JSE Journal of Systematics and Evolution

doi: 10.1111/jse.12262

Invited Review

A worldwide phylogenetic classification of the Poaceae (Gramineae) II: An update and a comparison of two 2015 classifications

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Received 21 April 2017; Accepted 25 May 2017; Article first published online xx Month 2017

Abstract We present a new worldwide phylogenetic classification of 11 506 grass species in 768 genera, 12 subfamilies, seven supertribes, 52 tribes, five supersubtribes, and 90 subtribes; and compare two phylogenetic classifications of the grass family published in 2015 (Soreng et al. and Kellogg). The subfamilies (in descending order based on the number of species) are Pooideae with 3968 species in 202 genera, 15 tribes, and 30 subtribes; Panicoideae with 3241 species in 247 genera, 13 tribes, and 19 subtribes; Bambusoideae with 1670 species in 125 genera, three tribes, and 15 subtribes; Chloridoideae with 1602 species in 124 genera, five tribes, and 26 subtribes; Aristidoideae with 367 species in three genera, and one tribe; Danthonioideae with 292 species in 19 genera, and one tribe; Micrairoideae with 184 species in eight genera, and three tribes; Oryzoideae with 115 species in 19 genera, four tribes, and two subtribes; Arundinoideae with 40 species in 14 genera, two tribes, and two subtribes; Pharoideae with 12 species in three genera, and one tribe; Puelioideae with 11 species in two genera, and two tribes; and the Anomochlooideae with four species in two genera, and two tribes. We also include a radial tree illustrating the hierarchical relationships among the subtribes, tribes, and subfamilies. Newly described taxa include: supertribes Melicodae and Nardodae; supersubtribes Agrostidodinae, Boutelouodinae, Gouiniodinae, Loliodinae, and Poodinae; and subtribes Echinopogoninae and Ventenatinae.

Key words: classification, DNA, Gramineae, grasses, morphology, phylogeny, subfamily, subtribe, supertribe, supersubtribe, tribe.

1 Introduction

Based on molecular DNA and morphological studies we presented a generic classification and hierarchical tree with detailed relationships of all subfamilies, tribes, and subtribes within the Poaceae (Soreng et al., 2015b). In the same year a comprehensive treatment of the Poaceae was completed by Kellogg (2015) that included, in addition to a generic classification outlining relationships among the subfamilies, tribes, and subtribes, chapters on overall morphology, phytochemistry, distribution, reproduction, and domestication, and keys to subdivisions and genera, along with diagnoses and comments.

The classifications of Soreng et al. (2015b) and Kellogg (2015) represent a synthesis of molecular studies that have greatly added to traditional classifications based entirely on morphology, anatomy, and cytology (Clayton & Renvoize, 1986; Watson & Dallwitz, 1992). In our earlier publication we recognized 764 genera in 12 subfamilies, six supertribes, 51 tribes, and 79 subtribes encompassing ± 12 074 species (Soreng et al., 2015b) whereas Kellogg (2015) recognized 698 genera, and 13 isolated species, without formal generic names, in the same 12 subfamilies, no supertribes, 30 tribes, and 53 subtribes encompassing ca. 11 000 species. In order to reduce redundancy, i.e., the use of more than one hierarchical name to circumscribe a clade or group, Kellogg (2015) chose to use fewer ranks below subfamily, avoiding all supertribe names, and tribes in small or single tribe subfamilies, or subtribes in small tribes, whereas Soreng et al. (2015b) perpetuated tribal names since they are integral ranks in the botanical code and have traditionally been used in the classification of the grasses for 200 years. We feel that for equivalence across the family each genus ought to be aligned within a tribe, and if monophyletic and morphologically diagnosable, prefixes for additional suprageneric taxa, such as, sub- and super-, should be used to recognize larger or smaller clades within or above tribes.

In this paper we compare our earlier grass classification (Soreng et al., 2015b) with the classification in Kellogg (2015), and we present a new radial phylogenetic tree and updated classification incorporating new studies reported in the literature.

2 Material and Methods

2.1 Phylogenetic data

Starting with our radial phylogenetic tree derived from a large dataset of 448 grass species using *matK* and *ndhF* plastid DNA markers (Soreng et al., 2015b, Fig. 1.), to assemble our new Figure 1 we then inserted new tribal and subtribal names in the appropriate location based on publications supported by molecular analyses (Besnard et al., 2013; Hochbach et al., 2015; Kellogg, 2015; Soreng et al., 2015a; Peterson et al., 2016; Teisher, 2016; Teisher et al., in press; Wong et al., 2016). *Joinvillea* Gaudich. ex Brongn. & Gris and *Ecdeiocolea* F. Muell. were used as outgroups based on previous studies (Michelangeli et al., 2003). For our new classification we also used our unpublished DNA sequences that are not yet available to the public, particularly in the Pooideae and Chloridoideae. We base our generic limits and concepts on current phylogenetic studies, and when this is lacking, we generally take the conservative view using morphology, cytology, and anatomy as a guide. However, there are many occasions when a lineage is unresolved and requires additional study. The number of species per genus, leading to the total number per subtribe, tribe, and subfamily (Appendices 1 and 2) was calculated primarily by consulting GrassWorld (Simon, 2014), GrassBase (Clayton et al., 2016), and the entire taxonomic literature.

2.2 Nomenclature

All suprageneric taxa and genera are recorded in the Missouri Botanical Garden's taxonomic database, Tropicos (http://www.tropicos.org/Home.aspx), with their original place of publication and authorship. We used this database to generate all author names and we follow the suggested abbreviations in Brummitt & Powell (1992) and the International Plant Names Index (http://www.ipni.org/index.html). New updated classifications (Soreng et al., 2017) are also available at: http://www.tropicos.org/projectwebportal.aspx?pagename=ClassificationNWG&projectid=10.

Appendix I lists a comparison of the suprageneric classification of Kellogg (2015), Soreng et al. (2015b), and our current version. Appendix II arranges each genus in our current classification, and accounts for all legitimate (and some illegitimate and invalid) suprageneric names and synonyms we have documented along with authorship and date of publication. Each genus in Appendix II is color coded to indicate the predominant indigenous distribution of its species in the Americas (Western Hemisphere), Africa, Australasia, and Eurasia. Photosynthetic pathway is noted as C_3 or C_4 for each highest rank where it is internally constant. Generic names in *italics* indicate DNA has been studied for one or more of the species. Comments are liberally inserted after accepted names to indicate special issues such as reticulate origins (nothotaxa are not listed). Doc. S1 lists all the treated genera with their authors, their acceptance or synonymy, and an estimate of the number of species in each genus, and its subfamily classification.

