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J. Travis Columbus

*Rancho Santa Ana Botanic Garden, Claremont, California*

James P. Smith Jr.

*Humboldt State University, Arcata, California*

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NOMENCLATURAL CHANGES FOR SOME GRASSES IN CALIFORNIA AND  
THE *MUHLENBERGIA* CLADE (POACEAE)

J. TRAVIS COLUMBUS<sup>1</sup> AND JAMES P. SMITH, JR.<sup>2</sup>

<sup>1</sup>Rancho Santa Ana Botanic Garden and Claremont Graduate University, 1500 North College Avenue, Claremont, California 91711-3157, USA (j.travis.columbus@cgu.edu); <sup>2</sup>Department of Biological Sciences, Humboldt State University, Arcata, California 95521, USA

ABSTRACT

New combinations and names are here validated for ten grass (Poaceae) taxa in California for the forthcoming revision of The Jepson Manual. In addition, guided by recent molecular phylogenetic studies, ten non-California grass species are here transferred to *Muhlenbergia* (Chloridoideae: Cynodonteae) to achieve monophyly of the genus. *Lolium*, long known to be phylogenetically nested within *Festuca*, is here subsumed into *Festuca*, and the circumscription of *Stipa* is expanded to include all Stipeae (native and non-native) in California. In Stipeae, most currently recognized genera are not monophyletic. Attaining monophyly while bearing in mind identification for persons not expert in Stipeae were the guiding principles in expanding the circumscription of *Stipa*. Newly recognized are: ***Elymus elymoides* var. *californicus***, ***E. elymoides* var. *hordeoides***, ***Festuca perennis***, ***Hilaria* subgen. *Pleuraphis***, ***Muhlenbergia brevigluma***, ***M. diandra***, ***M. imperfecta***, ***M. multiflora***, ***M. paniculata***, ***M. phleoides***, ***M. plumiseta***, ***M. spatha***, ***M. tricholepis***, ***M. uniseta***, ***Schismus barbatus* var. *arabicus***, ***Stipa chaetophora***, ***S. divaricata***, ***S. exigua***, ***S. mauritanica***, and ***S. purpurata***.

Key words: California, *Festuca*, *Lolium*, *Muhlenbergia*, nomenclature, *Pleuraphis*, Poaceae, *Stipa*, Stipeae, taxonomy.

The nomenclatural novelties presented in this paper are outcomes of two projects. First, the forthcoming revision of The Jepson Manual: Higher Plants of California (B. G. Baldwin et al. in prep.) requires a number of new combinations. Notably, we relegate *Lolium* L. to synonymy under *Festuca* L. and treat all Californian species of Stipeae in a single genus, *Stipa* L. These decisions were guided by two principles, monophyly and ease of identification (diagnosability). Molecular phylogenetic studies have shown *Lolium* to be nested within *Festuca* (Charmet et al. 1997; Gaut et al. 2000; Torrecilla and Catalán 2002; Torrecilla et al. 2004; Catalán et al. 2004, 2007). Although *Lolium* is set apart morphologically from *Festuca* by its spicate inflorescence and undeveloped lower glumes (except in the terminal spikelet), hybridization between the genera is well documented (e.g., Crowder 1953; Gymer and Whittington 1973). Breaking *Festuca* into several monophyletic genera in order to accommodate *Lolium* is rejected because it likely would result in some genera that cannot be readily distinguished by persons not expert in the group. The situation in Stipeae is more complicated. Most of the genera currently recognized in California are not monophyletic in molecular studies (Jacobs et al. 2000, 2007; Döring et al. 2007; Barkworth et al. 2008). We advocate a large, monophyletic genus *Stipa* that is straightforward to identify by a suite of characters including long glumes, a single floret per spikelet, and the lemmas becoming firm at maturity and having overlapping margins and a terminal awn. Not all species possess all diagnostic characters, however. Notably, plants of the species formerly placed in the monotypic *Ampelodesmos* Link have multiple florets per spikelet.

