

## ANEMANTHELE VELDK. (GRAMINEAE: STIPEAE), A NEW GENUS FROM NEW ZEALAND

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### SUMMARY

General morphological characters and the anatomy of leaf and embryo indicate that *Oryzopsis lessoniana* (Steud.) Veldk. from New Zealand represents an undescribed genus of the grass tribe Stipeae Kunth.

In 1974 I proposed the combination *Oryzopsis (Piptatherum) lessoniana* (Steud.) Veldk. for a puzzling grass from New Zealand, which some have regarded as belonging to the Agrostideae Kunth or Aveneae Adans., others as a member of the Stipeae Kunth L. I agreed with the latter opinion, but was not very satisfied with the resulting disjunct distribution of this otherwise North temperate genus. Soon afterwards FREITAG (1975) published a revision of *Piptatherum* Beauv. showing that it was generically distinct from *Oryzopsis*. From this article and a subsequent inspection of material by Freitag it became apparent that the New Zealand species could not belong to either genus. The question then was where to place it instead. The arguments may be found from the anatomical and morphological data.

### 1. ANATOMY

1.1. The leaf. (Based on Druce s.n., CHR 274952, in L sub no. 459840, and Zotov 3998, L).

*Transverse section*: Abaxial surface slightly undulate. Adaxial surface with prominent ribs of two orders of size, midrib conspicuous. Bulliform cells in discrete U-shaped groups lining the adaxial grooves. Chlorenchyma not radiate. Lateral cell count (after HATTERSLEY & WATSON 1975) more than 4, sheaths of major vascular bundles ("vb's") 2-layered, XyMs + (C<sub>3</sub>, HATTERSLEY & WATSON 1976). Midrib with 1 vb. Sclerenchym above and below and associated with all vb's, forming T-shaped girders at the major ones.

*Abaxial epidermis*: No micro- or macrohairs, papillae, stomata, or a clear costal/intercostal zonation. Long cells common, costal and intercostal ones all in cork/silica cell pairs, occasionally in threes. Silica bodies  $\pm$  circular, irregularly isodiametric, oval to slightly elongated and irregular.

*Adaxial epidermis*: No microhairs or papillae. Ribs bordered by small hook-shaped prickles. Stomata common, subsidiary cells parallel-sided to low dome-shaped. Intercostal long cells with inflated outer walls. Short cells only over the veins, common, usually paired, sometimes solitary or in threes. Silica bodies elongated, sinuous, dumbbell-shaped or  $\pm$  square.

This anatomy is only found in the Pooideae and Stipeae. The latter usually, but not always, have adaxial microhairs and *abaxially* have a very varied complement of silica bodies, including such typical non-poid shapes as dumbbells and elongated sinuous ones. Here *adaxially* microhairs are absent, dumbbell and elongated sinuous bodies are present, but it must be realized that comparative data for the adaxial epidermis are very much poorer known than for the abaxial one. The parallel-sided stomatal subsidiaries tend to the dome-shaped ones found in the Stipeae. (After MACFARLANE & WATSON 1980, and Macfarlane, in litt.).

1.2. The lemma. (Based on Druce s.n., CHR 159313, in L sub no. 459837, and Henry s.n., CHR 202704, in L sub no 459838).

The epidermal pattern is similar to that found in the Stipeae, e.g. in *Achnatherum* sensu Tsvelev (M. E. Barkworth, in litt.), which TSVELEV (1977) considers to be the most primitive extant member of that tribe.

1.3. The embryo. (Based on Gow s.n., CHR 132487, in L sub no. 459842). As was to be expected the embryo is basically festucoid with the formula  $F + FF$  (REEDER 1957) found both in the Aveneae and the Stipeae. The primary root, however, is distinctly bent away from the main axis as is typical for the Stipeae and not in line with it as is found in the Aveneae.

## 2. MORPHOLOGY

Several authors have suggested affinities with *Agrostis* L. (e.g. RICHARD 1832; STEUDEL 1840), *Apera* Adans. (HOOKER f. 1853; COLENZO 1889), or *Dichelachne* (STEUDEL 1854), the latter genus sometimes erroneously included in the Stipeae. Within the Aveneae (incl. Agrostideae), however, it is immediately conspicuous for the anastomosing nerves of the lemma and the subapical awn, which articulates so readily at base, features that I have failed to detect elsewhere in this tribe (for the awn see also MACFARLANE & WATSON 1980, p. 657–658), but which are present in many Stipeae.

Within the latter tribe, where it has been placed by BENTHAM (18881), CHEESEMAN (1906) and ZOTOV (1943) and myself, the species apparently stands alone for possessing an unique combination of sometimes exceptional characters (see *table 1*), while it is aberrant for having a lemma with only 3 nerves instead of 5, and a caryopsis with a subbasal, elliptic hilum, which elsewhere is at least half as long as the fruit.

These morphological characters and the indications from the anatomical data of the leaf and the embryo, strongly suggest that the species is best accommodated in the Stipeae, and as there seems to be no genus in which it can be included satisfactorily, a new one is here proposed. If it could somehow be shown that the species is a true poid after all, it would still represent a distinct genus in that alliance, for I have been unable to discover a suitable one to place it in. Because of BUCHANAN's suggestion (1880) to call it "New Zealand Wind Grass", the name *Anemanthele* seemed appropriate ("anemos" = wind, "anthele" = plume).

Table 1. Morphological characters in some Stipeae.