3 Results

3.1 Comparison of two classifications

The following is a list of 40 genera accepted by Soreng et al. (2015b) and in our new classification (except *Leptophyllochloa* which is now a synonym of *Cinnagrostis*); names in parentheses were treated as synonyms by Kellogg (2015), and 14 of these (marked with an asterisk*) we now place as synonyms in our new classification: *Aegilops* (syn. *Amblyopyrum*), *Agrostis* (syn. *Chaetopogon**), *Arthropogon* (syn. *Achlaena*, *Altoparadisium*), *Axonopus* (syn. *Baptorhachis*), *Bambusa* (syn. *Phuphanochloa*), *Chasmanthium* (syn. *Bromuniola**), *Chionachne* (syn. *Polytoca*, *Sclerachne*, *Trilobachne*), *Cleistochloa* (syn. *Ancistrachne*, *Calyptochloa*), *Desmazeria* (syn. *Catapodium*), *Deyeuxia* (syn. *Dichelachne*), *Diarrhena* (syn. *Neomolinia*), *Dupontia* (syn. *Arctophila*), *Ehrharta* (syn. *Microlaena*, *Tetrarrhena*, *Zotovia*), *Elymus* (syn. *Anthosachne*, *Connorochloa*, *Douglasdeweya*, *Kengyilia*, *Pascopyrum*), *Eragrostis* (syn. *Ectrosia**, *Harpachne**, *Pogonarthria**, *Psammagrostis**), *Eulalia* (syn. *Pseudopogonatherum*), *Homopholis* (syn. *Walwhalleya**), *Leptatherum* (syn. *Polliniopsis**), *Leucopoa* (syn. *Drymochloa*, *Leucopoa*), *Leymus* (syn. *Hordelymus*), *Melinis* (syn. *Mildbraediochloa**), *Microchloa* (syn. *Rendlia**), *Miscanthus* (syn. *Miscanthidium*, *Narenga*, *Miscanthus*, *Sclerostachya*), *Mnesithea* (syn. *Ratzeburgia*), *Munroa* (syn. *Dasyochloa*), *Neurachne* (syn. *Paraneurachne*), *Otachyrium* (syn. *Plagiantha*, *Steinchisma*), *Panicum* (syn. *Yakirra**), *Parabambusa* (syn. *Pinga*), *Paractaenum* (syn. *Plagiosetum*), *Paspalum* (syn. *Spheneria**), *Phleum* (syn. *Pseudophleum*), *Saccharum* (syn. *Erianthus*), *Schizostachyum* (syn. *Dendrochloa**), *Sorghum* (syn. *Hemisorghum*), *Trisetaria* (syn. *Avellinia*, *Gaudinia*, *Koeleria*, *Leptophyllochloa*, *Peyritschia*, *Rostraria*, *Trisetum*), *Tristachya* (syn. *Dilophotriche*, *Loudetiopsis*, *Zonotriche*), *Urochloa* (syn. *Megathyrsus*, *Scutachne*), *Ventenata* (syn. *Gaudinopsis*), *Zeugites* (syn. *Pohlidium**).

The following is a list of 16 genera accepted by Kellogg (2015) with names in parentheses treated as synonyms by Soreng et al. (2015b), four of which (marked with an asterisk*) we now accept in our new classification: *Andropogon* (syn. *Hypogynium*), *Aulonemia* (syn. *Colanthelia**), *Calamagrostis* (syn. *Deyeuxia*), *Cenchrus* (syn. *Snowdenia*), *Chloris* (syn. *Ochthochloa*), *Coelachyrum* (syn. *Coelachyriopsis*), *Deschampsia* (syn. *Scribneria*), *Dichanthium* (syn. *Eremopogon**), *Festuca* (syn. *Loliolum*), *Leptochloa* (syn. *Trichloris*), *Mnesithea* (syn. *Hackelochloa**), *Puccinellia* (syn. *Pseudosclerochloa*), *Reitzia* (syn. *Piresia*), *Sorghum* (syn. *Cleistachne**, *Sarga*), and *Sporobolus* (syn. *Calamovilfa, Crypsis, Spartina, Thellungia*).

The following 24 genera were accepted by Soreng et al. (2015b) but were not accounted for in Kellogg (2015), five of these (marked with an asterisk*) were recently published and could not have been addressed by Kellogg: *Aconisia*, *Adenochloa*, *Brizochloa*, *Chloachne*, *Dupontiopsis**, *Helictochloa*, *Kalinia**, *Lorenzochloa*, *Micrachne**, *Moliniopsis*, *Morronea**, *Parianella**, *Parvotrisetum*, *Patzkea*, *Sasaella*,

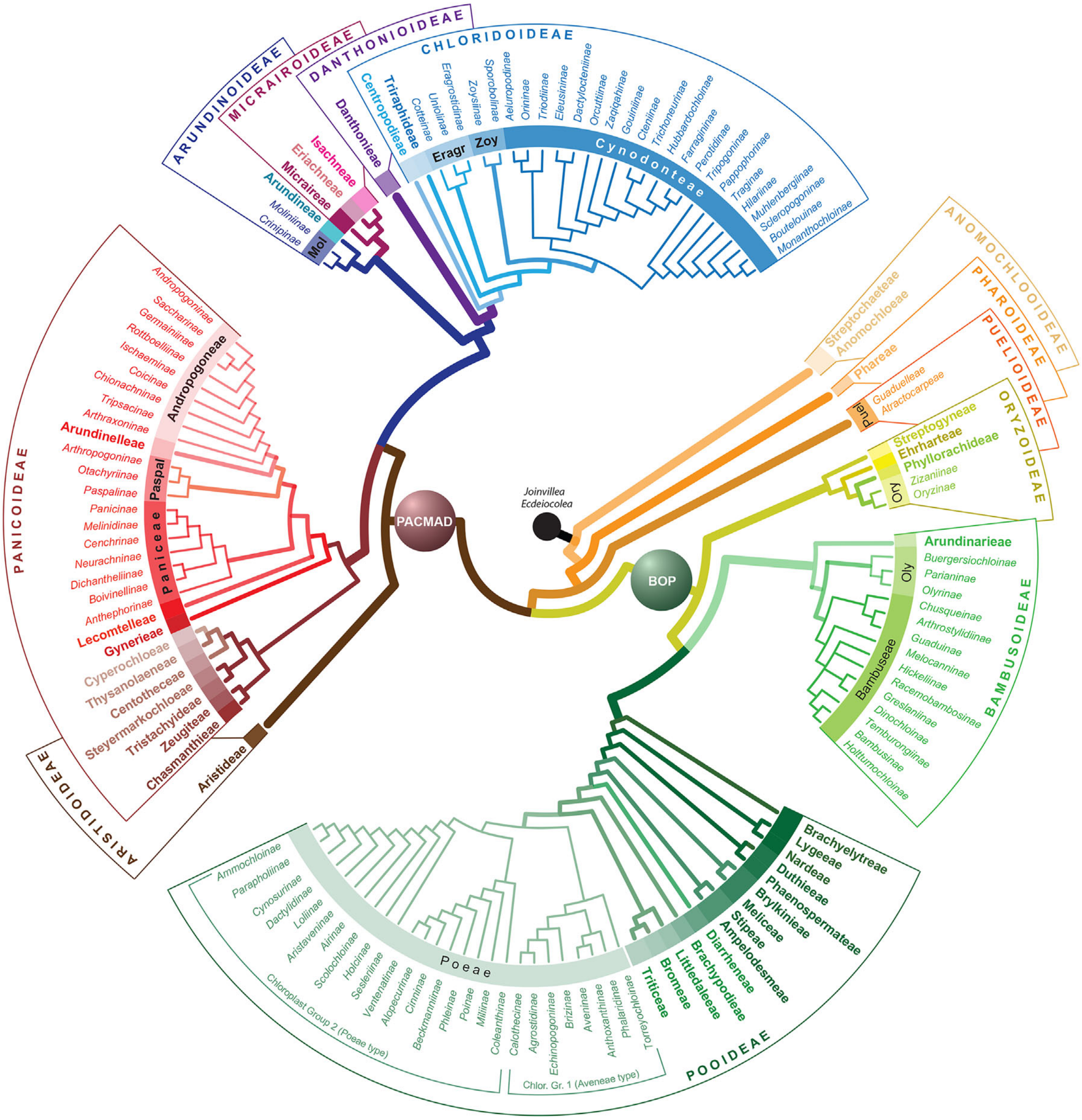

Fig. 1. A phylogenetic classification of the Poaceae, includes 12 subfamilies, 53 tribes, and 90 subtribes evolving clockwise from *Joinvillea* and *Ecdeiocolea* (outgroups). BOP = Bambusoideae, Oryzoideae, and Pooideae; PACMAD = Panicoideae, Aristidoideae, Chloridoideae, Micrairoideae, Arundinoideae, and Danthonioideae. Thick branches represent subfamily splits; medium thick branches represent tribe splits; and thin branches represent subfamily splits.

Schenckochloa, Semiarundinaria, Sesleriella, Taeniorhachis, Tricholemma, Tripidium, Veldkampia, Vietnamocalamus, Vietnamochloa. In our new classification we place *Aconisia* as a synonym of *Hymenachne*, all others are still accepted by us. *Rendlia* was inadvertently accepted and synonymized (intended) by Soreng et al. (2015b).

