

## Nomenclature, variation and hybridisation in Rough Blown-grass (Poaceae: *Lachnagrostis*)

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### Introduction

Variation in Rough Blown-grass (also known as Ruddy, Even or Meagre Blown-grass) has been previously examined by Brown (2006) with the result that *Lachnagrostis aequata* (Nees) S.W.L.Jacobs (syn. *Agrostis aequata* Nees) and *L. scabra* (P.Beauv.) Nees ex Steud. (syn. *Agrostis scabra* R.Br. non Willd.) were considered to be the same taxon. In addition, it was found that the name *L. aequata* had been misapplied to a Tasmanian montane taxon, which was subsequently described as *L. morrisii* A.J.Br.

Recent doubt expressed in Tropicos (2014) and APC (2014) concerning the status of *Vilfa scabra* P.Beauv. as a new name or a new combination for *A. scabra* Willd. or *A. scabra* R.Br. respectively, has initiated a closer examination of the name *L. scabra* Nees ex Steud.

The status of *L. scabra* subsp. *curviseta* A.J.Br. also required review in light of the discovery of probable hybrids between Rough Blown-grass and Common Blown-grass (*L. filiformis* (G.Forst.) Trin.), as both the subspecies and the hybrids are largely distinguished by their unusually long awns. In addition, recent collections of new populations of a dwarf form of Rough Blown-grass from Flinders Island, and its closer examination through PhD research by Brown (2013) has suggested its formal recognition.

### Abstract

The name *Lachnagrostis scabra* (P. Beauv.) Nees ex Steud. for Rough Blown-grass is found to be a misapplication of *Lachnagrostis scabra* Nees ex Steud. (currently known as *Agrostis pilosula* Trin.): an Asiatic taxon not found in Australia. The correct name for Rough Blown-grass is *Lachnagrostis rudis* (Roem. & Schult.) Trin. A dwarf form of the species from Flinders Island is described as *L. rudis* subsp. *nana* A.J.Br., based on morphological and cytological evidence. However, considerable variation of awn length within mainland populations has resulted in *L. scabra* subsp. *curviseta* A.J.Br. being subsumed by *L. rudis* subsp. *rudis*. Plants probably resulting from hybridisation between *L. rudis* and *L. filiformis* (G.Forst.) Trin. along the Crawford River near Dartmoor, Victoria are described as *L. xripulae* A.J.Br.

**Key words:** hybrid, ploidy, taxonomy, Royle, Moleside Creek, Camerons Inlet

## Materials and methods

The nomenclatural history for *Lachnagrostis scabra* was examined in detail, in reference to the original published descriptions of types. Additional collections of Rough Blown-grass since Brown (2006) from Victoria, Tasmania and South Australia were examined morphologically.

Seed from Moleside Creek in south-west Victoria and from Camerons Inlet on Flinders Island, Tasmania, was germinated and grown in pinebark potting mix into mature flowering plants (four plants per accession) in the nursery of the Royal Botanic Gardens Melbourne during 2010 and 2011. Measurements of plant height, culm length, leaf width and number and size of inflorescences were made and compared to at least four field plant collections of each of the same populations. Inflorescence measurements were made on 14–16 panicles across the plants of each population.

Prior to flowering, mature leaves were sampled from both nursery accessions, sealed in plastic bags and refrigerated until undergoing flow-cytometry analysis to estimate whole genome content (2C-value). The accession from Moleside Creek was also subjected to direct chromosome counting via a conventional root-tip thumb-squash method. The methodology for both flow cytometry and chromosome counts were described in the PhD thesis (Brown 2013).

## Results and discussion

### Nomenclatural examination

Palisot de Beauvois (1812) transferred more than half (approx. 62%) of the then current *Agrostis* L. names to *Vilfa* Adans. In the index to his work, he listed both the American *A. scabra* Willd. and the Australian *A. scabra* R.Br. as synonymous with his *V. scabra* P.Beauv., but also expressed doubt of such, inasmuch as question marks follow each name. Whether these question marks can be interpreted as Palisot de Beauvois's lack of knowledge regarding possible synonymy of *A. scabra* Willd. and *A. scabra* R.Br. or he was unsure as to which of the two taxa should be referred to *V. scabra* P.Beauv. is unknown. The confusing treatment of *A. scabra* R.Br., *A. scabra* Willd. and *Deyeuxia scabra* (R.Br.) Benth. by Bentham (1878) is described in Brown (2006) and likely illustrates that 19th-century taxonomists were unsure as to whether they were dealing with one, two, or more taxa.

Apart from the confusion related to *A. scabra*, Palisot de Beauvois (1812), in the same index, also questioned another 60-odd *Agrostis* names (approx. 47% of all listed names), including the Australian *A. aemula* R.Br., *A. plebeia* R.Br., *A. retrofracta* Willd. and *A. debilis* Poir. (the last two regarded as synonymous with *A. avenacea* Gmel. by Vickery (1941)), seemingly because his direct knowledge of these New Holland taxa was limited. This large number of question marks causes one to wonder if, instead of being references to nomenclatural uncertainty, they may refer instead to types he had not viewed. Closer examination of the questioned names transferred to *Vilfa* (approx. 50), shows half to relate to non-European collections. Although Palisot de Beauvois made personal collections in West Africa, Haiti and the USA during the 1790s, most of these collections were destroyed by fire or shipwreck (Merrill 1936). Although the remainder of the 'uncertain' names he transferred to *Vilfa* were related to European taxa, almost all appear to be of single collections only, lack designated types or have uncertain authorship.

