs similar to those on the lemma, margins smooth and glabrous, 2-nerved. Lodicules 3; 2 abaxial 1.2–2.0 mm long, tips acute to  $\pm$  erose; paleal 1.5–3 mm long, acute. Anthers 5.5–8.5 mm long, penicillate. Caryopsis 4 mm long; embryo 25% the length; hilum 75–90% the length.

DISTRIBUTION: Coastal areas of southern New South Wales, Victoria, Tasmania, South Australia and New Zealand.

SELECTED SPECIMENS: NEW SOUTH WALES: **South Coast**: Devils Hole, 2 miles [3 km] NE. of Pt Perpendicular, Jervis Bay, *Constable NSW 115818*, 2.1960 (NSW); Cave Beach, 3 miles [5 km] SW. of Jervis Bay, *Coveny 3682*, 10.1971 (NSW, CANB, BRI, MEL); 27 km NNE. of Batemans Bay, *Crisp 6736*, 4.10.1980 (CBG); Camel Beach, Wallaga, *Everett 451 & Jacobs*, 22.10.1981 (NSW); Boydtown, *Everett 443 & Jacobs*, 22.10.1981 (NSW); Towamba River, nr. Kiah, *Gaubá CBG 003956*, 16.11.1954 (CBG, MEL).

VICTORIA: **Region E:** Lower Glenelg River, *Beaulehole* 5891, 28.12.1963 (NSW, AD, MEL). **Region N:** Altona Saltworks, *Corrick* 2903, 11.11.1972 (Corick herb.). **Region P:** shores of Port Phillip, *French*, s.d. (CANB 134047); c. 10 km E. of Lara, *Allen*, 7.10.1977 (MEL 522361); Tooradin, *Blake* 7301, 20.1.1935 (BRI); Swan Bay, *Jacobs* 3667, 31.10.1979 (NSW); Mornington Peninsula, *Muir* 6436, 23.11.1978 (MEL); Western Port Bay, *Muir* 948, 16.11.1959 (NSW, AD, MEL, CANB). **Region X:** 90 Mile Beach, *Jacobs* 2396 & *Williams*, 16.11.1975 (NSW). **Region Z:** Mallacoota, *Gauba CBG* 003957, 16.11.1954 (CBG); c. 8.5 miles [14 km] SSW. of Mallacoota, *Beaulehole* 31125, 9.10.1969 (NSW).

TASMANIA: nr. George Town, *Stuart NSW* 116692, s.d. (NSW); hill above Derwent Estuary, *Burbidge* 3183, 18.1.1949 (CANB); Marion Bay, *Hemsley* 6687, 3.1.1972 (NSW); Clairmont, *Lucas NSW* 116688, 12.1923 (NSW); Risdon, *Vickery NSW* 7491, 18.1.1949 (NSW), *Blake* 18322, 18.1.1949 (BRI, NSW); Sandy Bay, *Rodway NSW* 116693, 11.1898; Tarroona Beach, *Townrow* 6, 11.1966 (JEST); Kingston Beach, *Rodway NSW* 116694, 25.11.1935 (NSW); Eaglehawk Neck, *Blake* 18280, 15.1.1949 (BRI, NSW); Ralphs Bay, *Townrow* 54, 54a 22.11.1967 (JEST); Premaydena, *Jacobs* 2016, 2.2.1975 (NSW); Bond Bay, Port Davey, *Davis* 1268, 14.3.1954 (MEL); Partridge Island, *Townrow*, 12.2.1975 (JEST); Southport, *Phillips & Vickery NSW* 116698, 20.1.1962 (NSW, CBG).

SOUTH AUSTRALIA: **Eyre Peninsula:** Hundred of Flinders, *Specht* 2670, 10.11.1960 (AD). **Murray:** edge of Lake Alexandrina, *Hilton*, 9.10.1954 (ADW 28120). **Yorke Peninsula:** Royston Head, *Weber* 4266, 11.10.1974 (AD); Stenhouse Bay, *Symon* 9549, 6.10.1974 (ADW, NSW). **Southern Lofty:** Waitpinga, *Cleland*, 25.1.1932 (AD 97421168). **Kangaroo Island:** Kangaroo I., *Tate*, 16.11.1883 (MEL, AD); Kingscote, *H.H.D.G.* [?], 28.10.1908 (AD), *Eichler* 15250, 6.11.1958 (AD); Peneshaw, *Hilton* 3.12.1945 (ADW 43980); Hog Bay, *Cleland*, 15.11.1924 (AD); Dudley Peninsula, *Tate* 21.11.1883 (AD 97427497, 97427496); Pennington Bay, *Cleland*, 6.3.1926 (AD); South-West River, *Cleland* 7.11.1934 (AD); Remarkable Rocks, *Phillips CBG* 042830, 2.9.1965 (CBG). **South-eastern:** Vivonne Bay, *Latz*, 11.2.1972 (NT 62993); Woods Well, *Cleland*, 15.10.1955 (AD); Coorong, *Cleland NSW* 116677, 12.1922 (AD, NSW); S. of Banff, *Symon* 10508a, 11.10.1975 (NSW, dupl. of ADW); Lower Coorong, *Symon* 10469, 4.10.1975 (NT); between Kingston & Naracoorte, *Riceman*, 1.1936 (ADW); Robe, *Eardley*, 1.1938 (ADW); Dombey Cape, *Symon*, 26.11.1959 (ADW 21800); Beachport, *Black*, 30.11.1917 (AD 97421167); Rivoli Bay, *Cleland*, 5.3.1944 (AD); E. of Port MacDonnell, *Eardley* 3.2.1942 (ADW 4942).

Veldkamp (*ibid.*) cites *Dichelachne setacea* Nees in Lehmann, Pl. Preiss. 2: 98 (1846), as a synonym of *Stipa stipoides* (Hook. f.) Veldkamp, citing a specimen of *Preiss 1854* in BM as the Holotype of *Dichelachne setacea*. This specimen seems to have been subsequently misplaced and cannot now be found. Two specimens of *Preiss 1854*, one in LD and one in MEL, are *S. juncifolia* Hughes. Veldkamp was not aware that *S. stipoides*, always with a contracted panicle, is confined to littoral habitats, and would not be present 'In regionibus interioribus Australiae meridionale - occidentalis' as cited by Nees. *S. juncifolia* does have long lemma lobes, similar to *S. stipoides*, but differs in having an effuse panicle, elongate ligule, smaller glumes and floret, and a longer awn.

***Stipa stuposa* Hughes**, Kew Bull. 1921: 20 (1921); Townrow, Pap. & Proc. Roy. Soc. Tasmania 112: 259 (1978).

HOLOTYPE: TASMANIA: New Norfolk, *Gunn* 1480, 5.1.1840 (K!, also CANB photo 235994). The Holotype sheet bears, in addition to the main specimen, some fibrous material resembling partially unravelled twine that Gunn has annotated 'Produce I believe of 1480'. It is doubtless this material that caused Hughes to describe the base of the plant as finally breaking up into very long twisted fibres. This condition is believed to be pathological. Similar material is known to be caused by the fungal pathogen *Tolyposporium restifaciens* (Ropey Smut) in other species of *Stipa* (J. Walker, pers. comm.).

Caespitose perennial to c. 1 metre high, without rhizomes, with a basal tuft of leaves to about a third the height. Culms erect or geniculate at the base, terete, 1.5–6 mm wide near the base, not compressible, slightly ribbed, glabrous, scaberrulous to pubescent with hairs minute–1 mm long; nodes c. 3, exserted, densely sericeous with hairs c. 0.2 mm long, to 50% wider than adjacent

internodes. Leaf sheaths at first tightly enveloping the culm, later becoming loose, 4–10 mm wide, slightly ribbed to strongly ribbed on upper sheaths, glabrous to hirsute with hairs minute–0.4 mm long; inner margin glabrous; outer margin glabrous to sparsely ciliate with hairs 0.1–0.3 mm long, rarely longer on upper sheaths; collar glabrous or ciliate with hairs minute–0.6 mm long. Ligule truncate, membranous to coriaceous, 0.5–1 mm long, ciliate with hairs minute–0.2 mm long; abaxial surface densely sericeous with hairs to 0.4 mm long; auricles thickened, ciliate at the base with hairs minute–1.5 mm long. Leaf blade loosely rolled, 2–4 mm wide, to 35 cm long; abaxial surface smooth to moderately ribbed, glabrous to scaberulous with minute hairs and tubercles or pubescent with hairs 0.1–0.5 mm long; adaxial surface strongly ribbed, scaberulous to pubescent with hairs minute–0.3 mm long; margins scaberulous to ciliate with hairs c. 1 mm long, or similar to the abaxial surface. Panicle 20–35 cm long, exserted, with moderately distant fascicles of unequal, few- to many-flowered branches,  $\pm$  contracted or slightly expanded, 2.5–5 cm wide (excluding awns); axis terete to slightly flattened, scaberulous to scabrous with hairs minute–0.1 mm long; branches and pedicels angular to terete, scabrous along the edges with hairs minute–0.3 mm long; branches 3–6 cm long; pedicels 0.2–1 cm long. Spikelets 15–23 mm long (excluding awn), gaping. Glumes unequal, acuminate, straw-coloured, scaberulous along the ribs with hairs minute–0.2 mm long, puberulous elsewhere; lower glume 5–23 mm long, lower 50–85% 3-nerved; upper glume 12–19 mm long, lower (20–) 40–50% (7–) 5–3-nerved, upper (80–) 60–50% (5–) 3–1-nerved. Floret narrowly turbinate without a neck, 7–12 mm long (including callus). Lemma smooth to granular, sericeous with white hairs 0.5–1.5 mm long turning gold at maturity; lobes 2 when present, 0.1–0.2 mm long, ciliate with minute hairs; coma of dense, erect hairs, 1–3 mm long. Callus 1.5–2.5 mm long, densely sericeous with white hairs 0.1–1 (–1.5) mm long turning gold at maturity. Awn 45–70 mm long, with 2 bends, 0.2–0.4 mm wide near the base; column 20–25 mm long, 6–10 mm to the first bend, brown, pubescent to villous with hairs 0.5–1 mm long; bristle straw-coloured, scabrous with hairs minute–0.2 mm long. Palea equal to the lemma, acute, smooth along the edges, slightly granular down the centre, glabrous to sericeous down the centre back with hairs 0.2–1 mm long. Lodicules 2, membranous, abaxial, acute or obtuse, 1.5–2 mm long. Anthers c. 1 mm long, penicillate. Caryopsis 4–5 mm long; embryo 20–35% the length; hilum 70–90% the length.