3.2 New classification

A radial tree (Fig. 1) illustrating the hierarchical relationships among the subtribes, tribes, and subfamilies depicts Poaceae as monophyletic with 12 monophyletic subfamilies, in order of divergence: Anomochlooideae (four species in two genera), Pharoideae (12 species in three genera), and Puelioideae (11 species in two genera) forming the basal lineages; Oryzoideae (115 species in 19 genera), Bambusoideae (1670 species in 125 genera), and Pooideae (3968 species in 202 genera) forming the BOP clade (Clark et al., 1995); and Aristidoideae (367 species in three genera) + Panicoideae (3241 species in 247 genera) as sister to the remaining set of Arundinoideae (40 species in 14 genera) + Micrairoideae (184 species in eight genera), and Danthonioideae (292 species in 19 genera) + Chloridoideae (1602 species in 124 genera), forming the PACMAD clade (Sánchez-Ken & Clark, 2010) [Appendices I & II].

In the above 12 subfamilies we recognize 52 tribes, 90 subtribes, and 768 genera in approximately 11 506 species (Appendices I & II, Doc. S1). The numbers of genera and species in each of the 52 tribes are as follows: Ampelodesmeae (1, 1), Andropogoneae (98, 1202), Anomochloeae (1, 1), Aristideae (3, 367), Arundinarieae (31, 581), Arundineae (4, 17), Arundinelleae (3, 86), Atractocarpeae (1, 5), Bambuseae (73, 966), Brachyelytreae (1, 3), Brachypodieae (1, 22), Bromeae (1, 165), Brylkinieae (1, 1), Centotheceae (2, 3), Centropodieae (2, 6), Chasmanthieae (1, 7), Cynodonteae (95, 859), Cyperochloeae (2, 2), Danthonieae (18, 291), Diarrheneae (2, 5), Duthieeae (8, 16), Eragrostideae (14, 489), Ehrharteae (4, 38), Eriachneae (1, 50), Guaduelleae (1, 6), Gynerieae (1, 1), Isachneae (6, 119), Lecomtelleae (1, 1), Littledaleeae (1, 4), Lygeeae (1, 1), Meliceae (7, 158), Micraireae (1, 15) Molinieae (14, 178), Nardeae (1, 1), Olyreae (21, 123), Oryzoideae (11, 71), Paniceae (83, 1227), Paspaleae (39, 597), Phaenospermateae (1, 1), Phareae (3, 12), Phyllorachideae (2, 3), Poeae (121, 2562), Steyermarkochloeae (2, 2), Stipeae (28, 527), Streptochaeteae (1, 3), Streptogyneae (1, 2), Thysanolaeneae (1, 1), Triraphideae (3, 15), Tristachyideae (8, 87), Triticeae (27, 501), Zeugiteae (4, 17), and Zoysieae (4, 233) [Appendix I]. We recognize 90 subtribes (number of genera, number of species): Aeluropodinae (2, 7), Agrostidinae (11, 409), Airinae (7, 43), Alopecurinae (3, 47), Ammochloinae (1, 3), Andropogoninae (25, 514), Anthephorinae (8, 291), Anthoxanthinae (1, 42), Aristaveninae (1, 51), Arthraxoninae (1, 27), Arthropogoninae (16, 71), Arthrostylidiinae (15, 185), Arundinariinae (31, 581), Aveninae (18, 343), Bambusinae (17, 324), Beckmanniinae (4, 6), Boivinellinae (18, 146), Boutelouinae (1, 60), Brizinae (2, 6), Buergersiochloinae (1,1), Calothecinae (1, 22), Cenchrinae (24, 287), Chinoachninae (5, 15), Chusqueinae (1, 175), Cinninae (5, 13), Coicinae (1, 4), Coleanthinae (10, 156), Cotteinae (4, 28), Crinipinae (4, 10), Cteniinae (1, 20), Cynosurinae (1, 10), Dactylidinae (2, 4), Dactylocteniinae (4, 20), Dichantheliinae (2, 76), Dinochloinae (7, 56), Echinopogoninae (5, 20), Eleusininae (27, 231), Eragrostidinae (5, 451), Farragininae (2, 4), Germainiinae (4, 31), Gouiniinae (6, 21), Greslaniinae (1, 2), Guaduinae (5, 53), Hickeliinae (9, 32), Hilariinae (1, 10), Holcinae (2, 11), Holttumochloinae (3, 6), Hubbardochloinae (8, 27), Ischaeminae (7, 151), Loliinae (9, 659), Melinidinae (13, 166), Melocanninae (9, 99), Miliinae (1, 5), Moliniinae (4, 7), Monanthochloinae (1, 11), Muhlenbergiinae (1, 182), Neurachninae (6, 21), Olyrinae (17, 88), Orcuttiinae (2, 9), Orininae (2, 20), Oryzinae (4, 44), Otachyriinae (5, 34), Panicinae (3, 157), Pappophorinae (3, 25), Parapholiinae (8, 26), Parianinae (3, 34), Paspalinae (17, 491), Perotidinae (3, 19), Phalaridinae (1, 17), Phleinae (1, 16), Poinae (1, 550), Racemobambosinae (3, 31), Rottbolliinae (16, 112), Saccharinae (26, 179), Scleropogoninae (6, 15), Scolochloinae (2, 3), Sesleriinae (5, 39), Sporobolinae (2, 221), Temburongiinae (1, 1), Torreyochloinae (2, 16), Traginae (6, 16), Trichoneurinae (1, 8), Triodiinae (1, 69), Tripogoninae (7, 66) Tripsacinae (7, 59), Uniolinae (5, 10), Ventenatinae (6, 21), Zaqiqahinae (1, 1), Zizaniinae (7, 27), and Zoysiinae (2, 12) [Appendices I & II, Doc. S1].

We tally 4783 species with known C_4 metabolism occurring in Aristidoideae, Chloridoideae, Micrairoideae, and Panicoideae or approximately 41.6% of the grasses.

3.3 Taxonomy

Based on our results we propose two new supertribes, five new supersubtribes, and two new subtribes below.

Agrostidodinae Soreng, **supersubtribe nov.**

Type: *Agrostis* L., Sp. Pl. 1: 61. 1753.

Description: Annuals or perennials; upper culm leaf sheaths open to the base; ligules membranous without a fringe of hairs; synflorescence paniculate, sometimes densely contracted; spikelets 1-flowered, or several-flowered (Brizinae and Calothecinae, rarely elsewhere); disarticulation above or below the glumes; multi-flowered spikelets often plump, and with broad paleas; glumes shorter or longer than the lowest floret; rachilla extension absent or minute, or well-developed and often pilulose or pilose; lemmas glabrous or with a short line of hairs along the margins, with or without awns, awns terminal subterminal or dorsal, lateral veins often excurrent as short teeth or setae or forming awns; callus glabrous, bearded, or with a crown of hairs (hairs rarely in several tufts); paleas coriaceous, chartaceous, scarious, or hyaline (and frequently rudimentary), keels well-spaced with narrow flanges, or approximate with flanges broader than the gap between the keels; lodicules lanceolate, unlobed or sometimes lobed, hyaline, obscurely veined; ovary glabrous or hairy; caryopsis hard or soft, with lipid (where known), hilum linear, elliptical, or round.

Included subtribes: Agrostidinae, Brizinae, Calothecinae, and Echinopogoninae.

Distribution: Echinopogoninae and Calothecinae are primarily southern hemisphere (excluding Africa), Brizinae are in Europe and southwest Asia, and Agrostidinae are worldwide.

Boutelouodinae P.M. Peterson & Romasch., **supersubtribe nov.**

Type: *Bouteloua* Lag., Varied. Ci. 2(4, 21): 134 . 1805.