In addition to question marks related to *Agrostis* names, Palisot de Beauvois (1812) questioned 14 of his *Agrostis* to *Vilfa* transfers, including the cosmopolitan *A. littoralis* Lam. (syn. *Sporobolus virginicus* (L.) Kunth), and the Australasian *A. cylindrica* R.Br. (syn. *Deyeuxia quadriseta* (Labill.) Benth.), *A. lobata* R.Br. (syn. *Deyeuxia quadriseta* (Labill.) Benth.), *A. magellanica* Lam., *A. rara* R.Br. (syn. *Dichelachne rara* (R.Br.) Vickery), *A. retrofracta* Willd. and *A. sciurea* R.Br. (syn. *Dichelachne micrantha* (Cav.) Domin). In almost all of these cases, this questioning has been vindicated by later, and more informed, treatments of these species. However, apart from Palisot de Beauvois's questioning of his new *Vilfa* combinations, 23 of his non-questioned *Vilfa* combinations are now assigned to *Cynodon* Rich., *Deyeuxia* Clarion ex P.Beauv., *Digitaria* Haller, *Eriochloa* Kunth in Humb., *Gastridium* P.Beauv., *Muhlenbergia* Schreb., *Polypogon* Desf., *Sporobolus* R.Br. or *Stipa* L.

In Australia, Vickery (1941) was of the opinion that *A. scabra* R.Br. was the basionym for *V. scabra* '(R.Br.) P.Beauv.', while in North America, Niles and Chase (1925) and Hitchcock (1951) regarded *A. scabra* Willd. as the basionym for *V. scabra* '(Willd.) P.Beauv.'. Because *A. scabra* R.Br. (1810) is a later homonym of *A. scabra* Willd. (1797) and therefore illegitimate, Vickery utilised

*A. rudis* Roem. & Schult. as the next legitimately published name based on the Robert Brown collection that was also the type of *A. scabra* R.Br. Jacobs (2002) followed Vickery's (1941) basionym interpretation, but cited *V. scabra* 'P.Beauv.' as a nomen novum for *A. scabra* R.Br., and consequently, *V. scabra* as the basionym for *Lachnagrostis scabra* '(P.Beauv.) Nees ex Steud.'. Likewise, Jacobs (2002) added *Deyeuxia scabra* '(P.Beauv.) Kunth' in synonymy, which, under the interpretation of *V. scabra* 'P.Beauv.' nom. nov. for *A. scabra* R.Br., would be a correct citation, even though Kunth (1829) made no reference to Beauvois but transferred *A. scabra* R.Br. to *D. scabra* '(R.Br.) Kunth'.

Despite Palisot de Beauvois questions in relation to the name *V. scabra* P.Beauv., it is here treated, not as a nom. nov. but as a comb. nov. for *A. scabra* Willd. (rather than for *A. scabra* R.Br.) on the basis that the former is the earlier and therefore legitimate name. Article 36.1 of the *International Code of Nomenclature for algae, fungi, and plants* (McNeill et al. 2012) indicates that a name is not invalidly published even if there is a question mark or other indication of taxonomic doubt, if that name is accepted by its author.

Steudel (1840, 1841) introduced the name *Lachnagrostis scabra* Nees ex Steud., not as a new combination for any prior name but for an unpublished Nees name, found on a collection at the Royle Herbarium. In the same publication, he replaced the name with *Calamagrostis neesii* Steud. 'Ind. or.' (Part 1, p. 250), presumably as the species name 'scabra' was already taken by the Alaskan/Canadian taxon, *C. scabra* Presl, (syn. *Deyeuxia preslii* Kunth) (Part 1, p. 251). However, in a mistaken twist, he also referred *L. scabra* Nees to *C. scabra* instead of to *C. neesii* (Part 2, p. 2). Steudel (1854) does not repeat this mistake.

Trinius (1841) refers to *L. scabra* 'N. ab. Es. Ind. orient. reg. mont. super. (Royle)' as a synonym of *Agrostis pilosula* Trin. Bor (1954) notes that the type sheet of *A. pilosula* Trin. from Trinius's herbarium in Leningrad (Saint Petersburg) has two labels: the first with an affixed inflorescence branch and a drawing of spikelet, lemma, palea and anther and the second in Trinius's handwriting '*Agrostis pilosula* m. *Lachnagrostis scabra* N. ab. Ess. in hbio. Royle, Ind. reg. mont. sup. No. 72'.

Steudel (1840, 1841) made no reference to *V. scabra* P.Beauv. in relation to the Nees annotation, although

he did note (Part 2, p.768) that *V. scabra* P.Beauv. was an *Agrostis* species according to Trinius. As Steudel (1840, 1841) assigned both *A. scabra* R.Br. and *A. rudis* Roem. & Schult. to *Calamagrostis rudis* Steud. (Part 1, p. 42), it is obvious that Nees's '*Lachnagrostis scabra*' annotation on the specimen from the herbarium of John Forbes Royle was applied to a collection likely derived from the Himalayas in Northern India, where the majority of Royle's collecting took place (Harrison 1978), rather than to any Australian collection. In fact, Bor (1854) found three specimens in Royle's own herbarium (now at the Liverpool World Museum) labelled as '*Lachnagrostis scabra* N. ab E.' (i.e. Nees von Esenbeck): 'Huttoo', '187/73' and '187/267'. He also found an accompanying slip in Nees's handwriting stating '187/72 & 73 *Lachnagrostis scabra* Simla [i.e. Shimla, Himachal Pradesh, Northern India], Mussooree [i.e. Mussoorie, Uttarakhand, Northern India], Huttoo [i.e. Mount Whartoo near Kotgarh, Himachal Pradesh]'. He identified '187/267' as *Poa nemoralis* L. but concluded that 'Huttoo' and '187/73' were conspecific, with the former being a duplicate of *Royle's No. 72* (i.e. 187/72), which is the type (in LE) of *A. pilosula* Trin.