**DISTRIBUTION:** Scattered through southern New South Wales and Victoria, common in Tasmania.

**SELECTED SPECIMENS:** NEW SOUTH WALES: **South Coast:** Eden, 37°04'S, 149°55'E, *Everett 449 & Jacobs*, 22.10.1981 (NSW); Twofold Bay, *Davis NSW 115820*, 27.12.1952 (NSW); Boydtown, Nullica Bay, 37°06'S, 149°53'E, *Everett 445 & Jacobs*, 22.10.1981 (NSW). **South Western Plains:** Lake Cargellico, *Boorman NSW 117408*, 10.1906 (NSW); Mt Melongel, *Gauba CBG 067328*, 19.11.1950 (CBG); Griffith, *Jacobs 4161*, 24.9.1981 (NSW).

**VICTORIA:** **Region C:** Wimmera, *Reader*, 1892 (MEL). **Region D:** 2.5 miles [4 km] W. of Dergholm, *Beaughtehole 38079*, 24.2.1971 (ACB). **Region H:** Western Highway, NW. of Dadswells Bridge, *Beaughtehole 30100A*, 18.12.1968 (NSW). **Region N:** Observatory grounds, S. Yarra, *Morris*, 14.11.1946 (MEL). **Region P:** Moorabool River, *Carr & Adair 7285*, 18.1.1981 (NSW). **Region R:** 5 miles [8 km] S. of Buckland, *Townrow*, 24.11.1962 (BRI). **Region W:** NE. of Omeo, *Beaughtehole 36852*, 20.2.1971 (NSW); between Ensay N. & Ensay S., *Beaughtehole 37030*, 24.2.1971 (ACB); c. 6 miles [9 km] W. of Lakes Entrance, Metung road, *Muir 1956*, 29.11.1960 (MEL); Kalimna Bluff, *Wakefield 2525*, 3.1948 (MEL).

**TASMANIA:** Big Green I., *Whinray 334*, 25.10.1968 (AD); Launceston, *no collector*, 12.1888 (MEL 60821); Evandale, *Townrow 115*, 12.1967 (JEST); Cressy, *Townrow 120*, 20.12.1967 (NSW); Poatina, *Townrow 7*, 5.4.1967 (HO); nr. O'Connors Peak, *Townrow 116*, 19.12.1967 (NSW); 3 miles [5 km] W. of Orford, *Townrow 69*, 24.11.1967 (JEST); nr. Runnymede, *Phillips 577*, 4.11.1960

(NSW); Risdon, *Burbidge 3185*, 18.1.1949 (CANB); Cambridge side of Warrane, *Townrow*, 5.4.1967 (HO); N. of Lindisfarne, *Townrow 100*, 13.12.1967 (JEST); Hobart, *Blake 18268*, 14.1.1949 (BRI, NSW); Derwent Valley, *Martin NSW 116801*, 12.1933 (NSW); Mt Nelson, *Curtis*, 1.2.1947 (BRI); Slopen I., *Townrow 86*, 12.1967 (JEST); Bonnet Hill, *Townrow 164*, 1.1968 (JEST); 3 miles [5 km] S. of Opossum Bay, *Townrow 50*, 11.1967 (JEST); North Bruny I., *Townrow 159*, 4.1.1968 (JEST); South Bruny I., *Phillips CBG 046199*, 29.11.1965 (CBG).

SOUTH AUSTRALIA: **Southern Lofty**: Black Hill, *Spooner 1691*, 18.11.1971 (AD).

***Stipa tenuifolia* Steudel**, Syn. Pl. Glum. 1: 128 (1854); Hughes, Kew Bull. 1921: 12 (1921); Gardner, Fl. W. Austral. 1, Gram.: 180 (1952).

HOLOTYPE: *Drummond Coll. IV*, 391 N. Holl. (P!; presumed isotypes K, MEL 59997). Gardner (*loc. cit.*) states that *Drummond 220* is the Type, but this number was not cited in the protologue.

SYNONYMS: *S. eriopus* Benth., Fl. Austral. 7: 570 (1878); Hughes, Kew Bull. 1921: 12 (1921); Gardner, Fl. W. Austral. 1, Gram.: 179 (1952). HOLOTYPE: WESTERN AUSTRALIA: Swan River, *Drummond 962* (K!, isotype MEL 59927, CANB photo 237024). The Type specimen is exceptionally woolly-hairy at the base (though scarcely bulbous) and the leaves are strongly curved. Similar hairs are present, but less conspicuous, on numerous other specimens, and the leaves often tend to curve on drying.

*S. scabra* var. *occidentalis* Benth., Fl. Austral. 7: 571 (1878). LECTOTYPE, **here designated**: WESTERN AUSTRALIA: *Drummond 391* (K). In the protologue Bentham cites three synonyms: *S. flavescens* Nees non Labill., *S. tenuifolia* Steud. and *S. puberula* Steud., and cites a number of specimens from Western Australia including *Drummond 391* (the Holotype number of *S. tenuifolia*), *Drummond 220*, 960 and 963 and Murchison River, *Oldfield*, Frasers Range, *Dempster* and *Champion Bay*, *C. Gray* (which are all *S. tenuifolia*) and *Drummond 379* (the Holotype number of *S. puberula* Steud.). Examination of duplicates of the 'Type' of '*S. flavescens* Nees non Labill.' (*Preiss 1826*) in LD and HBG (no specimen now extant at B) has shown that it does belong to *S. flavescens* Labill. though excluded from that species by Bentham, perhaps on account of its unusually spreading inflorescence (see notes under *S. flavescens*). Bentham's brief description of var. *occidentalis*: 'Spikelets usually rather larger and fewer' [than *S. scabra* Lindl.] appears to fit *S. tenuifolia* Steud. much more aptly than *S. puberula* Steud. We therefore agree with Hughes in treating *S. scabra* var. *occidentalis* as a synonym of *S. tenuifolia* Steud. Hughes also cites the variety under *S. puberula* Steud.

*S. scabra* var. *pubescens* Benth., Fl. Austral. 7: 571 (1878). LECTOTYPE, **here designated**: WESTERN AUSTRALIA: *Drummond 375* (K). Bentham cites *Drummond 375* (K!, dupl. MEL 59943) and 973 (K!, dupl. MEL 59944). Hughes cites *Drummond 375* as the Holotype of *S. incurva* Hughes and cites *S. scabra* var. *pubescens* as a synonym. She also cites *Drummond 973* under *S. incurva*. Both specimens are *S. tenuifolia*.

*S. leptophylla* Hughes, Kew Bull. 1921: 14 (1921). HOLOTYPE: WESTERN AUSTRALIA: Swan River, *Drummond 381* (K!, CANB photo 237017).

*S. incurva* Hughes, Kew Bull. 1921: 16 (1921); Black, Fl. S. Austral. edn 2: 87 (1943), *p.p.* HOLOTYPE: WESTERN AUSTRALIA: Swan River, *Drummond 375* (K!, isotype MEL 59943), indicated as such by Hughes with an asterisk. Hughes also cites *Drummond 973* (K!, dupl. MEL 59944) and *S. scabra* var. *pubescens* Benth. as synonyms. The foliage of the two *Drummond* specimens is rather more hirsute than the majority of the specimens of *S. tenuifolia*, and the pubescence on the column is sparse in *Drummond 375*.

Caespitose perennial 0.6–1 metre high with a sparse basal tuft of usually conspicuously extravaginal shoots to 40 cm high. Culms erect or occasionally geniculate, compressible, terete, 0.8–2 (–2.5) mm wide near the base, slightly ribbed, puberulous, especially just below the nodes, or scaberulous or glabrous upwards; nodes 2–3, rarely exserted, to 60% wider than adjacent internodes, glabrous or occasionally very sparsely pubescent. Leaf sheaths tightly enclosing the culm, ribbed; lowermost sheaths villous with long, appressed hairs, or rarely pubescent; upper sheaths puberulous, scaberulous, or glabrous; inner margin glabrous; outer margin sparsely to densely ciliate especially just below the

nodes. Ligule thinly coriaceous, 0.8–1 mm long in the middle, to 4 mm long where continuous with sheath-margin lobes, ovate to obliquely truncate, minutely ciliate or  $\pm$  glabrous, occasionally densely pubescent on the back; auricles thickened, spreading; sheath margin lobes with a dense line of long and thick hairs. Leaf blades to 30 cm long, flexuous or sinuous, usually inrolled, 0.5–1.5 mm diameter, occasionally expanded and to 3 mm wide; abaxial surface unribbed to slightly ribbed, scabrous with short or long stiff hairs or densely hirsute and scabrous; adaxial surface strongly ribbed, hirsute or pubescent, occasionally glabrous; margins similar to abaxial surface. Panicle to 35 cm long, exserted, spreading, to 5 cm wide (excluding awns), usually sparse, occasionally denser, with moderately close fascicles of usually few-flowered branches; axis terete, strongly scabrous; branches to 8 cm long, terete, scabrous; pedicels to 25 mm long, terete, minutely scaberulous or scabrous. Spikelets 13–20 mm long (excluding awn), usually gaping after floret disarticulation. Glumes unequal to almost equal, acuminate, usually purple-tinged; lower glume 13–20 mm long, membranous and translucent, the lower 30–50% 3-nerved; upper glume 12–18 mm long, membranous and translucent at the tip, firmer and green or yellow at the base, the lower 25–35% 5-nerved, the next 35–25% 3-nerved. Floret linear, 7–8 (–9) mm long (including callus), with a well-defined neck, the 3 main nerves slightly thickened at the apex. Lemma finely granular, except tuberculate over the apex of the midvein, black-brown at maturity; hairs white, erect and spreading, sparse especially at the apex; coma obscure, of few hairs in two lateral tufts to 1.5 mm long, or absent; lobes usually 2, to 0.4 mm long. Callus 2.1–3.1 mm long, straight, with dense white to pale yellow hairs. Awn 70–85 (–120) mm long, 0.25–0.45 mm wide near the base, falcate; column 11–16 (–20) mm long, 7–12 mm to the end of the straight portion, densely pubescent or villous with slightly spreading hairs 0.2–0.4 (–0.6) mm long; bristle scaberulous. Palea 0.3–1.3 mm shorter than the lemma, broadly acute to obtuse, coriaceous down the centre with a line of white hairs; margins and tip membranous and glabrous. Lodicules 2, membranous, abaxial, 1.4–1.8 mm long, long-spathulate. Anthers 2.5–3.5 mm long, penicillate. Caryopsis 3–5 mm long; embryo 30% the length; hilum 80% the length.