Description: Perennials or annuals, sometimes stoloniferous or rhizomatous; ligules membranous or a fringe of hairs; synflorescence a panicle, occasionally a false spike with spicate branches; spikelets 1–10(–25)-flowered, bisexual, unisexual (monoecious or dioecious) or sterile, solitary, paired or in triplets; glumes 1–3(–11)-veined; lemmas usually 3(7–13)-veined, the apex entire, lobed or cleft, unawned, mucronate or awned.

Included subtribes and genera: Boutelouinae, Hilariinae, Monanthochloinae, Muhlenbergiinae, Scleropogoninae, and Traginae; included orphan genera: *Allolepis, Jouvea, Kalinia,* and *Sohnsia.*

Distribution: Boutelouinae, Hilariinae, Monanthochloinae, Muhlenbergiinae, Scleropogoninae, *Allolepis, Jouvea, Kalinia,* and *Sohnsia* are almost exclusively from the western hemisphere; Traginae is primarily African.

Echinopogoninae Soreng, **subtribe nov.**

Type: *Echinopogon*, P. Beauv., Ess. Agrostogr. 42, 148, 161. 1812.

Description: Annuals and perennials; spikelets 1-flowered (1 or infrequently 2-flowered in *Relchela*); rachilla extension present, terete in cross section, 1/5–4/5 the lemma in length (minute in *Dichelachne*), glabrous or the longer ones short pilose to hispid along the length; callus blunt, rounded or oblique (rarely sharp), with a distinct crown of hairs around the base or along the sides, to 1/10–½ the lemma in length (rarely bearded along the sides in *Dichelachne crinata*); lemmas subcoriaceous to coriaceous, smooth or scabrous, awnless (*Relchela*) or awned, central awn stout, entered by intermediate veins (*Echinopogon* and *Ancistragrostis*), and straight or sinuous (uncinate in *Ancistragrostis*), or only the central vein, frequently scabrid; palea at least distally, coriaceous to chartaceous, and green in part, or scarious (*Dichelachne*), as long as the lemma, keels closely spaced and densely scabrous to ciliate distally (or smooth or minutely scabrous in *Dichelachne*), lateral margins more than (1–) 2–3 x broader than the gap between the keels; ovary apex with stiff hairs at least on the base of the styles or glabrous (some *Dichelachne*); caryopsis solid (*Relchela*, *Echinopogon*) or soft (*Dichelachne*), rounded, lanceoloid, narrowly sulcate; hilum 1/3–1/2 the grain in length, broadly to narrowly linear.

Included genera: *Ancistragrostis*, *Dichelachne*, *Echinopogon*, *Pentapogon*, and *Relchela.*

Distribution: The genera are confined to the southern hemisphere, mainly in Australasia, but *Relchela* is endemic to southern South America.

Gouiniodinae P.M. Peterson & Romasch., **supersubtribe nov.**

Type: *Gouinia* E. Fourn. ex Benth. & Hook. f., Gen. Pl. 3: 1178. 1883.

Description: Perennials or annuals; culms erect, often geniculate or decumbent; ligules membranous, sometimes a fringe of hairs; synflorescence of many racemes scattered along a central axis, sometimes subdigitally arranged; spikelets 1–14-flowered with bisexual (perfect) florets; glumes 1–7-veined; lemmas usually (0 or 1)3(5–9)-veined, unawned, mucronate or awned.

Included subtribes: Cteniinae, Farragininae, Gouiniinae, Hubbardochloinae, Perotidinae, Trichoneurinae, and Zaqiqahinae.

Distribution: Farragininae and Zaqiqah are African; Gouiniinae is western hemisphere; *Ctenium*, Hubbardochloinae, and Trichoneurinae are African and western hemisphere; Perotidinae is African and southeast Asian.

Loliodinae Soreng, **supersubtribe nov.**

Type: *Lolium* L., Sp. Pl. 1: 83. 1753.

Description: Annuals and perennials; upper culm leaf sheaths usually open to the base; ligules membranous without a fringe of hairs; synflorescence paniculate, racemose, or spicate; spikelets multiple-flowered spikelets (except *Hainardia*), disarticulation above or below the glumes, sometimes along branches or axes; glumes shorter than the first lemma, infrequently equaling the first lemma, the lower glume sometimes rudimentary; rachilla joints glabrous, often slightly flattened in cross section; lemmas with terminal, rarely subterminal, awned or without awns, glabrous, infrequently hispidulous; callus glabrous, rarely short hairy; lodicules 2, rarely absent, hyaline, usually lobed, obscurely veined; ovary with styles well separated; caryopses glabrous or hairy, hard without lipid or with lipid (soft in some Parapholiinae), hilum long linear (short linear in some Parapholiinae).

Included subtribes: Ammochloinae, Dactylidinae, Loliinae, Parapholiinae.

Distribution: *Festuca* is worldwide, but other than *Megalachne* and *Podophorus* of the Juan Fernandez Islands off the coast of Chile, the rest of the genera are confined to the eastern hemisphere, mostly around the Mediterranean; *Pseudobromus* is African.

Melicodae Soreng, **supertribe nov.**

Type: *Melica* L., Sp. Pl. 1: 66. 1753.

Description: Perennials; leaf sheath margins fused for much of their length; spikelets multiple-flowered (1-flowered in *Triniochloa*); lodicules 2, usually truncate fleshy, usually fused over part of their margins (*Brylkinia* and *Koordersiochloa* lodicules lanceolate, distally hyaline, and free or partly fused); ovary glabrous; styles 2, subapical, bases persistent, lanceoloid (*Brylkinia* and *Koordersiochloa*) or globose in outline; stigmatic branches rebranched often divaricate; caryopses hard without lipid and with compound starch grains, hilum long linear.

Included tribes: Brylkinieae, and Meliceae.

Distribution: *Melica* and *Glyceria* are widespread; *Koordersiochloa* is in continents surrounding the Indian Ocean in subtropical uplands; *Triniochloa* is western hemisphere; the other genera are relatively localized.

Nardodae Soreng, **supertribe nov.**

Type: *Nardus* L., Sp. Pl. 1: 53. 1753.

Description: Perennials; sheaths open to the base; leaf blades with bicellular microhairs with the terminal cell inflated (*Lygeum*); synflorescence a secund spike (*Nardus*) or reduced to a single spatheolate highly modified compound spikelet per flowering culm (*Lygeum*); spikelets 1-flowered (*Nardus*) or 2 (3)-flowered (*Lygeum*); rachilla extension absent; glumes rudimentary or absent; lodicules absent; styles 1, linear, non-plumose and papilliate (*Lygeum*) or simple plumose (*Nardus*); caryopsis hilum long-linear.

Included tribes: Lygeeae, Nardeae

Distribution and habitat: Europe and Mediterranean to southwestern Asia, *Nardus* occurs in alpine and moor lands, *Lygeum* in arid low hills and plains of subcoastal Mediterranean.

Poodinae L.J. Gillespie & Soreng, **supersubtribe nov.**

Type: *Poa* L., Sp. Pl. 1: 67. 1753.

Description: Annuals and perennials; upper culm leaf sheaths open to the base or closed for some length; synflorescence paniculate, rarely racemose (*Gaudinopsis*) or spicate (*Pholiurus*); spikelets 1- or several-flowered; disarticulation above or infrequently below the glumes; glumes well-developed, the upper glume usually ¾ to slightly exceeding the proximal lemma in length (sometimes saccate in Beckmanniinae); rachilla joints in multiple flowered spikelets terete in cross section, glabrous, scabrous, or puberulent (with an apical crown of hairs in *Bellardiochloa*); lemmas laterally compressed, often distinctly keeled, frequently pubescent; awns terminal, subterminal or dorsal; callus in multiple-flowered spikelets commonly with a short crown or infrequently a beard of hairs (hairs commonly dorsal in *Poa*), sometimes glabrous; paleas usually chartaceous or membranous and green in part (hyaline or absent in Alopecurinae); lodicules 2 (rarely absent), hyaline, often lobed, obscurely veined; ovary with styles approximate or connate at base, plumose, compound or simple; caryopsis glabrous, hard or soft, lipid usually present, hilum (<1/3 the grain in length, short, round to narrowly elliptical (not linear).