Steudel (1854) used *Wallich 3775a* as the type for *A. wallichiana* Steud. Bor (1954) noted, however, that Bentham identified the Kew specimen *Wallich 3775a* (Wall. L3775a) as Trinius's *A. pilosula* Trin. and Hooker (1896) mistakenly cited the same specimen as the type for *Calamagrostis pilosula* (Trin.) Hook f., which he based on *A. pilosula* Trin.

The only reference to *V. scabra* P.Beauv. by Trinius is in the index of Trinius (1824) where he notes it as '*Agrostis ? Lachnagrostis ?*'. Also in the index to this work, he notes both *A. scabra* Br. and *A. rudis* Br. as '*Lachnagrostis*', but only the latter appears in both the index and the body of the publication as '*Lachnagrostis rudis* Trin.'. Both here and earlier in Trinius (1820), he designates Br. (i.e. R.Br.) as the authority for *A. rudis*, which, as Vickery (1941) pointed out is incorrect as this was not a Robert Brown name but should have been ascribed to Roemer and Schultes (1817). Trinius (1841) lists *A. scabra* Willd. as a synonym of *A. michauxii* Trin. but makes no mention of *A. scabra* R.Br. Despite Trinius's incorrect designation of the authority for the basionym, the correct name for Rough Blown-grass is *Lachnagrostis rudis* (Roem. & Schult.) Trin.

## Morphological examination

Since the assessment by Brown (2006) of collections of *Lachnagrostis rudis*, further collections have been examined from a range of additional south-eastern Australian sites, including: seepage zones along Ellard's Creek at Piccaninnie Ponds and dune swales in the Little Dip Conservation Park in south-east South Australia; on the banks of the Crawford and Glenelg Rivers near Dartmoor, along a limestone creek at Battersby Landing and in burnt heathland between Kentbruck and Moleside Creek in south-west Victoria; in shaded woodland at Main Creek near Bushrangers Bay and in *Melaleuca ericifolia*-dominated wetlands at Boneo on the Mornington Peninsula, Victoria; and from the beds of drying lagoons and along the banks of tidal streams on Flinders Island, Tasmania.

While all of the newly examined mainland populations contain typical *L. rudis* subsp. *rudis* plants, a few (Piccaninnie Ponds, Little Dip, Crawford River and Main Creek) also have plants with long-awned lemmas as described for subsp. *curviseta* by Brown (2006). This subspecies was based on the then only known collection from Sherbrook River near Port Campbell, Victoria – the only distinguishing feature being the slightly curved lemma awn from 1.0–1.4 mm long, compared to subsp. *rudis* with either awnless lemmas or with awns usually 0.1–0.7 mm. While some plants from Piccaninnie Ponds, Little Dip and Main Creek have some lemmas with awns to 1.4 mm and even to 1.8 mm long, they are morphologically similar to *L. rudis* subsp. *rudis* in all other respects and indicate that awn length is not clearly distinctive. As a result, subsp. *curviseta* is reduced

to synonymy with subsp. *rudis* and the descriptions of Brown (2006) and Jacobs and Brown (2009) updated accordingly.

In contrast to the other longer-awned populations noted above, the Crawford River population consists of both typical plants with awnless lemmas (sometimes with a minute bristle) and fertile anthers (Fig. 1m–q) and atypical plants with variously awned lemmas and largely empty sterile anthers (Fig. 1f–l). All of these plants were growing sympatrically with small but typical plants of *L. filiformis* (Fig. 1a–e). As the sterile plants have morphological forms that bridge those of *L. rudis* and *L. filiformis*, it seems highly probable that they represent hybrids between the two established taxa. A further collection from the Glenelg River, near its junction with the Crawford River and approximately 350 m west of the Crawford River collection site, appears to be of hybrid origin only. These supposed hybrids are described below as *Lachnagrostis xripulae* A.J.Br.

Recent collections made on Flinders Island confirm the dwarf stature of these plants and the small inflorescences and spikelets (Fig. 2) reported by Brown (2006) for a number of previously examined collections. Growing one of the newly collected populations (Camerons Inlet) from seed under nursery conditions increased its height, culm length, leaf width and inflorescence size in comparison with field populations, but not relative to a typical mainland population (Moleside Creek) (Table 1) and is suggestive of an underlying genetic differentiation. This finding was supported by a difference in 2C-value found by Brown (2013): 15 pg for Moleside Creek and 19 pg for Camerons Inlet. The mean

**Table 1.** Mean growth and inflorescence measurements for nursery and field grown *Lachnagrostis rudis* accessions from Moleside Creek, SW Victoria, and Camerons Inlet, Flinders Island

Accession	Plant height <sup>1</sup> (cm)	Culm length <sup>2</sup> (cm)	Leaf width <sup>3</sup> (mm)	Inflorescence nos.	Inflorescence size (h <sup>4</sup> x w)
<b>Field sample</b>					
Moleside Creek	51.5	70.3	3.4	-	18×12
Camerons Inlet	12.7	20.3	1.1	-	9×11
<b>Nursery sample</b>					
Moleside Creek	31.5	77.5	8.6	19.5	22×11
Camerons Inlet	15.8	47.0	3.3	40.3	12×12