**DISTRIBUTION:** Southern regions of Western Australia and east to the Yorke Peninsula in South Australia.

**SPECIMENS EXAMINED:** SOUTH AUSTRALIA: **Eyre Peninsula:** Reserve near Mt Verran, *Cleland*, 9.11.1960 (AD 968061284); Flora and Fauna Reserve, Hundred of Hincks, c. 85 km N. of Port Lincoln, *Specht* 2563, 11.11.1960 (AD); S. of Coorabie, *Cleland*, 18.10.1953 (ADW 44063 in part). **Northern Lofty:** Kalimna Scrub, 1 mile [1.6 km] NW. of Nuriootpa, 20 miles [32 km] NE. of Gawler, *Hilton*, (ADW 44097); Miananga, Barossa Valley, *Hilton*, 5.7.1951 (ADW 44107). **Yorke Peninsula:** Port Pirie, *Koch* NSW 116954, 9.1901 (NSW). **Southern Lofty:** Vine Vale, Barossa Valley, *Hilton*, 1.7.1951 (ADW 44106); c. 1 mile [1.6 km] N. of Tanunda, *Kraehenbuehl* 1655, 23.10.1966 (AD); Altona, via Lyndoch, 9 miles [14 km] E. of Gawler, *Hilton*, 11.1952 (ADW 44098, 44099); near Highbury Hotel, *Kraehenbuehl* 882, 22.10.1962 (AD, NSW); Halletts Cove, c. 25 km S. of Adelaide, *Cleland*, 9.10.1920 (AD); Port Noarlunga, *Crisp* 633, 14.10.1973 (CBG); Kuitpo Forest, *Spooner* 720, 28.9.1969 (AD). **Kangaroo Island:** Kingscote, at Reeves Point, *Jackson* 75, 8.10.1960 (AD).

**WESTERN AUSTRALIA:** **Austin:** Murchison River, *Oldfield*, (MEL 59948). **Coolgardie:** Mt Malcolm, *Fitzgerald* NSW 116943, 7.1899 (NSW). **Roe:** Frasers Range, *Dempster* NSW 116831, [1876] (NSW). **Irwin:** Buller River, N. of Geraldton, *Blake* 18080, 2.9.1947 (BRI, PERTH, K); Champion Bay, *Gray*, 1873 (MEL 60027, 60028); 22 miles [35 km] N. of Geraldton in Oakabella Hills, *Burbidge* 2074, 2.9.1947 (CANB); Mingenew, *Holms*, 20.8.1934 (PERTH). **Avon:** Upper Irwin, *Gwerin*, (MEL 60004); 27.1 miles [35 km] from Carnamah towards Mingenew, *Canning* CBG 039490, 14.6.1968 (CBG); between Kununoppin & Mt Marshall & Lake Barlee, *Fraser* NSW 116830, winter–spring 1919 (NSW); c. 41 miles [66 km] S. of Marchagee, *Maslin* 1407, 10.10.1970 (PERTH); 5 miles [8 km] from Goomalling towards Wongan Hills, *Phillips* CBG 039219, 12.9.1968 (CBG).



NSW); 14.5 km from Wyalkatchem towards Dowerin, *Phillips CBG 054857*, 19.9.1962 (CBG); Merredin Research Station, *Landfield*, 10.1948 (PERTH); Grass Valley, *Despeissis*, 1898 (PERTH); Kellerberrin, *Leake*, 9.1897 (PERTH); Muntadgin, *Bailey 176*, 9.1945 (PERTH); Bruce Rock, *Baxter*, 10.1913 (PERTH); Quairading, *Waters*, 9.1957 (PERTH); 17 miles [27 km] E. of Pingelly, *Aplin 773*, 10.1960 (PERTH); 3 miles [5 km] W. of Wagin, *Phillips*, 28.10.1962 (CANB 027110); Kojonup, *Symon*, 9.1954 (ADW). **Darling:** York, *Meadly*, 6.12.1947 (PERTH); Perth, *Maiden NSW 116942*, 10.1909 (NSW); Meekering, 100 miles [160 km] S. of Perth, *Symon*, 9.1954 (ADW 44168); Kelmscott, *Helms*, 11.9.1897 (PERTH); Lake Banganup, Jandakot, *Weston 9798*, 2.11.1974 (PERTH); Medina, *Aplin 1068*, 10.1961 (PERTH); Capel, *Royce 2698*, 25.9.1948 (PERTH); Busselton, *Gardner*, 11.1936 (PERTH); Maryvale, *Macpherson*, 1898 (MEL 60006); Bremer Bay, *Wellstead*, 1900 (PERTH); Albany Highway, 25 km N. of Mt Barker, *Pullen 10004*, 12.12.1974 (CANB); King Georges Sound, *Oldfield* (MEL 59992). **Eyre:** between Jeramungup & Ravensthorpe at West River Crossing, *Canning*, 10.11.1968 (CBG); Desmond, near Ravensthorpe, *Maiden NSW 116949*, 11.1909 (NSW); between Esperance Bay & Frasers Range, *Dempster*, 1876 (MEL 60926).

*S. tenuifolia* is similar to *S. variabilis* but differs in the longer floret and awns and the longer, usually unequal glumes.

***Stipa trichophylla* Benth.**, Fl. Austral. 7: 570 (1878); Hughes, Kew Bull. 1921: 14 (1921); Gardner, Fl. W. Austral. 1, Gram.: 180 (1952).

HOLOTYPE: WESTERN AUSTRALIA: *Drummond 122* (K!; isotype MEL 60010, 60011, CANB photo 237021).

Caespitose perennial to 0.6 metres high with a basal tuft of mainly intravaginal shoots to half the height. Culms erect but usually geniculate at the first node, easily compressible, terete, 0.8–1.5 mm wide near the base, smooth to slightly ribbed, glabrous (or the basal internodes puberulous) but sparsely to moderately pubescent or scaberulous just below the nodes; nodes 2–3, exserted, to 50% broader than adjacent internodes, glabrous. Leaf sheaths tightly enveloping the culms although older basal sheaths often present and loose, ribbed, 2.5–5 mm wide, the uppermost sheath broader, to 7 mm wide; lowermost sheaths pubescent, almost glabrous, or villous with appressed hairs; upper sheaths glabrous to minutely scaberulous between the nerves; inner margin glabrous; outer margin long-ciliate, especially just below the orifice, or glabrous on the upper sheaths. Ligule membranous, 0.5–1 mm long where continuous with the sheath-margin lobes, usually much shorter in the middle, obtuse or lacinate, ciliate, auricles slightly thickened, not spreading, with a tuft of fine, straight or slightly crinkly hairs 1–1.7 mm long. Leaf blades to 20 cm long, very fine, erect or flexuose, tightly inrolled, 0.3–0.5 mm diameter; abaxial surface scarcely ribbed, hirsute with dense to sparse, soft, spreading hairs to 1 mm long, scabrous with a layer of shorter, stronger hairs; adaxial surface strongly ribbed, sparsely to densely hirsute with long hairs, margin similar to abaxial surface or with antrorse scabrous hairs. Panicle to 25 cm long, exserted, contracted, or occasionally spreading, 15–40 mm wide (excluding awns), sparse with moderately distant fascicles of few, sparsely-flowered branches; axis terete; axis, branches and pedicels scabrous to puberulous; branches angular to 8 cm long; pedicels to 15 mm long, very slender, flattened. Spikelets 9.5–14 mm long (excluding awn), slightly gaping after floret disarticulation. Glumes subequal to unequal, finely acuminate, purple-tinged at the ends of the nerves, otherwise straw-coloured, transparent and membranous at the tip, firm at the base; lower glume 9.5–14 mm long, the lower 50–70% 3-nerved; upper glume 8–11.5 mm long, the lower 20–50% 5-nerved, the next 10–40% 3-nerved. Floret linear to fusiform, 3.8–6.5 mm long (including callus) with a slight neck, the 3 main nerves slightly prominent at the apex. Lemma finely granular except tuberculate over the apex of the midvein, gold-brown at maturity, the nerves paler; hairs

white, erect and spreading, sparse especially at the apex; coma obscure, of few hairs in two lateral tufts to 1.5 mm long; lobes usually 2, to 0.3 mm long. Callus 1.2–2.5 mm long, straight and fine, with dense white hairs. Awn 38–60 (–75) mm long, 0.15–0.35 mm wide near the base, falcate; column 6–10 mm long, densely pubescent with spreading hairs 0.15–0.3 (–0.4) mm long; bristle scaberulous. Palea 0.25–0.5 mm shorter than the lemma, broadly acute to obtuse, coriaceous down the centre with a line of white hairs; margins and tip membranous and glabrous. Lodicules 2, membranous, abaxial, 0.5–0.7 mm long, linear to slightly spatulate. Anthers 1.5–2 mm long, penicillate. Caryopsis 2.3–3 mm long; embryo 20–30% the length; hilum 40–50% the length.

**DISTRIBUTION:** Scattered and uncommon in the drier areas of New South Wales, Victoria, South Australia, Northern Territory and southern Western Australia.

**SELECTED SPECIMENS:** NEW SOUTH WALES: **South Western Plains:** Kyalite State Forest, 34°58'S, 143°32'E, *Everett 52 & Jacobs*, 22.11.1980 (NSW). **North Far Western Plains:** Olive Downs Jump Up, 32°04'S, 141°55'E, *Everett 237 & Jacobs*, 6.9. 1981 (NSW).

**VICTORIA: Region C:** S. slope of Mt Arapiles, 36°45'S, 141°50'E, *Everett 366 & Jacobs*, 17.10.1981 (NSW). **Region D:** 3.7 miles [6 km] W. of Tubbut, *Beaughtole 33132 & Finck*, 5.1.1970 (NSW).

**NORTHERN TERRITORY:** 8 miles [13 km] WNW. of Ayers Rock, *Lazarides 6152*, 7.9.1956 (NSW); 37 miles [43 km] NE. of Docker River Settlement, *Latz 868*, 28.10.1970 (NT, CANB).