Character	Anemanthele	Oryzopsis	Piptatherum	Stipa s.l.
floret	laterally sub-compressed	laterally sub-compressed to $\pm$ terete	dorsally sub-compressed	terete
in fruit	membranous	coriaceous (excl. <i>O. pungens</i> )	coriaceous (excl. <i>P. miliacea</i> )	coriaceous
callus	bearded obtuse conical	bearded or not obtuse conical	glabrous obtuse very small (to conical oblique, rarely straight	bearded pungent cylindrical
	straight	straight to oblique		oblique
lemma nerves	3	5	5	5
margins (overlap)	upper part	completely or in upper part	no overlap	completely
lodicules	2	2 or 3	3	2 or 3
stigmas	free to base	united to nearly free to base	free to base	free to base
hilum	elliptic	linear	linear	linear
x fruit	c. 1/6	c. 1	( $\frac{1}{2}$ )-1	( $\frac{1}{2}$ )-1

**ANEMANTHELE** Veldk., gen. nov.

Flosculus lateraliter subcompressus persistenter membranaceus. Lemma marginibus sub anthesi imbricatis in partibus apicalibus, nervis 3 sursum anastomosantibus, callo minuto obtuso conico recto. Lodiculae 2. Stigmata 2 a basi libera in fructu verruculam apicalem singulam relinquunt. Hilum minutum ellipticum in 1/6 parte inferiore positum. --- Typus: *Anemanthele lessoniana* (Steud.) Veldk.

Perennial grass. Ligules membranous. Spikelets in panicles. Lower glume shorter than the upper, persistent, longer than the lemma. Florets laterally sub-compressed, persistently membranous, falling as a whole. Rachilla-process absent. Lemma with the margins overlapping in the upper part during anthesis exposing the lower half of the palea, nerves 3, anastomosing apically; callus weakly developed, straight, obtuse, conical, with short hairs; apex minutely bilobed, the awn thereby pseudo-terminal, not divided into a column and an arista, articulating at base and soon deciduous, straight or slightly tortuous. Palea weakly nerved, neither keeled nor furrowed, completely free in fruit. Lodicules 2, lanceolate-lingular, scarious, not nerved glabrous. Stigmas 2, plumose, free to base but leaving a single apical tubercle in fruit, emerging laterally. Caryopsis fusiform, brown, epidermis finely reticulate, exposed between the divergent lemma and palea; hilum elliptic, small, in the lower 1/6th.

**Anemanthele lessoniana** (Steud.) Veldk., comb. nov.

*Agrostis procera* A. Rich., Voy. Astrol. 1 (1832) 125, non Retz. (1786/1787). – *Agrostis lessoniana* Steud., Nomencl. Bot., ed. 2, 1 (1840) 41, 42. – *Dichelachne procera* Steud., Syn. 1 (1854) 121, nom. ill. – *Oryzopsis lessoniana* Veldk., Blumea 22 (1974) 11. – Type: Lesson s.n. (P, holo).

*Agrostis rigida* A. Rich., Voy. Astrol. 1 (1832) 124, non Spreng. (1825). – *Dichelachne rigida* Steud., Syn. 1 (1854) 120. – *Oryzopsis rigida* Zotov, Trans. & Proc. Roy. Soc. n. Zeal. 73 (1943) 255, nom. ill. – Type: Lesson s.n. (P, holo).

*Apera arundinacea* Hook. f., Fl. N. Zel. 1 (1853) 295, t. 67; Handb. N. Zeal. Fl. (1864) 326; Buchanan, N. Zeal. Grasses (1880) t. 17. – *Stipa arundinacea* Benth., J. Linn. Soc., London, Bot. 19 (1881) 81; Cheeseman, Man. N. Zeal. Fl. (1906) 857; ed. 2 (1925) 148. – Type: Colenso s.n. (K, hololec-to, BM, P; WELT, n.v.).

*Apera purpurascens* Colenso, Trans. Proc. N. Zeal. Inst. 21 (1889) 106. – Type: Colenso s.n. (WELT, holo, AK, n.v.; K).

Densely tufted from a short, creeping, cataphyllous rhizome. Culms stiff, glabrous, smooth, up to 1.5 m high. Sheaths appressed, margins ciliate. Ligules truncate, 1–1.5 mm long. Blades involute, sometimes flat, stiff, up to 40 cm by 8 mm, upper surface and margins smooth to scaberulous. Panicle large, up to 75 cm long, effuse, lax, nodding; branches verticillate, 5–8 together, naked in the lower half, capillary. Spikelets greenish-purple to lead-coloured. Glumes scarious, glabrous, keeled, midrib scabrous; lower glume 2.5–3 mm long, acute, 1-nerved; upper glume 2.75–3.25 mm long, apex erose, 1(–3)-nerved, midrib slightly excurrent. Lemma 2–2.25 mm long, excl. the 0.15–0.2 mm long callus with 0.15–0.2 mm long hairs; scaberulous upward, glabrous. Palea 1.5–1.6 mm long, apex erose to slightly fimbriate. Lodicules c. 0.6 mm long, closely set with imbricate margins. Anther 1, c. 1 mm long, glabrous, yellow (i.s.). Caryopsis c. 1.5 mm long, embryo c. 0.3 times as long, hilum c. 0.2 mm long.

*Distribution:* New Zealand, erroneously cited for subtropical E. Australia, probably confused with *Stipa ramosissima* (Trin.) Nees or *S. verticillata* Spreng. by Hook. f. (1864) and Buchanan (1880).

*Ecology:* Edges of streamlets, up to 460 m alt. Apparently rare.

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