<sup>1</sup> height without fully exerted inflorescences

<sup>2</sup> overall height

<sup>3</sup> at broadest point on widest leaf

<sup>4</sup> from lowest whorl



**Figure 1.** Probable parental and hybrid plants from Crawford River, Victoria. *Lachnagrostis filiformis*: **a.** part tussock  $\times 0.3$ ; **b.** floret  $\times 10$ ; **c.** spikelet cluster  $\times 5$ ; **d.** anther  $\times 10$ ; **e.** spikelet  $\times 10$ . *L. xripulae*: **f.** floret  $\times 10$ ; **g.** spikelet  $\times 10$ ; **h.** shrivelled anther  $\times 10$ ; **i.** spikelet cluster  $\times 5$ ; **j.** part tussock  $\times 0.3$ ; **k.** floret  $\times 10$ ; **l.** spikelet  $\times 10$ . *L. rudis*: **m.** spikelet  $\times 10$ ; **n.** floret  $\times 10$ ; **o.** anther  $\times 10$ ; **p.** spikelet cluster  $\times 5$ ; **q.** part tussock  $\times 0.3$  (**a–e** A.J. Brown 2414; **f–i** A.J. Brown 2419; **j.** A.J. Brown 2415; **k–l** A.J. Brown 2416; **m–q** A. J. Brown 2412).

standard deviation for repeated flow-cytometry analysis on 26 *Lachnagrostis* samples reported by Brown (2013) is calculated to be 1.4 pg and indicates that the 2C-value difference between the *L. rudis* accessions is significant. Brown (2013) made 2n chromosome counts of 42 or 49 for the Moleside Creek accession, equating to ploidy levels of 6x (hexaploid) or 7x (heptaploid) and calculated mean genome sizes of 2.14 or 2.50 pg. If it is assumed that the genome size (i.e. additive chromosome size) for the two accessions is the same, the ploidy level of the Camerons Inlet accession is calculated to be  $19/15 \times 6 = 7.6$  pg or 8x (octoploid) or  $19/15 \times 7 = 8.87$  pg or 9x (nonaploid). Stable fertility is more likely in the hexaploid (Moleside Creek) and octoploid (Camerons Inlet) scenarios. Brown (2006) did not segregate the dwarf form of *L. rudis* due to the overlapping ranges in morphological measurements between plants of the Bass Strait Islands and the mainland. However, there does appear to be sufficient evidence for segregation of a smaller set of populations, largely, if not exclusively restricted to Flinders Island. Future field and cytological work may elucidate a wider distribution. On the basis of this evidence, a new subspecies is described below as *Lachnagrostis rudis* subsp. *nana* A.J.Br.

## Taxonomy

In order to clarify the nomenclature of the Australian taxon *Lachnagrostis rudis* (Roem. & Schult.) Trin, the nomenclature of some extra-Australian species (*Agrostis scabra* Willd., *Agrostis hyemalis* (Walter) Britton, Stern & Poggenb., *Agrostis pilosula* Trin. and *Calamagrostis scabra* J.Presl.) is presented first.

***Agrostis scabra*** Willd., *Sp. Pl., ed. 4* [Willdenow] 1(1): 370 (1797)

*Vilfa scabra* (Willd.) P.Beauv., *Ess. Agrostogr.* 16, 148, 182 (1812); *Agrostis hyemalis* var. *scabra* (Willd.) H.L.Blomq. *The Grasses of North Carolina* 82 (1948).

**Type:** 'America borealis'; holotype: Anon., S-G-270 (chosen by Willd.), photo seen; isotype: Canada, *T. Haenke s.n.*, MO-123101, photo seen.

**Notes:** This is not a complete synonymy of this taxon. Some authors regard *Agrostis scabra* as a synonym of *A. hyemalis* (Walter) Britton, Sterns & Poggenb. but most treat it as a separate taxon.

*Agrostis scabra* Willd. was not definitively designated as the basionym for *Vilfa scabra* P.Beauv. by Palisot de Beauvois, who either included *A. scabra* R.Br. as an alternative possible basionym or considered the two taxa to be synonymous. However, *A. scabra* Willd. is treated here as the basionym for *V. scabra* P.Beauv. as it is the earlier name.

***Agrostis hyemalis*** (Walter) Britton, Sterns & Poggenb., *Prelim. Cat.* 68 (1888)

*Cornucopiae hyemalis* Walter, *Fl. Carol.* [Walter] 73 (1788); *Agrostis canina* var. *hyemalis* (Walter) Kuntze, *Revis. Gen. Pl.* 3(3): 338 (1898).

**Type:** holotype: Anon; S-G-256 (small fragment of inflorescence), photo seen; neotype (designated by Ward 2007; verified by Walter 1788): Charleston, South Carolina, *B.L. Robinson 97*, 27.iv.1912, GH00247993 photo seen; isoneotypes: BH *n.v.*, US-866901 *n.v.*

**Note:** This is not a complete synonymy for this taxon. The orthographic variant '*hiemalis*' was used in many North American publications, but also by Vickery (1941) who included 'with some hesitation' a range of Australian specimens in the 'widespread and variable American species, *Agrostis hiemalis*'. Such Australian specimens have since been segregated into a number of new endemic *Agrostis* taxa by Jacobs (2001).