**SOUTH AUSTRALIA: North-western:** Government North West Expedition, *Basedow 120*, 1903 (NSW); Tompkinson Ranges, *Cleland*, 25.8.1954 (AD 96806194); c. 1.75 km WNW. of summit of Mt Poondinna, *Whibley 6447*, 29.8.1978 (AD). **Lake Eyre Basin:** Hamilton Creek, *Langley 396*, 9.1898 (AD). **Flinders Ranges:** Arkaroola, 30°19'S, 139°18'E, *Everett 245* 13.9.1981 (NSW); Mt Gee, *Kuchel 3167*, 15.9.1973 (AD); Mt Chambers Gorge, *Cleland*, 31.5.1937 (AD 95714010); 'Moolooloo', between Blinman & Beltana, *Rogers NSW 116876*, 10.1915 (NSW); above Aroona Valley, *Symon 7241*, 12.9.1971 (ADW, NSW); Wilpena Pound, 31°31'S, 138°34'E, *Everett 266*, 17.9.1981 (NSW); Melrose, *Czornij 632*, 10.10.1973 (AD). **Eastern:** 'Koonamore', *Osborne*, 18.12.1924 (AD 97741253); 'Mt Victor', *Crisp 440*, 4.9.1971 (CBG); Morialta, *Vickery NSW 116873*, 11.1938 (NSW). **Eyre Peninsula:** Gawler Range, *Weber 3073*, 23.9.1972 (AD); Warunda, *White*, 10.1909 (AD 97734167). **Northern Lofty:** South Hummocks Range, *Blaylock 736*, 1.10.1967; nr. Owen, *Cleland*, 30.10.1968 (AD 97350090). **Murray:** 15 km W. of Murray Bridge, *Carrick 3805*, 2.10.1974 (NSW); c. 25 km N. of Lameroo, *Cleland*, 13.10.1960 (AD 968061298). **Yorke Peninsula:** 1.5 miles [2 km] N. of Winulta, *Symon 1475*, 14.9.1961 (ADW). **Southern Lofty:** 2 miles [3 km] WNW. of Gawler, *Smith 959*, 23.10.1967 (AD). **South-eastern:** 47 km N. of Kingston, *Symon 10548*, 11.10.1975 (ADW, NSW); 3.7 km S. of Banff, *Symon 10414*, 9.10.1975 (ADW, NSW).

**WESTERN AUSTRALIA: Eucla:** Eucla, *Noble NSW 116864*, 8.8.1973 (NSW). **Austin:** 40 miles [64 km] E. of Meekathara, *Royce 2004*, 15.6.1947 (PERTH); Wiluna area, *Morrisey 48*, 12.1970 (PERTH); 4 miles [6 km] S. of Agnew, *Beaughtole 59683 & Errey*, 14.9.1978 (NSW); Youanmi townsite, *Saffrey 1023*, 26.8.1970 (PERTH); Poison Creek via Leonora, *McGregor NSW 116857*, 9.1909 (NSW); 'Glenorn', *Burbidge 114*, 8.1938 (PERTH). **Coolgardie:** 30 miles [48 km] S. of Coolgardie, *Smith 532*, 16.9.1966 (NSW); Fraser Range, *Beard 6301*, 13.9.1970 (PERTH, NSW). **Roe:** 0.5 miles [1 km] E. of Julakin Rock, *Malcom*, 24.10.1959 (PERTH); Peak Charles, *Newbey 6457*, 11.11.1979 (PERTH); Desmond, *Maiden NSW 116861*, 11.1909 (NSW). **Eyre:** Cape Arid National Park, *Royce 10145*, 5.12.1971 (PERTH); 104 miles [168 km] W. of Esperance, *Beaughtole 13094*, 17.9.1965 (PERTH, NSW); Susetta Creek, *Royce 9190*, 21.10.1970 (NSW). **Avon:** 12 miles [19 km] NW. of Wialki, *Storr NSW 150582*, 4.10.1958 (PERTH); Merredin, *Maiden NSW 116855*, 10.1909 (NSW); Tammin, *Maiden NSW 116863*, 9.1909 (NSW); Northam, *Gardner 6433 p.p.*, 7–8.9.1942 (PERTH); 17 miles [27 km] E. of Pingelly, *Aplin 773*, 10.1960 (PERTH); Wagin, *Gardner*, 10.1920 (PERTH). **Carnarvon:** 1 mile [1.5 km] S. of Wannoo, *Phillips CBG 039486*, 16.9.1968 (CBG). **Irwin:** Northampton, *Helms NSW 116858*, 10.1898 (NSW, PERTH); Pindar, *Maiden NSW 116865*, 10.1909 (NSW). **Darling:** Mt Barker, *Gardner 1.1925* (PERTH).

***Stipa tuckeri* F. Muell.**, *Fragm.* 9: 129 (1881); Hughes, *Kew Bull.* 1921: 11 (1921); Gardner, *Fl. W. Austral.* 1, Gram.: 172, pl. 50B (1952); Willis, *Handb. Pl. Victoria* 1: 181 (1962), edn 2: 181 (1970); Black, *Fl. S. Austral.* 1: 65 (1922), edn 2: 84 (1943).

**HOLOTYPE:** The specimen labelled 'Type' in MEL bears the following: [in an unidentified hand] '*Stipa Tuckeri*, F.v.M. in *Fragm.* XI. p 128 (1881) Type.' [and in Mueller's hand] '*Stipa breviplumosa* F.v.M. Between the Lach, and Darl. R. Not extending so far south as *S. elegantissima*. Garard Tucker' (MEL; dupl. NSW).

Caespitose perennial to c. 0.5 metres high, shortly rhizomatous, without a basal tuft of leaves but with many culm leaves. Culms erect to decumbent, terete, wiry, c. 1.5 mm wide near the base, frequently branching at the nodes,  $\pm$  compressible, smooth to strongly ribbed, lowest internodes glabrous, upper internodes pubescent with retrorse hairs 0.5–1 mm long; nodes 3–5, not swollen, not exserted, with sericeous hairs c. 0.6 mm long at the base of the node. Leaf sheaths at first tightly enveloping the culm, later becoming slightly free, pubescent with hairs 0.6–1 mm long, margins glabrous; lower sheath 4.5–7.5 mm wide, moderately ribbed; upper sheath 4.5–8.5 mm wide, weakly to strongly ribbed. Ligule obtuse, membranous, 2.5–6 mm long, glabrous to pubescent on the sides with hairs 0.2 mm long; auricles absent. Leaf blade expanded or loosely rolled, 0.3–1.2 mm wide, c. 13 cm long, strongly ribbed; abaxial surface pubescent with hairs 0.2–0.3 mm long to glabrous; adaxial surface pubescent with hairs 0.1–0.3 mm long; margins ciliate with hairs 0.2–0.5 mm long. Panicle 15–20 cm long, 10–17 cm wide (excluding awns), exserted, pyramidal with whorls of moderately long, few-flowered, compound branches, spreading widely at maturity; axis terete to slightly flattened, glabrous to plumose upwards with hairs c. 0.5 mm long; branches 5–6 cm long, slightly flattened to angular, plumose with hairs 0.3–0.6 mm long; pedicels 1–1.5 cm long, terete, plumose with hairs c. 0.3 mm long. Spikelets 6–7.5 mm long (excluding awn), gaping only at maturity. Glumes unequal, rounded on the back, purple with a straw-coloured tip, scabrous with hairs 0.1–0.2 mm long; lower glume 6–9 mm long, tip acute (to acuminate), lower 40–50% 3-nerved; upper glume 5–9 mm long with an acuminate tip, lower 50–60% 3-nerved, upper 40–50% 1 (–2)-nerved. Floret narrow-cylindrical, tapering to the apex, 4–5 mm long (including callus). Lemma dark brown, the surface tuberculate; coma obscure, 0.1–0.25 mm long; lobes absent. Callus 0.2–0.3 mm long, almost straight, with white hairs 0.2–0.5 (–0.8) mm long. Awn 30–35 mm long, straight or once bent, 0.1–0.2 mm wide near the base, straw-coloured to dark-brown; column c. 10 mm long, scabrous with hairs 0.05–0.1 mm long; bristle scaberulous. Palea 20–35% the length of the lemma, obtuse, surface granular down the centre, margins smooth. Lodicules 2, abaxial, 2–3 mm long, oblong with acute tips. Anthers 1–1.5 mm long, not penicillate. Caryopsis 2.5–3 mm long; embryo 10–30% the length; hilum 50–60% the length.

**DISTRIBUTION:** Mainly on the Western Plains of New South Wales but also on the North and Central Western Slopes, and in South Australia and Western Australia.

**SELECTED SPECIMENS:** NEW SOUTH WALES: **North Western Slopes:** Liverpool Plains, *no collector*, *no date* (NSW 115816). **Central Western Slopes:** Trangie, *Whittet* NSW 115807, 3.1946 (NSW); *Huichens*, 3.1947 (CANB 13121); 6 miles [9 km] S. of Tullibigeal, 'Wilga Plains' road, *Ingram* NSW 115805, 9.1956 (NSW). **North Western Plains:** c. 25 miles [40 km] SE. of Louth, *Moore* 4932, 21.4.1967 (NSW, CANB); 3 miles [5 km] N. of Cobar, *Leigh* NSW 97794, 10.1966 (NSW); Mt Boppy, *Boorman* NSW 115809, 11.1903 (NSW, K); Nyngan, *Blakely* NSW 115817, 10.1912 (NSW). **South Western Plains:** 3 km NE. of Gilgunnia, *Pickard* NSW 145675, *s.d.* (NSW); 5 miles [8 km] N. of Ivanhoe, *Leigh* NSW 115800, 4.1969 (NSW); between Lachlan & Darling rivers, *Tucker* NSW 115815, *s.d.* (NSW); Yenda, *Nicholson* NSW 115813, 6.1925 (NSW).

SOUTH AUSTRALIA: **Eastern:** 'Bibliando', nr. New West Bore, 31°54'S, 139°03'E, *Crisp* 724, 12.4.1974 (CBG); N. of 'Baratta', SW. of Lake Frome, *Cleland*, 3.12.1930 (AD 97421157). **Murray:** 43 km N. of 'Hypurna', 33°10'S, 140°54'E, *Conn* 930, 12.9.1980 (AD).

WESTERN AUSTRALIA: **Austin:** 'Glenlorn', Malcolm, *Burbidge* 293, 8.1938 (PERTH). **Coolgardie:** Coolgardie-Esperance highway between Norseman & Widgeemooltha, *Willis*, 3.10.1961 (MEL 1509516).

*Stipa variabilis* *Hughes*, Kew Bull. 1921: 15 (1921); Gardner, Fl. W. Austral. 1, Gram.: 182 (1952).