The new combinations and names in *Muhlenbergia* (Chloridoideae: Cynodonteae) stem from a second project by Columbus et al. (in press). *Muhlenbergia* is not monophyletic

in molecular phylogenies (nuclear and chloroplast) because nine much smaller genera are nested within it (see also Columbus et al. 2007 based on a smaller taxon sample). Using the approach above and paralleling the decision to expand the circumscription of *Bouteloua* Lag. (Columbus 1999), the nine genera are here subsumed within *Muhlenbergia*, which is diagnosed by membranous ligules, one floret per spikelet, and three-nerved lemmas. Interestingly, similar to the situation with *Ampelodesmos*, plants of the species formerly positioned in the monotypic *Redfieldia* Vasey have a ligule of hairs and multiple florets per spikelet. However, continuing to recognize *Redfieldia* renders *Muhlenbergia* paraphyletic, and breaking up *Muhlenbergia* in order to preserve the nine nested genera would require erecting a significant number of new genera, many of which would be difficult to distinguish morphologically. This parallels the option for *Festuca* if one desires to preserve *Lolium*. Nomenclatural changes are not needed for all species in the nine small genera because combinations in *Muhlenbergia* exist for some, including those recently made by Giraldo-Cañas and Peterson (2009), who curiously did not cite Columbus et al. (2007, in press).

Table 1 lists the names employed in previous treatments and their corresponding names here.

***Elymus elymoides* (Raf.) Swezey var. *californicus* (J.G.Sm.) J.P.Sm., comb. et stat. nov.**

Basionym: *Sitanion californicum* J.G.Sm., *Bull. Div. Agrostol., U.S.D.A.* **18**: 13 (1899).

***Elymus elymoides* (Raf.) Swezey var. *hordeoides* (Suksd.) J.P.Sm., comb. et stat. nov.**

Basionym: *Sitanion hordeoides* Suksd., *Werdenda* **1(2)**: 4–5 (1923).

***Festuca perennis* (L.) Columbus & J.P.Sm., comb. nov.**

Table 1. Corresponding names under the previous and new treatments.

Previous treatment	New treatment
<i>Aegopogon cenchroides</i> Humb. & Bonpl. ex Willd. var. <i>breviglumis</i> (Scribn.) Beetle	<i>Muhlenbergia brevigluma</i> (Scribn.) Columbus
<i>Aegopogon tenellus</i> (DC.) Trin. var. <i>abortivus</i> (E.Fourn.) Beetle	<i>Muhlenbergia imperfecta</i> (Nash) Columbus
<i>Aegopogon tenellus</i> var. <i>tenellus</i>	<i>Muhlenbergia unisetata</i> (Lag.) Columbus
<i>Ampelodesmos mauritanicus</i> (Poir.) T.Durand & Schinz	<i>Stipa mauritanica</i> (Poir.) Columbus & J.P.Sm.
<i>Blepharoneuron tricholepis</i> (Torr.) Nash	<i>Muhlenbergia tricholepis</i> (Torr.) Columbus
<i>Elymus elymoides</i> (Raf.) Swezey subsp. <i>californicus</i> (J.G.Sm.) Barkworth	<i>Elymus elymoides</i> var. <i>californicus</i> (J.G.Sm.) J.P.Sm.
<i>Elymus elymoides</i> subsp. <i>hordeoides</i> (Suksd.) Barkworth	<i>Elymus elymoides</i> var. <i>hordeoides</i> (Suksd.) J.P.Sm.
<i>Lolium perenne</i> L.	<i>Festuca perennis</i> (L.) Columbus & J.P.Sm.
<i>Lycurus phleoides</i> Kunth	<i>Muhlenbergia phleoides</i> (Kunth) Columbus
<i>Pereilema ciliatum</i> E.Fourn.	<i>Muhlenbergia plumiseta</i> Columbus
<i>Pereilema diandrum</i> R.W.Pohl	<i>Muhlenbergia diandra</i> (R.W.Pohl) Columbus
<i>Piptatherum exiguum</i> (Thurb.) Dorn	<i>Stipa exigua</i> (Thurb.) Columbus & J.P.Sm.
<i>Piptatherum micranthum</i> (Trin. & Rupr.) Barkworth	<i>Stipa divaricata</i> Columbus & J.P.Sm.
<i>Piptochaetium setosum</i> (Trin.) Arechav. (nom. illeg.)	<i>Stipa purpurata</i> (Phil.) Columbus & J.P.Sm.
<i>Piptochaetium stipoides</i> (Trin. & Rupr.) Hack. ex Arechav.	<i>Stipa chaetophora</i> (Griseb.) Columbus & J.P.Sm.
<i>Pleuraphis</i> Torr.	<i>Hilaria</i> Kunth subgen. <i>Pleuraphis</i> (Torr.) Columbus
<i>Redfieldia flexuosa</i> (Thurb.) Vasey	<i>Muhlenbergia multiflora</i> Columbus
<i>Schaffnerella gracilis</i> (Benth.) Nash.	<i>Muhlenbergia spatha</i> Columbus
<i>Schedonnardus paniculatus</i> (Nutt.) Branner & Coville	<i>Muhlenbergia paniculata</i> (Nutt.) Columbus
<i>Schismus arabicus</i> Nees	<i>Schismus barbatus</i> (Loefl. ex L.) Thell. var. <i>arabicus</i> (Nees) J.P.Sm.