***Agrostis pilosula*** Trin., *Mém. Acad. Imp. Sci. St.-Pétersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat.* 6, 4(3–4): 372 (1841) [reprinted as *Agrostidea*, *Il. Callo Rotundo, (Agrostea), Typis Academiae Caesariae Scientiarum* 126 (1841)] nom. nov. for *Lachnagrostis scabra* Nees ex Steud. non *Agrostis scabra* Willd. (1797)

*Calamagrostis pilosula* (Trin.) Hook. f., *Fl. Bri. India* [J.D. Hooker] 7(22): 263–264 (1896); *Lachnagrostis scabra* Nees ex Steud., *Nomencl. Bot. [Steudel], ed. 2.* 1: 250 (1840); *Calamagrostis pilosula* var. *scabra* (Nees ex Steud.) Hook.f., *Fl. Brit. India* 7(22): 264 (1896); *Calamagrostis neesii* Steud., *Nomencl. Bot. [Steudel], ed. 2.* 1: 250 (1840) nom. nov. for *Lachnagrostis scabra* Nees ex Steud. non *Calamagrostis scabra* J.Presl. (1830).

**Type:** 'Ind. orient. reg. mont. super', Royle 72 *vide*. Chase and Niles (1962); holotype: LE *n.v.*, isotype: Roylean Herb. LIV *n.v.*

*Agrostis wallichiana* Steud. *Synopsis Plantarum Glumacearum* 174 (1854); *Calamagrostis pilosula* var. *wallichiana* (Steud.) Hook. f., *Fl. Bri. India* [J.D. Hooker] 7(22): 264 (1896); *Agrostis pilosula* var. *wallichiana* (Steud.) Bor., *Notes on Asiatic Grasses: XVIII. Indian species of Agrostis collected by Royle. Kew Bulletin* 9(3): 459 (1954). *Type*: 'India, R. Blinkworth for N. Wallich 3775a; holotype: K000032351–53 photos seen; isotypes: E00393883, E00393884, E00393885, W0026800 photos seen for all.

**Notes:** *Agrostis pilosula* Trin. and *Calamagrostis neesii* Steud. are not superfluous names for *Lachnagrostis scabra* Nees ex Steud. as the name 'scabra' was already occupied by *Agrostis scabra* Willd. and *Calamagrostis scabra* J.Presl., respectively.

In regard to typification, after extensive examination of *Agrostis* specimens collected in India by John Forbes Royle, Bor (1954) concluded that Royle 72 is the type for *L. scabra* Nees ex Steud. However, Hooker (1896), in discussion under *C. pilosula* (Trin.) Hook.f., incorrectly regarded *Wallich 3775a* as the type for *A. pilosula* Trin. while also specifically listing this collection under *C. pilosula* var. *wallichiana* (Steud.) Hook.f. (of which it is indeed the type). In addition, Hooker (1896) introduced *C. pilosula* var. *scabra* (Nees ex Steud.) Hook.f., under which is listed *L. scabra* Nees ex Steud. (upon which the name *C. pilosula* is ultimately based). Following Article 26.2, it is possible that one or more of these names for infraspecific taxa of *C. pilosula* as introduced by Hooker (1896) are invalid, because the infraspecific taxon that includes the type should have been denoted as the autonym, in this case: *C. pilosula* var. *pilosula*. However, it is beyond the scope of the present paper to resolve this issue, and, in addition, the nomenclatural status of these infraspecific taxa has no bearing on the correct name for the Australian material here placed under *L. rudis*.

This is not a complete synonymy of this high-elevation, variable Asian grass. Consult Bor (1954) for further information concerning the confusing array of associated taxa (many based on collections by J.F. Royle on the Indian sub-continent and in the Himalayas during the 1820s).

**Misapplied:** *Lachnagrostis scabra* Nees ex Steud. sensu. S.W.L.Jacobs, (2002), A.J.Br. (2006) and S.W.L.Jacobs & A.J.Br. (2009) as *Lachnagrostis scabra* '(P. Beauv.) Nees ex Steud.' [*Lachnagrostis rudis* (Roem. & Schult.) Trin.].

***Calamagrostis scabra*** J.Presl., *Reliq. Haenk.* 1(4–5): 234 (1830)

*Deyeuxia preslii* Kunth., *Enum. Pl.* [Kunth] 1: 243–244 (1833) non *Deyeuxia scabra* Kunth (1829) nom. nov. for *Calamagrostis scabra* J.Presl.; *Calamagrostis canadensis* (Michx.) P.Beauv. var. *scabra* (J.Presl) Hitchc., *Amer. J. Bot.* 21(3): 135 (1934).

**Type:** CANADA. 'Archipelago Montgrave' 'Hab. In Sinu Nootka' [Vancouver Island], *T. Haenke*; holotype: PR, isotypes: US-865764 n.v.

**Note:** This is not a complete synonymy of this subarctic–arctic grass.

***Lachnagrostis rudis*** (Roem. & Schult.) Trin., *Fund. Agrost.* 128 (1820), as '(Br.) Trin.'

*Agrostis scabra* R.Br., *Prodr.* 172 (1810) nom. illeg. non Willd. (1797); *Agrostis rudis* Roem. & Schult., *Syst. Veg.* 2: 360 (1817); *Deyeuxia scabra* Kunth, *Révis. Gramin.* 1: 77 (1829) nom. nov. for *Agrostis scabra* R.Br. (1810) non Willd. (1797); *Calamagrostis rudis* (Roem. & Schult.) Steud., *Nomencl. Bot.* 2nd edn, 1: 251 (1840–41); *Deyeuxia scabra* Benth., *Fl. Austral.* 7: 583 (1878) *superfluous* nom. nov. for *Agrostis scabra* R.Br. (1810) non Willd. (1797); *Lachnagrostis scabra* Nees ex Steud. sensu. S.W.L.Jacobs, *Telopea* 9(4): 837 (2002) as *Lachnagrostis scabra* (P.Beauv.) Nees ex Steud.