Included subtribes: Alopecurinae, Beckmanniinae, Cinninae, Miliinae, Phleinae, Poinae, and Ventenatinae; included orphan genera: *Arctagrostis*, *Arctophila*, *Brizochloa, Dupontia*, *Dupontiopsis*, *Hookerochloa, Nicoraepoa*, *Saxipoa*, *Sylvipoa*.

Distribution: Worldwide, *Hookerochloa*, *Nicoraepoa*, *Saxipoa*, *Simplicia*, and *Sylvipoa* are confined to the southern hemisphere, others to Eurasia and Mediterranean Africa, or more widespread, *Poa* occurs on all continents.

Ventenatinae Holub ex L.J. Gillespie, Cabi & Soreng**, subtribe nov.**

Ventenatinae Holub, Philip Maximilian Opiz und seine Bedeut. fur Pflanzentax. 104 (1958), nom. nud.

Type: *Ventenata* Koeler, Descr. Gram. 272. 1802.

Description: Annual (perennial in *Bellardiochloa*); tufted; upper leaf sheath fused for 1–4 mm at the base (1–4% the length); leaf blades involute, sometimes weakly so, infrequently flat, adaxially usually with pronounced ribs, scabrous or scabrous-hispidulous when involute; ligules (1–) 2–7 mm long, membranous, apex often lacerate; synflorescence paniculate (racemose in *Gaudinopsis*), sometimes whorled; spikelets disarticulation above (rarely also below in *Ventenata*) the glumes and between the florets, with a rachilla extension; glumes shorter or longer than the lowest floret, 1–9-veined; Spikelets 1- or (2)-flowered (*Apera*), or 2–5 (–10)-flowered; callus with a beard or crown of hairs (hairs sometimes minute), or glabrous; lemmas 2–15 mm long, (1 or 3) 5-veined, lanceoloid to oblanceoloid, abaxially rounded, glabrous or sometimes proximally with a short line of hairs on lateral veins and keel, awned, the awn dorsal and geniculate, or terminal (rarely absent in all florets), sometimes with awns from the lobes of a bifid apex; paleas chartaceous or membranous, green in part, 2-keeled, keels scabrous or pectinate ciliate in part; flowers bisexual; lodicules 2, free, distally hyaline, lanceolate, lobed or entire; anthers (1) 3; styles terminal, adjacent and free or briefly connate at base, stigmatic branching plumose or simple plumose; caryopses glabrous, endosperm with lipid, soft, hilum less than 1/10–1/5 the grain in length. $x = 7$ (only diploids known).

Included genera: *Apera*, *Bellardiochloa*, *Gaudinopsis*, *Nephelochloa*, *Parvotrisetum*, and *Ventenata.*

Distribution: The species are found primarily in southwestern Asia and adjacent Europe.

4 Discussion

4.1 Overall comparison

Kellogg (2015) accepted 698 genera along with 13 additional clades or grades for a total of 711 generic level entries whereas Soreng et al. (2015b) included 764; 675 genera were accepted in both accounts. Eighty-nine genera accepted by Soreng et al. (2015b) were not accepted by Kellogg (2015); 65 of these were placed in synonymy while 24 were unaccounted for. Twenty-four genera accepted by Kellogg (2015) were not accepted by Soreng et al. (2015b). Nineteen of the 24 genera were placed in synonymy and five were unaccounted for. There were 87 genera and synonyms that we were unaware of having molecular data to aid in a decision (Soreng et al., 2015b). Twelve of Kellogg's genera include a total of 40 generic names (as synonyms) accepted by Soreng et al. (2015b) while *Trisetaria*, *Elymus,* and *Eragrostis* sensu Kellogg account for 17 genera accepted by Soreng et al.; another 27 accepted genera were placed as synonyms in Kellogg. More significant is consensus between these two classifications by using the criterion of monophyly, and the inherent importance of molecular synthesis in dictating the acceptance of the same 12 subfamilies. Remarkably, only three genera (*Alloeochaete*, *Danthonidium*, and *Phaenanthoecium*) were placed in different subfamilies (Arundinoideae versus Danthonioideae), and only one genus (*Streptogyna*, in Kellogg, 2015) was left unplaced in a subfamily with the acknowledgment that it may be sister to the subfamily in which Soreng et al. (2015b) placed it (Oryzoideae). Kellogg (2015) explicitly united the following tribes accepted by Soreng et al. (2015b): Brylkinieae in Meliceae, Lygeeae in Nardeae, Ampelodesmeae in Stipeae, Zeugiteae in Chasmanthieae, Thysanolaeneae and Cyperochloeae in Centotheceae (all without subtribes); and Arundinelleae in Andropogoneae (as a subtribe). However, overall there were very few genera placed explicitly in different tribes. Each classification listed *incertae sedis* genera (i.e., of uncertain alignment) within the next lower accepted rank, and usually the difference here depended on availability of molecular data for assessing relationships, particularly for poorly known, small or monotypic genera with limited distribution.

Keeping up with recent changes and newly published taxa also contributed to divergent classifications. For instance, 179 genera have been published since Clayton & Renvoize (1986), 53 of these since 2009, and 14 since 2014. Needless to say, several recently described genera were absent from each of our classifications, or accepted without reciprocal evaluation. In Soreng et al. (2015b) we indicated (in Table 1 by *italics*) 783 genera (accepted and synonyms) that were known to have DNA sequence data and 87 genera that lack this information. In our current classification we indicate that 863 genera have DNA sequence data, including 700 of our currently accepted genera. Of course, not all of the DNA sequence markers are from the same region. In our current classification 667 of our 768 accepted genera are in common with Kellogg (2015). Of the 101 generic differences, Kellogg did not account for 48, including 15 new genera, and 33 other genera not mentioned in synonymy. There are multiple reasons for the above differences: different molecular publications or data sets available to the authors (including unpublished data), different interpretations of the results, different circumscriptions of some genera, planned or ongoing research to resolve conflicts of non-monophyly, different taxonomic expertise, the timing of the writing (Kellogg's manuscript took many years to prepare and review, leading to some inflexibility in making updates), and sometimes a tendency to split or lump taxa.

4.2 Anomochlooideae, Pharoideae, and Puelioideae

The basal lineages Anomochlooideae and Puelioideae each have two tribes and Pharoideae has a single tribe in Soreng et al. (2015b) whereas Kellogg (2015) recognized the same genera only within subfamily rank. These three subfamilies are unchanged from Soreng et al. (2015b) in our new classification.

4.3 Oryzoideae

Kellogg (2015) placed *Streptogyna* as *incertae sedis* in the BOP clade whereas Soreng et al. (2015b) placed it in the tribe

Streptogyneae at the base of the Oryzoideae. The Ehrharteae sensu Soreng et al. (2015b) comprised four genera, *Ehrharta, Microlaena, Tetrarrhena*, and *Zotovia* whereas Kellogg (2015) placed the last three within *Ehrharta.* Even though Verboom et al. (2003) found *Microlaena* polyphyletic and recognition of *Tetrarrhena* and *Zotovia* appears to render *Ehrharta* paraphyletic, better plastid DNA markers and taxa need to be surveyed to address the monophyly of these four genera. Soreng et al. (2015b) placed *Maltebrunia* and *Prosphytochloa* in Zizaniinae whereas Kellogg (2015) followed Tang et al. (2010) who indicated the pair are sister to *Leersia* and belong in the Oryzinae. In our new classification we still retain *Ehrharta, Microlaena, Tetrarrhena*, and *Zotovia* in the Ehrharteae, and we have aligned *Maltebrunia* and *Prosphytochloa* in the Oryzinae. Like *Oryza*, *Maltebrunia* and *Prosphytochloa* have spikelets with two basal sterile florets and 5-veined lemmas while most members of the Zizaniinae lack basal sterile florets and have 3–10-veined lemmas (Terrell et al., 2001; Clayton et al., 2016).