HOLOTYPE: WESTERN AUSTRALIA: *Drummond* 961 [which Hughes indicated by an asterisk as the Type] (K!; isotype MEL 59987, CANB photos 237000 and 237001). With her description, Hughes cites three purported synonyms and a number of specimens from four States. The first and second purported synonyms merely report misidentifications by the respective authors and, in view of her clear indication of the specimen she indicated as the Type of *S. variabilis*, have no claim for consideration as Type elements. The third appears to be a synonym of varietal rank, as discussed below. Of the specimens cited from Western Australia, Hughes herself (Kew Bull. 1922: 16 (1922)) casts doubt upon the identity of the three numbers collected at Kauring by Stoward (not seen by us). She accepted *Drummond* 961 as her Type, she also cited 'Ningham Country beyond the Arrowsmith River, *Monger*' which appears to be the Type of *S. pubescens* var. *effusa* Benth. We have seen three sheets: 'Beyond the River Arrowsmith, *Monger*' (MEL 60014), 'Ningham country, *Monger*' (MEL 60013, 60012) which are apparent duplicates, and which are conspecific with *S. variabilis*. We consider it highly improbable that the sheets Hughes cites from South Australia, Victoria and Tasmania (not seen by us) represent *S. variabilis*. Although *S. variabilis* does occur in South Australia it is relatively uncommon and the earliest record is from 1946 indicating the possibility that *S. variabilis* is a comparatively recent introduction to South Australia.

SYNONYM: *S. pubescens* var. *effusa* Benth., Fl. Austral. 7: 750 (1878), as 'var. ?*effusa*'. HOLOTYPE: WESTERN AUSTRALIA: 'Ningham country beyond Arrowsmith River, *Monger*' (K!; 3 apparent isotypes MEL 60012, 60013, 60014).

Caespitose perennial, to 0.8 metres high with a sparse basal tuft of mainly intravaginal shoots to a quarter the height. Culms erect or geniculate, compressible, terete, 0.6–1.0 mm wide near the base, slightly ribbed, glabrous but minutely puberulous just below the nodes, rarely sparsely puberulous overall; nodes 2–3, barely exserted, to 50% broader than adjacent internodes, glabrous. Leaf sheaths tightly enveloping the culms, at length loose, ribbed; lowermost sheaths pubescent or almost glabrous or villous with long, appressed hairs; upper sheaths glabrous or scaberulous; inner margin glabrous; outer margin ciliate, especially just below the orifice or glabrous on the upper sheaths. Ligule thinly coriaceous, 0.5–1.0 mm long in the middle, to 2.0 mm long where continuous with sheath-margin lobes, obliquely truncate, glabrous; auricles thickened, spreading; auricles with a dense line of long thick hairs. Leaf blades to 25 cm long, flexuose, usually inrolled, 0.5–0.6 mm diameter, occasionally expanded, to 4 mm wide; abaxial surface scarcely ribbed, glabrous or occasionally scabrous to hirsute, especially on the basal leaves; adaxial surface strongly ribbed, sparsely to densely hirsute; margins similar to abaxial surface or with minute antrorse scabrous hairs. Panicle to 35 cm long, exserted, contracted or occasionally spreading, to 4 cm wide (excluding awns), sparse with moderately close fascicles of few, sparsely-flowered branches; axis terete, glabrous or scaberulous; branches to 9 cm long, terete, scaberulous; pedicels to 20 mm long, terete, scaberulous to scabrous upwards. Spikelets 10–13 mm long (excluding awn), slightly gaping after floret disarticulation. Glumes equal to unequal, acuminate, usually purple-tinged; lower glume 10–15 mm long, membranous and translucent, the lower 30–50% 3-nerved; upper glume 8.5–12.5 mm long, membranous and translucent at the tip, firmer and green or yellow at the base, the lower 25–35% 5-nerved, 3-nerved to 40–60%. Floret

linear to fusiform, 4.5–6.5 (–7) mm long (including callus) with a slight neck, the 3 main nerves slightly thickened at the apex. Lemma finely granular, except tuberculate over the apex of the midvein, black-brown at maturity; hairs white, erect and spreading, sparse especially at the apex; coma obscure, of few hairs in 2 lateral tufts to 1.0 mm long; lobes usually 2, to 0.25 mm long. Callus 1.6–2.2 mm long, straight and sturdy, sericeous with dense white to pale yellow hairs. Awn 50–70 (–90) mm long, (0.2–) 0.3–0.4 mm wide near the base, falcate; column 11–14 mm long, 6–11 mm to the end of the straight portion, densely pubescent or villous with spreading hairs 0.2–0.5 mm long; bristle scaberulous. Palea 0.3–0.5 mm shorter than the lemma, broadly acute to obtuse, coriaceous down the centre with a line of white hairs; margins and tip membranous and glabrous. Lodicules 2, membranous, abaxial, 1.0–1.6 mm long, long-spathulate. Anthers 1.5–2.8 mm long, lightly penicillate. Caryopsis 3–4 mm long; embryo 25–30% the length; hilum 70–75% the length.

DISTRIBUTION: Southern Western Australia and eastwards to southern regions of South Australia.

SELECTED SPECIMENS: SOUTH AUSTRALIA: **Nullarbor**: 15 km E. of 'Koonalda', *Chinnock* 1192, 21.9.1973 (AD); Nullarbor Plain, *Hilton*, 22.8.1955 (ADW 1977). **Eyre Peninsula**: 9 km NE. of Penong, *Crisp* 6362, *Taylor & Jackson*, 5.10.1979 (CBG); c. 146 km S. of Kingoonya, Iron Knob road, *Orchard* 939, 26.8.1968 (AD). **Northern Lofty**: Tothill Range, *Kraehenbuehl* 1084, 27.10.1964 (AD). **Yorke Peninsula**: Kadina Mine dump, *Lothian* 3032, 3.11.1964 (AD). **Southern Lofty**: Elizabeth, *Kraehenbuehl* 1428, 20.6.1965 (AD); Anstys Hill, *Cleland*, 14.9.1946 (AD 96326158); Black Hill nr. Athelstone, *Spooner* 5318, 2.9.1977 (AD 97813108); National Park [Belair], *Cleland*, s.d. (AD 95714025); Woodville, *Cleland*, 9.9.1948 (AD 96326138); Victor Harbor, *Hilton*, 15.10.1955 (ADW 13246). **South-eastern**: nr. Keith, *Specht*, 9.1949 (AD 96514010).

WESTERN AUSTRALIA: **Eucla**: 50 miles [80 km] NNE. of Rawlinna, *Brooker* 172, 5.9.1974 (CANB); Forrest, *Aplin* 1647, 31.8.1962 (PERTH); 62 km S. of Rawlinna, Cocklebidly road, *George* 11882, 13.7.1974 (PERTH, NSW); Western Australia–South Australia border, Eyre Highway, *Phillips* 258, 8.9.1962 (CBG); c. 1 km N. of Eucla, *Beauglehole* 49433, 30.8.1974 (CANB). **Austin**: W. of Youanmi, *Aplin* 6089(a), 1.9.1975 (PERTH); Laverton, *Maiden* NSW 117001, 1.9.1909 (NSW). **Coolgardie**: 9 miles [14 km] W. of Coolgardie, *Phillips* CBG 027104, 16.9.1962 (CBG); between Norseman & Coolgardie, *Canning* 2637, 5.9.1968 (CBG, NSW); 48 km W. of Coonana nr. Cardonia Rocks, *Chinnock* 1116, 18.9.1973 (AD); Fraser Range, *Dempster*, 1876 (MEL 59986, 60905); 2.5 miles [4 km] from Caiguna towards Madura, *Canning* CBG 039218, 4.9.1968 (CBG, NSW); Woodline, *Cleland* s.d. (AD 966050958). **Roe**: Pallarup Rocks, SE. of Lake King, *George* 1546, 13.10.1960 (PERTH). **Eyre**: Israelite Bay, *Brookes* NSW 151491, 9.1915 (NSW); Munglinup River, Esperance–Ravensthorpe road, *Canning* 7079, 7090, 3.11.1968 (CBG); West River, between Jeramungup & Ravensthorpe, *Canning* 7548, 10.11.1968 (CBG, NSW); between Esperance Bay & Fraser Range, *Dempster* 1876 (MEL 60937); Observatory I., 33°56'S, 121°48'E, *Weston* 9415, 2.6.1974 (PERTH); Lort River, Esperance–Ravensthorpe road, *Jackson* 1365B, 9.10.1968 (AD, PERTH); Susetta River, *George* 10011, 13.7.1970 (PERTH); Fitzgerald River, *George* 10558 (PERTH), 10571 19.12.1970 (PERTH, NSW); Stirling Range, *Nelson* ANU 16802, 24.10.1972 (CANB); Young River, Esperance–Ravensthorpe road, *Donner* 2968, 10.10.1968 (AD, PERTH). **Avon**: Mingenew, *Holmes*, 20.8.1934 (PERTH); Three Springs, *Canning* 3347, 23.9.1968 (CBG, AD); 46 miles [74 km] N. of Coorow, *Phillips* CBG 018892, 25.9.1962 (CBG); 35.6 miles [57 km] from Wubin towards Wongan Hills, *Canning* 2889, 13.9.1968 (CBG, BRI); 3–4 miles [5–6 km] from Northam, *Salasoo* 241, 244, 15.10.1949 (NSW). **Irwin**: Northampton, *Galbraith* 573, 27.8.1964 (MEL); Minninooka [Moonyoonooka] 25 miles [40 km] E. of Geraldton, *Morris*, 9.1947 (MEL 60023, 60026). **Darling**: 15 miles [24 km] from Jurien Bay towards Moora *Phillips* 1678, 25.9.1968 (CBG, BRI); Moora, *Blake* 18049, 1.9.1947 (BRI, PERTH); c. 6 miles [9 km] S. of New Norcia, *Beard* 7935, 30.9.1976 (NSW, PERTH); Gingin, *Gardner*, 7.12.1923 (PERTH); Darling Range, *Morris*, 9.1947 (MEL 60017, 60018); 25 km N. of Mt Barker, *Pullen* 10004, 12.12.1974 (NSW).

The specific epithet has been applied to a range of species (nearly all of the Falcateae) by Australian collectors and authors in recent years, and their identifications and descriptions must be regarded with caution.

*S. variabilis* is characterised by a floret 4.5–7 mm long and a densely pubescent column of the awn.

***Stipa velutina* J. Vickery, S.W.L. Jacobs & J. Everett, sp. nov.**

*S. flavescenti* affinis, sed pilis velutinis laminarum foliorum vaginarumque, glumis pubescentibus, flosculo plerumque brevior, differt.