**Type:** no location, Anon.; holotype: BM! (reverse of type sheet has pencilled 'Van Diemens Land – Adventure Bay' but noted in Brown (1810) as 'J.D.' [Port Jackson, Van Diemens Land], whereas Brown (2006) concluded that Port Dalrymple, Tasmania was the probable location).

*Agrostis aequata* Nees in W.J.Hooker, *London J. Bot.* 2: 412 (1843); *Deyeuxia aequata* (Nees) Benth., *Fl. Austral.* 7: 578 (1878); *Calamagrostis aequata* (Nees) J.M.Black, *Fl. S. Australia* 1: 70 (1922); *Lachnagrostis aequata* (Nees) S.W.L.Jacobs, *Telopea* 9(3): 445 (2001). *Type:* Van Diemens Land, 18.i.1838, *Gunn 1005*; holotype: CGE n.v., probable isotype: K!, syntype: MEL2273954!

*Lachnagrostis scabra* subsp. *curviseta* A.J.Br. *Muelleria* 24: 127 (2006). *Type:* VICTORIA. Sherbrooke River, Port Campbell National Park, 6.ix.1966, *Beaglehole and Finke 21182*; holotype: MEL 1584733!

**Note:** *Vilfa scabra* P.Beauv. is not listed in the above synonymy, because it is not considered to be based on *Agrostis scabra* R.Br. nom. illeg., but rather is a new combination for *A. scabra* Willd., which is the earlier and legitimate name.

**Key to *Lachnagrostis rudis* subspecies and hybrids**

- 1 Glumes acuminate; lemma moderately hairy with a strongly geniculate awn attached 50–75% from the lemma base; anthers 0.2–0.3 mm long ..... *L. filiformis*
- 1: Glumes acute; lemma glabrous or sparsely hairy and awnless or with a non-geniculate to weakly geniculate awn; anthers 0.3–0.5 mm long ..... 2
- 2 Lemma sparsely hairy with an awn from 2–2.5 mm long ..... *L. xripulae*
- 2: Lemma glabrous (occasionally with a few scattered hairs) and awnless or with a minute bristle or fine, fragile awn to 1.8 mm long ..... 3
- 3 Mature plant usually in excess of 50 cm tall, shortly rhizomatous to stoloniferous, culms often geniculate-ascending and sometimes branching; mature inflorescence greater than 10 cm long, usually longer than wide and rather lax; spikelets 1.5–3.0 mm long ..... *L. rudis* subsp. *rudis*
- 3: Mature plant to 20 cm tall (including inflorescences), erect to weakly ascending but never branching; inflorescence 10 cm long or shorter, usually as wide as long or wider and rather stiff; spikelets 1.1–1.6 mm long ..... *L. rudis* subsp. *nana*

Green or purplish-green, loosely tufted to rhizomatous or stoloniferous, glabrous, short-lived *perennial* or *annual*, to 80 cm tall or with ascending to geniculate, trailing or scrambling culms to 2 m long, branched or unbranched. *Leaf* blades smooth, filiform or flat, to 15 cm long and 5 mm wide; ligules obtuse, to 2 mm long. *Inflorescence* a sparse, open panicle with spreading, rather lax to somewhat stiff branches to 25 cm long or occasionally more, its base enclosed by the upper leaf sheath but becoming exerted with maturity by up to 15 cm; branches and pedicels green or purple. *Spikelets* 1.1–2.5(–3) mm long, pale to light green or sometimes purplish; glumes acute and keeled, subequal (sometimes the upper up to 0.2 mm longer than the lower), scabrous along the keel and smooth to scaberulous or minutely papillose on the lateral surfaces, particularly towards the apex, margins finely ciliate (at least in the upper half); lemma acute or obtuse, (1.1–)1.3–2(–2.2) mm long, minutely 4-toothed at the apex, usually with the upper nerves and teeth minutely and densely ciliate or fimbriate, body glabrous or very occasionally with a few isolated hairs, callus glabrous or with a few to some hairs 0.1–0.5 mm long, awnless or with a minute near-apical bristle to 0.5 mm long or with a fine, fragile, straight to curved or weakly geniculate awn to 1.8 mm long, arising from within the upper third of the lemma back; palea obtuse, subequal to the lemma and often similarly fimbriate at the apex; rachilla extension glabrous to plumose, (0.1–)0.5–1.5(–1.7) mm long or occasionally absent; stamens 3, anthers 0.3–0.6 mm long.