4.4 Bambusoideae

The Bambusoideae represent the only major clade of grasses to diversify primarily in association with forests (Clark et al., 2015) and in our new treatment the subfamily includes 1670 species in 125 genera in 3 tribes: Arundinarieae (temperate woody bamboos), Bambuseae (tropical woody bamboos) and Olyreae (herbaceous bamboos (Kelchner et al., 2013; Clark et al., 2015; Wysocki et al., 2015; Dransfield, 2016; Zhang et al., 2016; Vorontsova et al., 2016). In addition to strong molecular support for their monophyly, the bamboos are distinguished by the presence of strongly asymmetrically invaginated arm cells in the leaf mesophyll as seen in transverse section, although this is modified to weakly invaginated arm cells or rosette cells in some taxa (Clark et al., 2015). Bamboos also possess relatively broad and pseudopetiolate leaf blades usually with fusoid cells flanking the vascular bundles, features considered plesiomorphic within the family. The woody bamboos (Arundinarieae and Bambuseae) share well developed rhizome systems, highly lignified culms, culm leaves well differentiated from the foliage leaves, well developed and often complex aerial branching, and foliage leaves with outer (contra) ligules (Clark et al., 2015). Culms develop in two phases: first, new, unbranched shoots bearing a culm leaf at each node emerge from the soil and elongate to their full height; second, the culms become lignified and aerial branches develop and produce foliage leaves. Woody bamboos all have bisexual spikelets and usually exhibit gregarious flowering followed by monocarpy after long vegetative cycles (Guerreiro, 2014; Clark et al., 2015). The two tribes differ, however, in their patterns of branch development and cytology and to a lesser extent, rhizome morphology. The Arundinarieae generally exhibit basipetal branch development and are uniformly tetraploid ($2n = 48$, $x = 12$). Most are strictly runners, with leptomorph, monopodial rhizomes, but some genera (e.g., *Bergbambos*, *Fargesia*, *Kuruna*) possess only pachymorph, sympodial rhizomes (Clark et al., 2015; Attigala et al., 2016). The Bambuseae, however, exhibit acropetal or bidirectional branch development and are either tetraploid or hexaploid [$2n = 40, 44, 48$ with $x = 10$, (11) or 12 or $2n = 72$, with $x = 12$]. Most have strictly pachymorph, sympodial rhizomes, but amphimorph or leptomorph rhizomes are documented in *Chusquea* (Clark et al., 2015). The herbaceous bamboos (Olyreae), on the other hand, lack well differentiated culm leaves and outer ligules, and have relatively weakly lignified culms, restricted vegetative branching, and unisexual spikelets. Virtually all exhibit seasonal flowering, with a very few species apparently exhibiting gregarious monocarpy (Clark et al., 2015).

Molecular data have confirmed that the Bambusoideae, especially the two woody tribes, exhibit a complex history of hybridization and allopolyploidy (Fisher et al., 2009, 2014; Triplett et al., 2010, 2014; Goh et al., 2013; Yang et al., 2013; Attigala et al., 2014; Oliveira et al., 2014). Within Arundinarieae, the three traditionally recognized subtribes are polyphyletic and have been abandoned in favor of numbered lineages or clades (now twelve) based on molecular support (cited in Kellogg, 2015 but not in Soreng et al., 2015b), and a number of genera, including *Ampelocalamus, Indocalamus, Pleioblastus* and *Pseudosasa* among others, are demonstrably non-monophyletic (Triplett & Clark, 2010; Zeng et al., 2010; Yang et al., 2013; Zhang et al., 2016). Although some generic realignments have been formalized in recent years, such as the recognition of *Bergbambos* and *Oldeania* (Stapleton, 2013) and *Kuruna* (Attigala et al., 2014), and a much narrower concept of *Arundinaria* (Triplett et al., 2010), much work remains to be done in this taxonomically challenging tribe.

Two major clades based primarily on molecular support comprise the Bambuseae: the Neotropical woody bamboos (tetraploid) and the Paleotropical woody bamboos (hexaploid) (Clark et al., 2015). Within the Neotropical clade of the Bambuseae, the recognition of three subtribes has remained stable, with Chusqueinae well supported as sister to the Arthrostylidiinae + Guaduinae clade (Clark et al., 2015). For the most part the generic classification has remained stable as well; the classifications of Kellogg (2015) and Soreng et al. (2015b) for this clade are virtually identical, except for the placement of *Colanthelia* in synonymy with *Aulonemia* in Soreng et al. (2015b) and the annotation of some genera (e.g., *Aulonemia, Arthrostylidium, Rhipidocladum*) as non-monophyletic in Kellogg (2015). On-going molecular and morphological studies of the Neotropical woody bamboos will likely produce some additional changes at the generic level as more taxa are sampled.

Recent work by Goh et al. (2013), Chokthaweepanich (2014), Zhang et al. (2016), and Wong et al. (2016) has refined phylogenetic relationships within the Paleotropical clade of the Bambuseae and produced some changes in classification. The generic classifications of Kellogg (2015) and Soreng et al. (2015b) are very similar, again with the annotation of non-monophyletic genera in Kellogg (2015) but not in Soreng et al. (2015b). Wong et al. (2016) based on both molecular and morphological data recognize eight subtribes instead of the previous four (see Soreng et al., 2015b) and also highlight some generic realignments (e.g., resurrection of *Chloothamnus* for most of the Southeast and Australasian species of *Nastus* and the segregation of *Ruhooglandia* and *Widjajachloa* for aberrant species previously included in *Nastus*). Dransfield (2016) described *Sokinochloa* to accommodate three Madagascan species previously classified within the otherwise Eurasian *Cephalostachyum*. These changes resolved some of the obvious generic problems noted by Kellogg (2015), but generic circumscriptions within the Melocanninae deserve further scrutiny, as does the *Bambusa-Dendrocalamus-Gigantochloa* complex (Goh et al., 2013).

Kellogg (2015) and Soreng et al. (2015b) recognized more or less the same genera within the Olyreae (although *Parianella* was not mentioned in the Kellogg treatment), and the subtribal classification of the Olyreae, with three subtribes, (Soreng et al., 2015b) remains stable. Oliveira et al. (2014) demonstrated that *Olyra* and *Parodiolyra* as currently circumscribed are non-monophyletic, and on-going work by that group is expected to resolve the major generic issues that remain in the Olyrinae.

The classification here largely follows Clark et al. (2015) and Vorontsova et al. (2016). The Arundinarieae with only the subtribe Arundinariinae contains 581 species in 31 genera that are almost exclusively distributed in Eurasia; only the three species of *Arundinaria* are native to North America (Triplett & Clark, 2010; Triplett et al., 2010; Zhang et al., 2016). The species are principally temperate or subtemperate in distribution, associated primarily with forest vegetation but also in high elevation grasslands, with about 20 species occurring at high elevations in the Asian (India, Sri Lanka) or African (including Madagascar) tropics (Clark et al., 2015). Tribe Bambuseae includes 966 species in 73 genera placed in 11 subtribes. Subtribes Melocanninae (99 species in 9 genera), Hickeliinae (32 species in 9 genera), Bambusinae (324 species in 17 genera), Racemobambosinae (31 species in 3 genera), Dinochloinae (56 species in 7 genera), Greslaniinae (2 species in 1 genus), Holttumochloinae (6 species in 3 genera) and Temburongiinae (1 species in 1 genus) plus 2 monotypic genera (*Ruhooglandia* and *Temochloa*) currently considered *incertae sedis* form the Paleotropical woody bamboo clade distributed in Eurasia, Australasia or Africa (Kelchner et al., 2013; Clark et al., 2015; Wong et al., 2016). This clade shares a common ancestor with the Neotropical woody bamboo clade, formed by subtribes Arthrostylidiinae (185 species in 15 genera), Guaduinae (53 species in 5 genera), and Chusqueinae (175 species in 1 genus) distributed in the western hemisphere, in South and Central America, Mexico and the West Indies. Although many Bambuseae grow in association with lowland forests, or form extensive bamboo-dominated forests, a significant proportion of this tribe's diversity is found in tropical montane forests or high elevation grasslands (Clark et al., 2015). Tribe Olyreae includes 123 species in 21 genera, and these, with the exception of the monotypic *Buergersiochloa* from New Guinea and *Olyra latifolia* L. populations in Africa, occur in the western hemisphere, primarily in the understory of tropical forests in South and Central America (Clark et al., 2015).