HOLOTYPE: SOUTH AUSTRALIA: **Nullarbor**: Head of Bight, J.C. Noble 7, 7.8.1973 (NSW 117409).

Caespitose perennial 0.3–0.8 metres tall, without rhizomes. Shoots conspicuously extravaginal, flexuose, half to equal the height. Culms geniculate at the base, terete,  $\pm$  compressible, 1.5–2 mm wide near the base, sparsely ribbed to strongly ribbed upwards, velutinous with dense soft minute hairs; nodes to 50% wider than the adjacent internodes, exserted, velutinous with hairs 0.2–0.5 mm long. Leaf sheaths tight around the culms, uppermost slightly inflated at the base of the panicle, moderately ribbed, velutinous with hairs minute–1 mm long; basal sheaths glabrous on innovations, 4–8 mm wide, outer margin long-ciliate with hairs 0.2–0.5 mm long, inner margin glabrous; upper sheaths 4–5 mm wide, outer margin long-ciliate with hairs 0.2–1 mm long, inner margin glabrous. Ligule membranous, broadly obtuse to truncate, often erose, 0.2–1 mm long, sericeous on the abaxial surface, ciliate with hairs 0.1–0.3 mm long; auricles  $\pm$  thickened, c. 1 mm long, with tufts of straight hairs 1 mm long. Leaf blades linear, expanded or loosely inrolled, 2–3 mm wide, to 40 cm long, margins and both surfaces velutinous with hairs minute–0.1 mm long; abaxial surface smooth to moderately ribbed; adaxial surface strongly ribbed. Panicle contracted, 15 cm long, 0.5–2 cm wide (excluding awns), with closely spaced fascicles of unequal, few-flowered, compound branches, exserted late; axis terete, velutinous with hairs minute–0.2 mm long; branches angular, to 3.5 cm long, pubescent with hairs 0.1–0.2 mm long; pedicels angular, 1–5 mm long, pubescent with hairs 0.1–0.2 mm long. Spikelets slightly gaping, 9–12 mm long (excluding awn). Glumes unequal, sparsely pubescent with hairs minute to 0.5 mm long; lower glume 9–12 mm long, long-acuminate, lower 20–35% 3-nerved, upper 65–80% 2–1-nerved, green-yellow at the base but purple-tinged for most of its length; upper glume 6.5–10 mm long, acute to acuminate, lower 25–50% 5-nerved, upper 50–75% 3–1-nerved, green-yellow, purple at the tip. Floret narrow-fusiform, 5–6.5 mm long (including callus). Lemma surface slightly granular, with soft spreading white hairs 0.5–1.5 mm long; coma 0.1–0.5 mm long, formed from the upper hairs; lobes absent or 2, 0.1–0.2 mm long. Callus straight, 1–2 mm long, densely sericeous with white hairs 0.1–0.8 mm long. Awn 0.2 mm wide at the base, 30–45 mm long with two bends; column straw-coloured, 10–25 mm long, 7–9 mm to the first bend, pubescent with soft hairs 0.1–0.3 mm long; bristle straw-coloured, scaberulous. Palea subequal to the lemma, broadly acute to obtuse, slightly granular down the centre, sericeous down the centre with hairs 0.5–1.5 mm long, the tip ciliate with hairs 0.1–0.5 mm long. Lodicules 2, abaxial, oblong to acute, membranous, 0.8–1.2 mm long. Anthers 1–2 mm long, not penicillate. Caryopsis c. 3 mm long; embryo 15% the length; hilum 70% the length.

DISTRIBUTION: Coast and islands of the Great Australian Bight.

SPECIMENS EXAMINED: SOUTH AUSTRALIA: **Nullarbor**: 'Nullarbor', Cleland, 12.11.1955 (AD 96324049); Head of Great Australian Bight, Whibley 616, 13.9.1960 (AD), Noble 7, 7.8.1973 (NSW 117409); Franklin I., Forrest, 22.2.1969 (ADW 36594); Masillon I., Nuyts Archipelago, Wace 41 5.1.1971 (AD); Fenelon I., Wace 279, 5.10.1972 (NT).

WESTERN AUSTRALIA: **Eucla**: 3.5 miles [6 km] E. of Eucla, George 8516, 15.10.1966 (PERTH); between Eucla & Eilsons Bluffs, Phillips CBG 018888, 8.9.1962 (CBG).

***Stipa verticillata*** Nees ex Sprengel, Syst. Veg. 4, Cur. Post.: 30 (1827); Vickery, Contrib. N.S.W. Natl. Herb. 2: 77 (1953); Beadle, Evans & Carolin, Handb. Vasc. Pl. Sydney District: 532 (1963), Fl. Sydney Region: 657 (1972); Veldkamp, Blumea 22: 10 (1974).

*Streptachne verticillata* (Nees ex Sprengel) Trin. & Rupr., Mém. Acad. Imp. Sci. Saint-Petersbourg, ser. 6, Sci., Math, Seconde Pt. Sci. Nat. 5: 8 (1842).

TIPIFICATION: '*Sieber Agrostotheca* no. 64'. Sprengel's grass specimens were sold to Karl Muller and their whereabouts are now not known. Veldkamp (*loc. cit.*) claims that the Holotype is at LE but has not seen the specimen: he gives no reasons for making this claim. Isotypes are at K, MEL and BRI (and elsewhere). The specimen at K(!) has usually been taken as the Type and is here designated as **Lectotype**.

SYNONYM: *Stipa micrantha* R. Br., Prodr.: 175 (1810), *non* Cav. (1799). HOLOTYPE: AUSTRALIA: R. Brown, Iter Austral. 1802 (BM!), isotype: NSW 115965).

Caespitose perennial to c. 2 metres high, shortly rhizomatous, with numerous branches at each node, without a basal tuft. Culms erect, (0.9–) 2 (–3) mm wide near the base, terete,  $\pm$  compressible, finely but weakly ribbed, glabrous to scabrous with minute hairs; nodes (2–) 6–9, exserted, glabrous, 30–50% wider than the adjacent internodes. Leaf sheaths at first tightly enveloping the culm, later becoming free, glabrous, slightly to moderately ribbed, margins glabrous, basal sheath 0.5–1.5 cm wide, upper sheath (1–) 3–5 mm wide. Ligule erose to entire, membranous, 2–8 mm long, glabrous; auricles absent. Leaf blade expanded, linear, 1–3 mm wide, (14–) 17–25 (–40) cm long, often readily deciduous; abaxial surface slightly ribbed, pilose to scabrous; adaxial surface moderately ribbed, pilose to scabrous; margins glabrous to pilose or scabrous. Panicle 15–60 cm long, exserted,  $\pm$  contracted, (1–) 2–4 (–5) cm wide (excluding awns); axis terete, glabrous; branches to 13 cm long, angled, scabrous; pedicels (1–) 3–5 (–11) mm long, angled, scabrous. Spikelets 3 (–4) mm long (excluding awn), gaping. Glumes equal to subequal, acute, rounded on the back, pale green, scabrous along the nerves; lower glume 3–3.6 (–5) mm long, lower 90% 3-nerved; upper glume 3–3.5 (–5) mm long, lower 90–95% 3-nerved. Floret cylindrical without a neck, 2.7–3.5 (–4) mm long (including callus). Lemma straw-coloured, black at maturity, the surface with white hairs 0.2–0.5 mm long; lobes and coma absent. Callus 0.25 mm long, weakly bent, hairs 0.25–0.5 mm long, the same colour as those on the lemma. Awn 33–53 mm long, pale green to straw-coloured, scabrous with hairs 0.05–0.1 mm long, weakly once or twice bent, 0.1 mm wide near the base; column (7–) 10–16 (–30) mm long, 7–12 mm to the first bend; bristle often darker than the column. Palea 30–60% the length of the lemma, obtuse, the surface smooth to scabrous on the lower half, margins glabrous. Lodicules 2, abaxial, membranous, oblong. Anthers 1.5–2.8 mm long, penicillate. Caryopsis 2.1–3.5 mm long; embryo 25–30% the length, hilum c. 50% the length.

DISTRIBUTION: Widespread through eastern Queensland and the central and northern parts of New South Wales.

SELECTED SPECIMENS: QUEENSLAND: **Mitchell**: 'Warren Point', *Martensz* 94, 22.8.1968 (CANB). **Leichhardt**: Minerva, N. of Springsure, *Blake* 6928, 21.7.1934 (BRI); Carnarvon National Park, *Trapnell & Williams*, 29.6.1965 (BRI); 3 miles [5 km] E. of 'Glenmoral', *Speck* 1883, 17.10.1963 (BRI, NSW, CANB); 32 miles [51 km] W. of Theodore, *Lazarides* 6925, 7.8.1963 (CANB); Isla Gorge, *Sharpe & Hockings*, 21.8.1973 (BRI); 'Boxvale', *White* 9476, 26.10.1933 (BRI); 5.5 miles [9 km] N. of Wandoan, *Speck* 1968, 26.4.1964 (BRI, NSW, CANB, K). **Burnett**: Mundubbera, *Bloxsome*, 1930 (BRI); Gayndah, *White*, 13.5.1917 (BRI). **Warrego**: 'Chesterton', *Blake* 11096, 7.4.1936 (BRI, NSW); 24 km from Augathella on Tambo road, *Simon & Clarkson*, 18.5.1975 (BRI, NSW). **Maranoa**: Mitchell, *Blake* 5734, 4.4.1934 (BRI); 45 km S. of Roma, Surat road, *Blaxell* 1027 & *Johnson*, 29.11.1972 (BRI); between Tara & St. George, *Ebersohn*, 3.7.1962 (BRI); Noondoo, nr. Dirranbandi, *Blake* 10740A, 9.3.1936 (BRI). **Darling Downs**: c. 14 miles [22 km] NE. of

Chinchilla, *Boyland* 672, 9.2.1970 (BRI); Chinchilla, *Maiden NSW 115957*, 3.1909 (NSW); Jandowae, *Moore*, 3.1920 (BRI); 16 km SW. of Dalby, *Gillieatt*, 21.9.1964 (BRI); c. 12 miles [19 km] W. of Meandarra, *Johnson* 753, 23.3.1959 (BRI); nr. Allora, *Blake* 295, 25.6.1932 (BRI); Hermitage Research Station, *Simon & Henderson*, 9.12.1974 (BRI); between Inglewood & Milmeran, *White* 9729, 20.1.1934 (BRI); Yelarbon, *Blake* 10466, 22.2.1936 (BRI); Kurrumbul, *Everist* 702, 13.12.1934 (BRI); Maryland Creek, 28°38'S, 151°38'E, *Wilson* 4251a, 31.12.1981 (NSW); Wyberba, *Blake* 4642, 23.1.1933 (BRI). **Moreton:** nr. Yarraman, *Phillips CBG 001278*, 6.6.1961 (CBG); Brisbane River, *White*, 10.1915 (BRI); between One Mile Creek & Samson Vale, *Blake* 192, 28.12.1931 (BRI); Brisbane, *Blake* 167, 27.2.1931 (BRI); Laidley, *White* 6820, 5.7.1930 (BRI).