***Lachnagrostis rudis* (Roem. & Schult.) Trin. subsp. *rudis***

Green, commonly shortly rhizomatous or stoloniferous, short-lived *perennial* or *annual*, usually 20–80 cm tall but occasionally culms to 2 m long; culms weakly ascending to strongly geniculate and trailing or scrambling, lax, larger examples commonly branched. *Leaf* blades rather lax, smooth, flat, to 15 cm long and 1–5 mm wide. *Inflorescence* generally a sparse, open panicle with spreading but rather lax and somewhat sinuate branches, to 25 cm long or occasionally more, becoming exerted with maturity by up to 15 cm; branches and pedicels green when growing in partial shade but occasionally purplish in more exposed situations. *Spikelets* 1.5–2.5(–3) mm long, pale to light green or sometimes purplish; glumes smooth to finely scaberulous or minutely papillose on the lateral surfaces, lemma acute or obtuse, (1.1–)1.3–2(–2.2) mm long, body glabrous or very occasionally with a few isolated hairs, awnless or with a minute near-apical bristle to 0.5 mm long or with a fine, fragile, straight to curved or weakly geniculate awn to 1.8 mm long, arising from within the upper third of the lemma back, longest awns exceeding glumes by 1 mm (awn length often variable amongst spikelets of the same panicle and plants of the same population); anthers 0.3–0.6 mm long. Probable  $2n=42$  chromosomes.

**Note:** Smaller plants of subsp. *rudis* may approach subsp. *nana* but the combination of inflorescence character, the generally smaller spikelets and awnless lemmas of the latter should suffice to differentiate the two taxa in most cases.



**Distribution:** Scattered along or within 15 km inland of the southern coastlines of Victoria and South Australia from Lake Tyers to Robe, and on the western to south-western coastline of Tasmania from Trial Harbour to South Cape Bay and Adventure Bay, with isolated occurrences on the north-west coast and on King Island in Bass Strait. Also collected from *Leptospermum lanigerum* (Sol. ex Aiton) Sm. swamp and scrub at Lake Corangamite, Poolaijelo at Salt Creek and Wannon Swamp in Western Victoria.

**Habitat:** Favours damp ground, including seepage slopes, stream banks and swamps, wet limestone cracks and cliff faces and in sand and rocks above high tide on the fringe of coastal scrub.

**Selected specimens examined:** **TASMANIA.** Tamar, iii.1887, *Oakden s.n.* (MEL); Trial Harbour, xii.1894, *Rodway s.n.* (HO); Ettrick River, King Island, 7.iii.1966, *J.H. Willis s.n.* (MEL); Point Eric, Coxs Bight, 31.xii.1982, *D.I. Morris 82104* (HO); Pennerowne Point, 26.i.1984, *A. Moscal 5942* (HO, AD); Endeavour Bay, 30.i.1984, *A. Moscal 6014* (HO); Wallaby Bay, Port Davey, 8.i.1987, *A.M. Buchanan 9339* (HO); Welcome River, north of Redpath, 17.iv.1996, *L.A.S. Johnson* (HO). **SOUTH AUSTRALIA.** Dry Creek,

Glenelg River, 29.xii.1963, *A.C. Beauglehole 5894* (AD, MEL); Bluff Swamp, Tantanoola, 18.i.1993, *R. Bates 30964* (AD, CANB); Caroline Forest, 7.i.1994, *R. Bates 35759* (AD); Piccaninnie Ponds North, 20.i.2009, *R. Bates 80899* (MEL); Little Dip Conservation Park, xii.2011, *R. Bates 86419* (MEL). **VICTORIA.** Gorae West, ii.1946, *A.C. Beauglehole s.n.* (MEL); above Tidal River, Wilsons Promontory, 13.i.1967, *J.H. Willis s.n.* (MEL); Lonely Arm, Lake Tyers, 11.xii.1976, *D.G. Cameron 7637* (MEL); Georges Rest, Lower Glenelg National Park, 15.ii.1991, *D. Albrecht 4724* (MEL); Mornington Peninsula, Nepean State Park, near confluence of a gully with Main Creek, 30.xii.1991, *N.G. Walsh 3281* (MEL); Moleside Creek, 7.i.2009, *A.J. Brown 2398* (MEL); Boneo, 23.i.2013, *A.J. Brown 2597* (MEL); Battersby Landing on the Lower Glenelg River, iii.2014, *R. Bates 90105* (MEL); Kentbruck Heath, Glenelg River National Park, iii.2014, *R. Bates 91028* (MEL).

***Lachnagrostis rudis* subsp. *nana* A.J.Br., subsp. nov.**

Differs from subsp. *rudis* in its small tufted stature, small, rather stiff panicles and often purple, scaberulous glumes.



**Figure 2.** Spikelets of *Lachnagrostis rudis* subsp. *nana* from Camerons Inlet (left) and *L. rudis* subsp. *rudis* from Moleside Creek (right)

**Type: TASMANIA.** Pot Boil Lagoon, Flinders Island, 15.i.1977, *J.S. Whinray* 2223, holotype: MEL1522881; probable isotypes (as Whinray commonly distributed duplicates with different collecting numbers): *Coll. No.* 2306, CANB487730; *Coll. No.* 1522, AD98108282.

Green or purplish-green, non-rhizomatous and non-stoloniferous, short-lived *perennial* or *annual*, to 12 cm tall or to 20(–50) cm tall including flowering culms; culms erect or weakly ascending but never trailing or scrambling, unbranched. *Leaf* blades smooth, filiform or flat, 4–8(–13) cm long and 0.2–1.5 mm wide. *Inflorescence* an open panicle with divergent and usually rather stiff branches, to 12 cm long from the lowest whorl of branches (commonly wider than long), becoming shortly exerted by 0.5–5(–7) cm at maturity; branches and pedicels purple, or green when immature or in shade. *Spikelets* 1.1–1.6(–1.8) mm long, purple or sometimes green; glumes often scaberulous on the lateral surfaces; lemma obtuse, 1.1–1.4 mm long, body glabrous, awnless; anthers 0.3–0.5 mm long. Probable  $2n=56$  chromosomes.