4.5 Pooideae

The two 2015 classifications differed in combining three small tribes with their sister tribes by Kellogg (2015), for 10 total tribes, and the addition of one new tribe by Soreng et al. (2015b), for 14 total tribes. Placement of all genera within tribes was consistent between the two classifications except where the tribes were placed in synonymy or split. Kellogg (2015) included *Lygeum* in Nardeae (Schneider et al., 2009, 2011; Hochbach et al., 2015), and *Ampelodesmos* in Stipeae, rather than in their own monotypic tribes (Soreng et al., 2015b). *Brylkinia* and *Koordersiochloa* (Brylkinieae) of Soreng et al. (2015b) were merged into Meliceae by Kellogg (2015). In addition, the genus *Littledalea*, (Littledaleeae sensu Soreng) was included in Bromeae by Kellogg (2015), retaining Bromeae and Triticeae as sister tribes as done by Soreng et al. (2015b), rather than recognizing three subtribes within Triticeae as proposed by Schneider et al. (2009) and Hochbach et al. (2015). Kellogg (2015), without knowledge that Littledaleeae was published in 2015, favored making a new tribe for *Littledalea*. Soreng et al. (2015b) used the rank of supertribe Triticodae to unite Littledaleeae, Bromeae, and Triticeae tribes, and supertribe Poodae as sister to Triticodae. Kellogg (2015) did not use this rank.

In tribe Poeae Kellogg (2015) recognized 15 of 19 subtribes accepted by Soreng et al. (2015b). The tribe has two consistently resolved and well supported chloroplast DNA lineages (first resolved by Soreng et al., 1990) that were recognized in our 2015 classifications as Poeae chloroplast groups 1 and 2. Using DNA restriction site data within the tribe Poeae chloroplast clades 1 (Aveneae type) and 2 (Poeae type) were identified using six-base-pair restriction enzyme digests (Soreng et al., 1990; Soreng & Davis, 1998, 2000). Seven of the sites were unique to chloroplast group 1 (Aveneae type) and three were unique to chloroplast group 2 (Poaeae type). At least 65 species were surveyed using this restriction site protocol, and these two clades within the Poeae are still supported with new phylogenetic studies of chloroplast DNA sequences and whole plastids (Schneider et al., 2009; Hochbach et al., 2015; Saarela et al., 2015). Chloroplast group 1 contained genera of traditional Aveneae morphology (plus *Torreyochloa*, Brizinae, and Calothecinae), and Chloroplast group 2 contained genera with traditional Poeae morphology (plus Airinae, Alopecurinae, Holcinae, and Phleinae) sensu Clayton & Renvoize (1986) and older classifications. Recognition of the tribe Aveneae (sensu lato with Agrostideae included) usually was based on spikelets with one or multiple florets, one or both glumes longer than the lower florets, and lemmas with a dorsal, geniculate awn, and hyaline or scarious paleas, whereas Poeae spikelets usually have multiple florets, glumes shorter than the lowest floret, and lemmas with terminal awns or no awns, and chartaceous paleas that are green in part.

These characteristics are believed to have evolved multiple times in the two chloroplast groups (Soreng et al., 2007). When nrDNA was analyzed, the genera within chloroplast group 1 emerge as a clade nested within chloroplast group 2, with the Airinae, Aristaveninae, Holcinae, and Scolochloinae in a grade sister to the genera in chloroplast group 1. Moreover, genera of Sesleriinae (chloroplast group 2) nest within the set of *Arrhenatherum*, *Avena*, and *Helictotrichon* of subtribe Aveninae (Döring et al., 2007; Quintanar et al., 2007; Döring, 2009; Schneider et al., 2009). The evident mixing of morphologies and chloroplast types indicating hybridization and reticulation led to the abandonment of the two tribe (Aveneae and Poeae) system in favor of series of subtribes (Soreng & Davis, 2000; GPWG, 2001; Kellogg, 2015; Soreng et al., 2015b). The merging of Aveneae into Poeae was presaged prior to the availability of DNA phylogenetic data by Tzvelev (1987, 1989). Tzvelev also recognized a broad tribe Phleeae that encompassed several subtribes recognized by Kellogg (2015) and here in Poeae (corresponding to subtribes Alopecurinae, Ammochloinae, Beckmanniinae, Phalaridinae, Phleinae, and Sesleriinae sensu Soreng et al.), which he characterized as having basally connate, linear, simple plumose or merely papillate styles (versus styles separated, with more complex stigmatic branching in his Poeae).

In chloroplast group 1, Kellogg (2015) subsumed Brizinae s.l. (of our earlier on-line classifications, which included genera of Calothecinae) in Agrostideae. Brizinae (natives of Eurasia) and Calothecinae (of Latin America) have multiple-flowered spikelets with glumes shorter than the lower lemma, lemmas with flared margins and only vestiges of awns, and chartaceous paleas with well-spaced keels and narrow flanges, in contrast to the much of remainder of the Agrostidinae which have primarily single-flowered spikelets, lemmas without flared margins and often dorsally-awned, and hyaline paleas with keels that are often approximate and flanges often broader than the gap between the keels. In addition, within subtribe Aveninae, Kellogg (2015) lumped *Koeleria, Trisetum, Gaudinia, Rostraria, Avellinia, Peyritschia, Leptophyllochloa, Parafestuca* within *Trisetaria* based on interpretation of complex early DNA phylogenies (Quintanar et al., 2007; Saarela et al., 2007, 2010). Although the type species of *Trisetaria* had not yet been sampled in DNA studies until the work of Wölk & Röser (2017). Anticipating that further work on the subtribe might resolve these genera as monophyletic, Soreng et al. (2015b) retained all these genera (except *Parafestuca*). Both 2015 classifications overlooked *Trisetopsis* which is of complex reticulate origin within Aveninae (Wölk & Röser, 2013, 2014, 2017; Wölk et al., 2015).

In chloroplast group 2, Kellogg (2015) merged Holcinae sensu Soreng et al. (2015b) into Airinae, an option that seems reasonable on morphological grounds (all having been placed in the historical Aveneae), but this has not been supported on phylogenetic grounds (more study is needed here as the subtribes are closely related). Both 2015 classifications accepted Coleanthinae and a broad Poinae, with Miliinae accepted by Soreng et al. (2015b) and subsumed in Poinae by Kellogg (2015).

Within subtribe Loliinae, Kellogg (2015) treated the "broad leaf" clade of *Festuca* s.l. (Torrecilla & Catalán, 2002) as the "*Leucopoa* grade", rather than apportioning its species among five small genera (*Drymochloa*, *Leucopoa*, *Lolium*, *Patzkea*, *Pseudobromus*) as accepted by Soreng et al. (2015b). The wisdom of any approach here is expected to be tested soon by an in-depth study of phylogeny of *Festuca* s.l., worldwide (Minaya et al., 2017). A few other genera were aligned in different subtribes (e.g. *Cyathopus*, *Limnodea*) or were recognized by Soreng et al. (2015b) but not Kellogg (2015) [e.g., *Arctophila*, *Brizochloa*, *Catapodium*, *Dupontiopsis* (new in 2015, Soreng et al., 2015a), *Gaudinopsis*, *Pseudophleum*] or visa-versa (e.g., *Deyeuxia*, *Loliolum*, *Pseudosclerochloa*).