**NEW SOUTH WALES:** **North Coast:** Lismore, *Hewitt NSW 115960*, 12.1909 (NSW); Singleton, *Boorman NSW 115963*, 4.1908 (NSW); Bulga Ranges, *Brown NSW 115964*, 3.1906 (NSW). **Central Coast:** Windsor to Kurrajong, *Gray* 5988, 29.11.1966 (CANB); Penrith, *Betche NSW 115971*, 1899 (NSW); Flemington, *Vickery NSW 115967*, 5.1929 (NSW); Kogarah, *Cheel NSW 115969*, 10.1899 (NSW); Glenfield, *Cheel NSW 115972* (NSW). **South Coast:** Pig I., Shoalhaven River, *Rodway NSW 115973*, 1.1.1932 (NSW); Bega, *Waterson NSW 115975*, 12.1912 (NSW). **Northern Tablelands:** Moona Plains, *Crawford NSW 115962*, 3.1899 (NSW). **North Western Slopes:** Wallangra, *Boorman NSW 115991*, 4.1913 (NSW); Warialda, *Hadley NSW 115992*, 5.1908 (NSW); Gravesend to Glandon, *Carne NSW 115993*, 5.1914 (NSW); Inverell, *Thomas NSW 115995*, 1.1913 (NSW); Woods Reef, *Rupp NSW 115996*, 6.1913 (NSW); Boggabri, *Cabbage NSW 115997*, 11.1909 (NSW); Baradine, *Jensen NSW 115998*, 8.1911 (NSW); Manilla, *McKie NSW 2524*, 11.1938 (NSW); Gunnedah, *Cleland NSW 116000*, 2.1911 (NSW); Bugaldi, *Woodhill NSW 115999*, 2.1934 (NSW); between Piallamore & Dungowan, *Goode* 74, 11.1954 (NSW); Breeza, *Court NSW 116003*, 5.1899 (NSW). **Central Western Slopes:** Trangie, *Helms NSW 31946*, 11.1892 (NSW); Moonan Flat, *Maiden & Boorman NSW 115961*, 5.1902 (NSW, PERTH); Cassilis, *Reeve & Cook* 23, 11.3.1972 (CANB); Dunedoo, *Nicholson NSW 115978*, 6.1931 (NSW); Pages River, *Maiden NSW 115979*, 8.1899 (NSW); Belltrees via Scone, *White NSW 115980*, 2.1920 (NSW, BRI); Narromine, *Cowman NSW 115981*, 8.1946 (NSW); W. of Dubbo, Narromine Road, *Henderson NSW 9297*, 1.1948 (NSW); Growee Creek, nr. Bylong, *Gauba CBG 046359*, 8.3.1954 (CBG); Baerami Creek, SW. of Muswellbrook, *Story* 6739, 10.1959 (NSW, K); Wollar East, *Johnson & Constable NSW 16043*, 8.1950 (NSW); Yarrabin Road, Mudgee, *Wyndham* 3562, 16.3.1978 (NSW); 5 miles [8 km] S. of Cowra, *McBarron* 9176, 8.1964 (NSW). **South Western Slopes:** Thurgoona, nr. Albury, *McBarron* 6082, 2.1953 (NSW). **North Western Plains:** 15 miles [24 km] W. of Garah, *Solling* 494, 4.1973 (NSW); 16 miles [25 km] N. of Moree, *McBarron* 15752, 9.1968 (NSW); Burren Junction, *Boorman NSW 115986*, 6.1907 (NSW); Coonamble, *Breakwell NSW 115988*, 10.1912 (NSW); Gular, *Brown NSW 115989*, 6.1913 (NSW); 33 miles [53 km] W. of Nyngan, Cobar road, *Cunningham* 901, 5.1969 (NSW); Nyngan, *Little NSW 115990*, 1920 (NSW); 62 miles [99 km] E. of Cobar on Barrier Highway, *Moore* 3924, 19.11.1966 (CANB).

***Stipa vickeryana* J. Everett & S.W.L. Jacobs, *Telopea* 2(4): 397 (1983).**

**HOLOTYPE:** SOUTH AUSTRALIA: Ifould Lake, Nullarbor Plain Series R502 Barton 5121 74, 30°55'S, 132°05'E. Common grass. Forming dense clumps. Heads open, spreading. *R.J. Chinnock* 2729, 2.x.1975 (AD).

Caespitose annual or perennial to 45 cm high. Culms (1.5–) 2–2.5 mm wide near the base, terete to slightly flattened, ribbed, glabrous; nodes 1–2, glabrous. Leaf sheaths loose around the culms, glabrous except for the shortly pubescent bases of lowermost sheaths; outer margin fringed with long, woolly cilia; inner margin not ciliate. Ligule 3.5–8 (–13) mm long, laciniate, densely ciliate with long woolly hairs especially on those of the lower sheaths. Leaf blades to 18 cm long, 1.5–4 mm wide, often folded; abaxial surface unribbed, glabrous except for the very sparsely scabrous long-acute tip; adaxial surface strongly ribbed, the ribs covered with short  $\pm$  antrorse hairs. Panicle 9–20 cm long, slightly spreading, the base enclosed by the sheath. Spikelets scarcely gaping at maturity, widely gaping after floret disarticulation, 14–18 mm long (excluding awn). Glumes unequal, firm at the base, hyaline at the fine acuminate tip, the lower 75% 3-nerved, scaberulous on the nerves, glabrous between the nerves or minutely pubescent especially at the tip; lower glume 14–18 mm long, 3-nerved;



upper glume 9–14 mm long, 5-nerved at the base. Floret fusiform to turbinate, 6–7 mm long (including callus). Lemma deep brown at maturity, smooth except for an antrorsely scabrous neck, glabrous to very sparsely clothed with coppery hairs, denser along the margins; coma sparse, 1–1.5 mm long in two tufts. Callus straight, 2.5–3 mm long, with a tuft of coppery hairs. Awn relatively slender for its length, c. 0.3 mm wide near the base, (80–) 90–125 mm long,  $\pm$  straight to gently twice bent or sinuate; column 26–32 mm long, 15–18 mm to the first bend, densely pubescent with antrorse hairs 0.2–0.3 mm long; bristle antrorsely scabrous. Palea obtuse, subequal to the lemma, with sparse coppery hairs along the midline. Lodicules 3, membranous, spatulate; the 2 abaxial c. 1 mm long, the paleal much smaller. Anthers not observed. Caryopsis not observed.

DISTRIBUTION: Inland saline areas from eastern Western Australia to central South Australia.

SPECIMENS EXAMINED: SOUTH AUSTRALIA: **Nullarbor:** W. of Yarle Lakes, *Bowen* 312, 9.1956 (K); Ifould Lake, 30°55'S, 132°05'E, *Chinnock* 2729, 2.10.1975 (AD, NSW), *Lothian* 4033, 3.6.1967 (AD); Lake Ifould Crossing, *Copley* 2644, 28.7.1969 (AD).

WESTERN AUSTRALIA: **Coolgardie:** Norseman, *Andrews*, 10.1903 (PERTH).

Differs from *S. eremophila* in having few scattered hairs on the lemma (densely hairy in *S. eremophila*), in its long-hairy orifices (glabrous or sparsely hairy in *S. eremophila*) and longer (usually less than 1.5 mm in *S. eremophila*) lacinate ligules. *S. vickeryana* vegetatively resembles *S. macalpinei* but differs in its less hairy, broader and darker-coloured mature lemma. Additionally, on the sheaths, *S. macalpinei* has characteristic broad, curled, glistening-translucent hairs, quite different from the narrow, crinkled, more opaque hairs on those of *S. vickeryana*.

*S. vickeryana* differs from *S. nullanulla* in having coarser, usually folded leaves (rolled in *S. nullanulla*), a less open inflorescence and longer lemma and awn.

***Stipa wakoolica* J. Vickery, S.W.L. Jacobs & J. Everett, sp. nov.**

*S. metatoris* affinis sed glumis flosculisque brevioribus, coma aristaque plerumque brevior, differt.

HOLOTYPE: NEW SOUTH WALES: **South Western Plains:** NE. of Lake Tooim, *D.L.W. Henderson* 442, 5.11.1947 (NSW 117410; isotypes UTC, K, US, BRI, MEL, AD, PERTH).

Densely caespitose perennial to 1 metre high with conspicuously extravaginal innovations. Culms erect or geniculate at the base, 1.5–3 mm wide near the base, terete, compressible, slightly ribbed, densely pubescent to hirsute at the base, the upper internodes similar or scaberulous to glabrous except just below the nodes; nodes 2–3, densely sericeous, exserted, to 40% wider than adjacent internodes. Leaf sheaths tightly enclosing the culms, ribbed, densely pubescent to hirsute; inner margin similar to adjacent surfaces; outer margin densely long-woolly ciliate. Ligule firm, 0.5–0.8 mm long, obtuse to truncate, densely ciliate, abaxial surface sericeous; auricles spreading, the inner auricle conspicuously tufted. Leaf blade expanded to inrolled, 1.5–2.5 mm wide at the base, to 40 cm long; abaxial surface slightly ribbed, densely pubescent and hirsute; adaxial surface strongly ribbed, densely pubescent and hirsute. Panicle spreading, moderately dense, to 36 cm long, exserted at length, with distant fascicles of many-flowered branches, 3–5 cm wide (excluding awns); axis  $\pm$  angular, finely scaberulous; branches to 10 cm long, angular, scabrous; pedicels 2–7 mm long,

angular, scabrous. Spikelets 11–15 mm long (excluding awn), gaping early in development. Glumes unequal, firm at the very base, membranous and purple-tinged to hyaline at the tip, minutely scabrous on the nerves; lower glume 11–15 mm long, acuminate, the lower 60% 3-nerved; upper glume 9–11 mm long, broadly acute, the lower 50% 5-nerved, the next 15% 3-nerved. Floret turbinate, the three main nerves thickened at the apex, 5.5–6.5 mm long (including callus). Lemma deep brown at maturity,  $\pm$  smooth, sericeous with dense white hairs yellowing at maturity, the apex finely tuberculate and glabrous near the midrib; coma of erect soft hairs 2–2.5 mm long; lobes 2, less than 0.2 mm long. Callus 1.5–2 mm long, fine and straight, with hairs similar to those of the lemma. Awn 0.2–0.25 mm wide near the base, 35–60 mm long, twice bent; column 15–25 mm long, 7–10 mm to the first bend, scabrous with hairs less than 0.15 mm long; bristle scabrous, slightly curved. Palea acute to obtuse, subequal to the lemma (to 0.5 mm shorter), coriaceous, shiny, with a broad band of dense hairs down the centre, hyaline and glabrous at the margins. Lodicules 2, abaxial, membranous, c. 1 mm long, oblong. Caryopsis 3–4 mm long; embryo 30% the length; hilum 60–75% the length.