**Distribution:** Largely confined to the lagoons area of south-east Flinders Island but also at Killiecrankie Creek and North Pats River in the north-west and west respectively. May occur elsewhere on Bass Strait islands or on the Tasmanian or Victorian coast.

**Habitat:** Growing on the edges of winter-wet, sub-saline lagoons, often in the shelter of *Melaleuca* L. bushes or sedge tussocks. Also along the banks of creeks near their outlets to the ocean.

**Etymology:** After the Latin: named for the dwarf nature of the subspecies.

**Selected specimens examined: TASMANIA (Flinders Island).** North Pats River, 27 or 29.xii.1975, *J.S. Whinray* 1493, 2205, 2258 (AD, MEL, CANB respectively); Big Stony Lagoon, 31.i.1977, *J.S. Whinray* 703 in part (CANB); Killiecrankie Creek, 12.i.1980, *I.C. Clarke* 1090 (MELU); E-shaped Lagoon, 4.i.1984, *J.S. Whinray* 8143 (MEL); Long Swamp, 26.v.1984, *J.S. Whinray* 8192 (MEL); Hays Lagoon, 6.vi.1984, *J.S. Whinray* 8194 (MEL); E-shaped Lagoon, 20.vi.1984, *J.S. Whinray* 8217 (MEL, HO); Killiecrankie Creek, 19.i.2010, *A.J. Brown* 2469 (MEL); Camerons Inlet, 19.i.2010 *A.J. Brown* 2470 (MEL); Camerons Inlet, 20.i.2010, *A.J. Brown* 2482 (MEL); Stony Lagoon, Patriarch Sanctuary, 21.i.2010, *A.J. Brown* 2486 (MEL).

***Lachnagrostis xripulae* A.J.Br., nothosp. nov.**

Apparent hybrid between *Lachnagrostis rudis* and *L. filiformis*, combining the inflorescence and spikelet characteristics of both taxa but with largely sterile anthers. Differs from *L. rudis* in its more congested panicle, longer spikelets, less scabrous and ciliate glumes, more or less hairy lemmas, non-fimbriate lemma and palea apices and longer and lower attached lemmatal awn. Differs from most forms of *L. filiformis* in its stoloniferous growth habit, smaller spikelets, non-acuminate glumes and shorter and non-geniculate lemmatal awn.

**Type: VICTORIA.** Near the Crawford River Bridge on the Dartmoor–Hamilton Road, 29.ii.2008, *A.J. Brown* 2416, holotype: MEL2384078!

Green, shortly stoloniferous, glabrous, *annual*, to 12 cm tall; culms 0.5–1 mm wide, ascending, unbranched. *Leaf* blades smooth, flat, 5–10(–15) cm long and 1–1.5 mm wide; ligules obtuse, to 2 mm long. *Inflorescence* an open and rather lax panicle to 15 cm long from the lowest whorl of branches, its base enclosed by the upper leaf sheath but becoming exerted by 4–5 cm with maturity; branches and pedicels green. *Spikelets* (2.2–)2.5–2.7 mm long, green or sometimes purplish-green; glumes acute and keeled, subequal, scabrous along the keel, smooth on the lateral surfaces, margins smooth or finely ciliate towards the apex; lemma obtuse, 1.5–1.7 mm long, minutely 4-toothed at the apex, with a few scattered hairs to moderately pilose, awned from just above mid-back; awn fine and straight to curved or very weakly geniculate, 2.2–2.5 mm long; callus with 0.5 mm long hairs; palea 1.5–1.6 mm long; rachilla extension to 1.5–1.6 mm long; anthers 0.3 mm long if shrivelled, 0.5 mm long if non-shrivelled, both without or almost without pollen. (Fig. 1f–l)

**Notes:** Probably a hybrid between *Lachnagrostis rudis* and *L. filiformis* and/or a backcross of this hybrid with *L. filiformis*. There are likely a swarm of hybrids of varying forms. Some plants are to 70 cm tall with inflorescences to 25 cm long and leaves to 3 mm wide but in other respects conform to the type specimen. These plants usually have non-shrivelled anthers but still with limited pollen. Other plants have leaves only to 5 cm long and 1 mm wide, spikelets of only 2.2 mm length and almost

glabrous lemmas (Fig. 1f–g). Again these plants conform to the type in other respects, including shrivelled anthers (Fig. 1h).

The lemma of *L. rudis* is either awnless or possesses a minute, near-apical bristle or an occasional, very fine and fragile, straight to curved awn arising from the upper third of the lemma. In comparison, the lemmatal awns of *L. xripulae*, although still non-geniculate, are usually more substantial and attached at a lower point.

**Distribution:** Known only from the Crawford and Glenelg Rivers, near Dartmoor, Victoria.

**Habitat:** Growing in partial shade along or near the banks of rivers.

**Etymology:** After the Latin for river-bank.

**Further specimens examined: VICTORIA.** Close to Glenelg River, Fort O'Hare Caravan Park, Dartmoor, 7.i.2007, *R. Bates 76340* (MEL); Crawford River, Dartmoor, 20.i.2009, *A.J. Brown 2240* (MEL); near the Crawford River Bridge on the Dartmoor-Hamilton Road, 4.iii.2008, *A.J. Brown 2417, 2418, 2419* (MEL).

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