Basionym: *Lolium perenne* L., Sp. Pl. 1: 83 (1753).

**Hilaria** Kunth subgen. **Pleuraphis** (Torr.) Columbus, comb. et stat. nov.

Basionym: *Pleuraphis* Torr., *Ann. Lyceum Nat. Hist. New York* 1: 148, 150 (1824).

**Muhlenbergia brevigluma** (Scribn.) Columbus, comb. nov.

Basionym: *Aegopogon geminiflorus* Kunth var. *breviglumis* Scribn., *Zoë* 4(4): 386 (1894).

**Muhlenbergia diandra** (R.W.Pohl) Columbus, comb. nov.

Basionym: *Pereilema diandrum* R.W.Pohl, *Novon* 2(2): 102–103 (1992).

**Muhlenbergia imperfecta** (Nash) Columbus, comb. nov.

Basionym: *Aegopogon imperfectus* Nash, *N. Amer. Fl.* 17(2): 138 (1912).

**Muhlenbergia multiflora** Columbus, nom. nov.

Replaced name: *Grappheporum flexuosum* Thurb., *Proc. Acad. Nat. Sci. Philadelphia* 1863: 78 (1864).

*Note.*—The epithet refers to the multiple florets per spikelet.

**Muhlenbergia paniculata** (Nutt.) Columbus, comb. nov.

Basionym: *Lepturus paniculatus* Nutt., *Gen. N. Amer. Pl.* 1: 81 (1818).

**Muhlenbergia phleoides** (Kunth) Columbus, comb. nov.

Basionym: *Lycurus phleoides* Kunth, *Nov. Gen. Sp.* (quarto ed.) 1: 142, pl. 45 (1816).

**Muhlenbergia plumiseta** Columbus, nom. nov.

Replaced name: *Pereilema ciliatum* E.Fourn., *Mexic. Pl.* 2: 93 (1886).

*Note.*—The epithet refers to the plumose bristles in the inflorescence.

**Muhlenbergia spatha** Columbus, nom. nov.

Replaced name: *Schaffnera gracilis* Benth., *Hooker's Icon. Pl.* 14: 59, pl. 1378 (1882).

*Note.*—The epithet refers to the spatheate leaf subtending the inflorescence.

**Muhlenbergia tricholepis** (Torr.) Columbus, comb. nov.

Basionym: *Vilfa tricholepis* Torr., *Pacif. Railr. Rep.* 4(5): 155 (1857).

**Muhlenbergia unisetata** (Lag.) Columbus, comb. nov.

Basionym: *Hymenothecium unisetum* Lag., *Gen. Sp. Pl.* 4 (1816).

**Schismus barbatus** (Loefl. ex L.) Thell. var. **arabicus** (Nees) J.P.Sm., comb. et stat. nov.

Basionym: *Schismus arabicus* Nees, *Fl. Afr. Austral. Ill.* 1: 422–423 (1841).

**Stipa chaetophora** (Griseb.) Columbus & J.P.Sm., comb. nov.

Basionym: *Piptochaetium chaetophorum* Griseb., *Symb. Fl. Argent.* 298 (1879).

*Note.*—Species circumscription follows Cialdella and Arriaga (1998; as *Piptochaetium stipoides* (Trin. & Rupr.) Hack. ex Arechav.).

**Stipa divaricata** Columbus & J.P.Sm., nom. nov.

Replaced name: *Urachne micrantha* Trin. & Rupr., *Sp. Gram. Stipac.* 16 (1842).

*Note.*—The epithet refers to the spreading inflorescence branches.

**Stipa exigua** (Thurb.) Columbus & J.P.Sm., comb. nov.

Basionym: *Oryzopsis exigua* Thurb., U.S. Expl. Exped. 17(2): 481–482 (1874).

***Stipa mauritanica*** (Poir.) Columbus & J.P.Sm., comb. nov.

Basionym: *Arundo mauritanica* Poir., Voy. Barbarie 2: 104–105 (1789).

***Stipa purpurata*** (Phil.) Columbus & J.P.Sm., comb. nov.

Basionym: *Piptochaetium purpuratum* Phil., *Linnaea* 29(1): 86–87 (1858).

*Note.*—Species circumscription follows Cialdella and Arriaga (1998; as *Piptochaetium setosum* (Trin.) Arechav., nom. illeg.).

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