DISTRIBUTION: Floodplains of the Murray River tributaries of the South Western Plains of New South Wales.

SPECIMENS EXAMINED: NEW SOUTH WALES: **South Western Plains:** Meran Creek, *Henderson* 439, 16.11.1947 (NSW, UTC); N. of Lake Tooim, *Henderson* 443, 31.10.1947 (NSW, UTC, K, BRI); Tulla, *Henderson* 126, 10.1945 (NSW, K).

The specific epithet is derived from the name of the Wakool shire, to which the species appears to be confined.

### Acknowledgements

We wish to thank the many people who were involved in helping us with this study, especially Genevieve Godwin, Anna-Louise Quirico, Susanne Walker, Jeannie Highet, Liz Norris, Nerida Ashby and Robyn Thurtell. We would also like to thank Karen Wilson for preparing the Latin diagnoses and Don McGillivray for his useful comments on nomenclatural aspects.

We also acknowledge the assistance of the Directors of the various herbaria who lent specimens.

This study was largely funded by grants from the Australian Biological Resources Study.

Received 22 Aug. 1984

Accepted 26 Sept. 1985

## Index to Names

Entries in **bold type** are of new taxa; entries in roman type are accepted names; entries in *italics* are of synonyms or misapplied or illegitimate names.

- Dichelachne setacea* (R. Br.) Nees = S. setacea 113  
*Dichelachne stipoides* Hook. f. = S. stipoides 116  
*Stipa acrociliata* Reader 25  
*acrociliata* var. *minor* Reader = platychaeta 93  
*aphanoneura* Hughes = *flavescens* 59  
*aphylla* (Rodway) Townrow 26  
*appendiculata* Mez 13  
**aquarii** Vickery, Jacobs & Everett 27  
*"aquavilla"* see *aquarii* 28  
*arachnopus* Pilger = *puberula* 95  
*aristiglumis* F. Muell. 28  
*aristiglumis* var. *cana* Reader = *blackii* 32  
*bigeniculata* Hughes 30  
*blackii* C.E. Hubbard 32  
**blakei** Vickery, Jacobs & Everett 34  
*brachychaeta* Godr. see *caudata* 39  
*brachystephana* S.T. Blake = *setacea* 114  
*breviglumis* J. Black 35  
*campylachne* Nees 36  
*caudata* Trin. 38  
**centralis** Vickery, Jacob & Everett 39  
*celandii* Summerhayes & Hubbard = *blackii* 32  
*commutata* Trin. & Rupr. = *pubescens* 97  
*compacta* Hughes = *flavescens* 59  
*compressa* R. Br. 40  
*compressa* var. *lachnocolea* Benth. = *macalpinei* 70  
*congesta* Summerhayes & Hubbard = *densiflora* 44  
*crinita* Gaudich. 41  
*curticoma* J. Vickery 42  
*densiflora* Hughes 44  
*dielsii* Mez 13  
**dongicola** Vickery, Jacobs & Everett 46  
*drummondii* Steud. 47  
*dura* J. Black = *eremophila* 54  
**echinata** Vickery, Jacobs & Everett 50  
*effusa* Hughes = *nodosa* 86  
*elator* (Benth.) Hughes = *flavescens* 59  
*elegantissima* Labill. 51  
*eminens* Nees = *neesiana* 81  
*eremophila* Reader 53  
*eremophila* var. *dodrantaria* J. Black = *plumigera* 94  
*eripus* Benth. = *tenuifolia* 119  
*exilis* J. Vickery 56  
*falcata* Hughes = *scabra* ssp. *falcata* 110  
*falcata* var. *minor* J. Black = *nodosa* 86  
**feresetacea** Vickery, Jacobs & Everett 58  
*flavescens* Labill. 59  
*fusca* C.E. Hubbard = *eremophila* 53  
*fusiformis* Hughes = *aristiglumis* 29  
*gibbosa* J. Vickery 62  
*hemipogon* Benth. 63  
*hirsuta* Hughes = *flavescens* 59  
*horrifolia* J. Black = *drummondii* 47  
*hyalina* Nees 66  
*incurva* Hughes = *tenuifolia* 119  
*indepressa* J. Black = S. *hemipogon* 63  
*juncifolia* Hughes 66  
*lachnocolea* (Benth.) Hughes = *macalpinei* 70  
*laeviculmis* Nees poss. = *flavescens* 59  
*laevis* Mez poss. = *flavescens* 60  
**lanata** Vickery, Jacobs & Everett 68  
*leptophylla* Hughes = *tenuifolia* 119  
*leucotricha* Trin. & Rupr. 69  
*longearistata* Steud. = *compressa* 40  
*luehmannii* Reader = *drummondii* 47  
*macalpinei* Reader 70  
*megapotamia* Spreng. ex Trin. 72  
*metatoris* Everett & Jacobs 73  
*micrantha* Cav. = *Dichelachne micrantha* 13  
*micrantha* R. Br. = *verticillata* 127  
*micrantha* Sieber ex Trin. = *ramosissima* 102  
*mollis* R. Br. 74  
*muelleri* Tate 77  
*multispiculis* J. Black 78  
*mundula* J. Black 79  
*neesiana* Trin. & Rupr. 81  
*nervosa* Vickery = *rudis* ssp. *nervosa* 106  
*nervosa* var. *neutralis* Vickery = *rudis* ssp. *rudis* 104  
*nitida* Summerhayes & Hubbard 82  
*nivicola* J.H. Willis 85  
*nobilis* Pilger = *hemipogon* 63  
*nodosa* S.T. Blake 86  
*nullanulla* Everett & Jacobs 89  
**nullarborensis** Vickery, Jacobs & Everett 88  
*oligostachya* Hughes 90  
*"peronensis"* see *crinita* 42  
*petraea* J. Vickery 91  
**pilata** Jacobs & Everett 92

- plagiopogon* J. Black = *mollis* 74  
*platychaeta* Hughes 93  
*plumigera* Hughes 94  
*puberula* Steud. 95  
*pubescens* R. Br. 97  
*pubescens* var. *aphylla* Rodway =  
*aphylla* 26  
*pubescens* var. *auricoma* Reader =  
*eremophila* 53  
*pubescens* var. *comosa* J. Black =  
*blackii* 32  
*pubescens* var. *effusa* Benth. =  
*variabilis* 124  
*pubescens* var. *maritima* J. Black =  
*flavescens* 59  
*pubescens* var. *semiglabra* Reader =  
*pubinodis* 99  
*pubescens* var. *tenuior* Reader 13  
*pubinodis* Trin. & Rupr. 99  
*pynostachya* Benth. 100  
*ramosissima* (Trin.) Trin. 101  
*readeri* F. Muell. ex Reader =  
*acrociliata* 25  
*rudis* Spreng. 103  
*rudis* ssp. *rudis* Spreng. 104  
*rudis* ssp. *australis* Everett & Jacobs  
105  
*rudis* ssp. *nervosa* (Vickery) Everett &  
Jacobs 106  
*rugulosa* Mez = *ramosissima* 102  
*scabra* Lindl. 107  
*scabra* var. *auriculata* J. Black poss. =  
*drummondii* 47  
or poss. = *nitida* 82  
*scabra* var. *barbata* Benth. = *flavescens*  
59  
*scabra* var. *elator* Benth. = *flavescens*  
59  
*scabra* ssp. *falcata* (Hughes) Vickery,  
Jacobs & Everett 110  
*scabra* var. *occidentalis* Benth. =  
*tenuifolia* 119  
*scabra* var. *pallida* Reader = *nitida* 82  
*scabra* var. *pubescens* Benth. =  
*tenuifolia* 119  
*scabra* Lindl. ssp. *scabra* 108  
*scabra* var. *striata* Benth. = *flavescens*  
59  
*scabra* var. *subtricha* Reader poss. =  
*drummondii* 47  
*scelerata* Behr ex Black = *macalpinei*  
70  
*semibarbata* R. Br. 111  
*semibarbata* var. *campylachne* (Nees)  
Benth. = *campylachne* 36  
*semibarbata* var. *gracilis* J. Black =  
*hemipogon* 64  
*semibarbata* var. *mollis* (R. Br.) Benth.  
= *mollis* 74  
*setacea* R. Br. 113  
*setacea* var. *latifolia* Benth. =  
*macalpinei* 70  
*setacea* var. *latiglumis* J. Black =  
*setacea* 113  
*stipoides* (Hook. f.) Veldkamp 116  
*striata* Link 13  
*stuposa* Hughes 117  
*tenuifolia* Steud. 119  
*tenuiglumis* Hughes = *flavescens* 59  
*teretifolia* Steud. = *stipoides* 116  
*trichophylla* Benth. 121  
*tuckeri* F. Muell. 123  
*variabilis* Hughes 124  
*variabilis* Hughes var. *elator* (Benth.)  
C.A. Gardner = *flavescens* 59  
*variabilis* var. *striata* (Benth.) C.A.  
Gardner = *flavescens* 59  
*variegata* Summerhayes & Hubbard =  
*eremophila* 54  
*velutina* Vickery, Jacobs & Everett 126  
*verticillata* Nees ex Spreng. 127  
*vickeryana* Everett & Jacobs 128  
*wakoolica* Vickery, Everett & Jacobs  
129  
*Streptachne verticillata* (Nees ex Spreng.)  
Trin. & Rupr. = *S. verticillata* 127  
*Urachne ramosissima* Trin. = *S.*  
*ramosissima* 101