In our new classification of Pooideae we have 3968 species in 202 genera in 15 tribes. Poeae is the largest tribe with 2562 species in 121 genera in 25 subtribes, 41 (39 tested) genera are placed among those with chloroplast group 1 type, 80 (78 tested) are placed among those with chloroplast group 2 type.

Currently we retain Nardeae and Lygeeae as separate tribes. Recognizing the strong support for the sister status of *Lygeum* and *Nardus* found in molecular studies (Catalán et al., 1997; Davis & Soreng, 2007; Schneider et al., 2009; Hochbach et al., 2015; Saarela et al., 2015) and morphological synapomorphies, we here describe supertribe Nardodae. Both genera have bicellular microhairs (otherwise absent in Pooideae) and single linear (non-plumose or simple plumose) styles, and lack lodicules. However, the spatheate, single compound "spikelet" synflorescences of *Lygeum* are so modified that the traditional grass spikelet structure is unrecognizable.

In our current classification we separate a monotypic Phaenospermateae from Duthieeae based on molecular results of Schneider et al. (2011) and Hochbach et al. (2015). Among the Duthieeae and other Pooideae, *Phaenosperma* is morphologically odd with globose spikelets that disarticulate below the glumes, pseudopetiolate and resupinate leaf blades (Schneider et al., 2011), and it is apparently widely reticulate in origin among tribes Duthieeae, Stipeae, and possibly Meliceae (Hochbach et al., 2015). We retain *Ampelodesmos* in the Ampelodesmeae separate from Stipeae based on evidence of a reticulate origin with Duthieeae (Romaschenko et al., 2012, 2014). We recognize the strong genetic influence of Stipeae parentage in *Ampelodesmos*, by uniting Ampelodesmeae and Stipeae in supertribe Stipodae. One could argue for placing Phaenospermateae and Duthieeae within the Stipodae since some members possess three styles and three lodicules, but the origins of *Phaenosperma* might be broader. Alternatively, Ampelodesmeae, Duthieeae, Phaenospermateae, and Stipeae tribes might one day be aligned within the Stipodae.

Although *Brylkinia* is well supported as sister to Meliceae, Meliceae sensu Soreng et al. (2015b) have several morphological synapomorphies (globose styles, short-truncate fleshy lodicules that are usually fused) that are not shared with *Brylkinia* or *Koordersiochloa*, so the latter two genera were placed in Brylkinieae. Although our unpublished DNA data support *Koordersiochloa* as sister to Meliceae, and *Brylkinia* as sister to these, Schneider et al. (2011) and Hochbach et al. (2015) found support for placing *Koordersiochloa* within Meliceae. Here we place *Koordersiochloa* in Meliceae, and unite the tribes Brylkinieae and Meliceae in supertribe Melicodae.

In the Poeae, chloroplast group 1, we recognize *Ancistragrostis, Dichelachne, Echinopogon*, and *Relchela,* all primarily Australasian or South American, in a new subtribe, Echinopogoninae that have coriaceous to chartaceous lemmas and paleas (scarious to chartaceous in *Dichelachne*), lemmas with terminal or sub-terminal awns (absent in *Relchela*), hairy calluses, caryopses with a hairy apex and solid endosperm (soft in *Dichelachne*, and usually glabrous). *Ancistragrostis* is placed here based on morphological similarity to *Echinopogon*, the former has coriaceous lemmas a stout, central, hooked awn entered by lateral veins, and its caryopsis characters are unknown. *Echinopogon* and *Relchela* have been linked in plastid and nrDNA ITS studies (Döring, 2009; Barberá et al., unpublished data). *Dichelachne* is apparently reticulate and was resolved with *Echinopogon* (and *Relchela* where included) in plastid trees as sister to Agrostidinae + Calothecinae (Döring et al., 2007; Soreng et al., 2007; Döring, 2009; Barberá et al., unpublished data). However, in nrDNA-derived phylogenies *Dichelachne* was embedded in *Calamagrostis*. We here propose to unite subtribes Agrostideae, Brizinae, Calothecinae, and Echinopogoninae within supersubtribe Agrostidodinae. Within subtribe Agrostidinae our new data (Barberá et al., unpublished data) indicate *Calamagrostis* (which also includes *Deyeuxia* p.p. typica, of the eastern hemisphere) is polyphyletic with *Ammophila* embedded; *Chaetopogon* belongs in *Agrostis*, and *Chaetotropis* has a different origin from *Polypogon*. *Chaetotropis*, *Lachnagrostis* and *Polypogon* appear reticulate in origin.

Within subtribe Aveninae, at least three additional genera (*Graphephorum, Sphenopholis* and *Trisetopsis*) would need to be added to the expanded *Trisetaria* sensu Kellogg (2015) bringing the total to more than 260 species (Saarela et al., in press; Barberá et al., unpublished data). Here we retain all genera, except *Leptophyllochloa* and *Parafestuca,* based on extensive new molecular studies in the Aveninae by Saarela et al. (in press), Barberá et al. (unpublished data), Wölk & Röser (2014, 2017), and Wölk et al. (2015). In order to salvage *Koeleria, Trisetum, Gaudinia, Rostraria, Avellinia, Peyritschia, Graphephorum, Sphenopholis*, *Trisetopsis* along with *Trisetaria* we propose to resurrect *Acrospelion* s.l. for 12 to 14 Eurasian species of *Trisetum* that generally have hairy ovaries, distichous leaves, and lax panicles (or combinations of these), and *Cinnagrostis* for the majority of the South American "*Calamagrostis*/*Deyeuxia*" species (ca. 80 to 90 spp.). Also we would move the *Trisetum spicatum* complex (ca. 25 species) to an expanded *Koeleria* (ca. 70 spp.), and expand *Graphephorum* (ca. 6 spp.) and *Peyritschia* (ca. 27 spp.). Reticulation is evident in the origin of several genera such as *Graphephorum*, and sporadic among *Koeleria* and miscellaneous species of other lineages.

In chloroplast group 2 we here correct for polyphyly in our Holcinae (Soreng et al., 2015b) by recognizing subtribe Aristaveninae with only *Deschampsia*, which is expanded to include species of *Calamagrostis* sect. *Stylagrostis* (Saarela et al., in press; Barberá et al., unpublished data). We here describe supersubtribe Loliodinae to unite the consistently resolved clade that includes the Ammochloinae, Dactylidinae, Loliinae, and Parapholiinae. These subtribes have multiple-flowered spikelets, glumes shorter than the first lemma, lemmas with terminal awns when present, a glabrous callus, and caryopses with a linear hilum that is usually long.

For lack of a rank below subtribe, we erect supersubtribe Poodinae to unite the diverse, but internally homogeneous, subtribes Alopecurinae, Beckmanniinae, Cinninae, Miliinae, Phleinae, Poinae, and Ventenatinae (validated here). Some subsets of the genera placed here have sometimes been accepted in traditional classifications (Tzvelev, 1976, 1989; Davis, 1985), or implied by generic arrangements (Tutin, 1980; Clayton & Renvoize, 1986). However, these subtribes were not banded together until recent molecular studies verified their relationships (Döring et al., 2007; Gillespie et al., 2008, 2010, unpublished data; Döring, 2009; Schneider et al., 2011; Soreng et al., 2015a). They share glabrous caryopses, usually with lipid, and a short hilum (mostly less than ¼ the length), and a hairy callus in genera with more than one floret per spikelet. The large subtribe Poinae sensu Soreng et al. (2015b) and Kellogg (2015) is subdivided, Poinae is revised to include only *Poa*, and the new subtribe Ventenatinae is recognized here based on the above molecular studies.

Within the Pooideae *Agropyropsis*, *Agrostopoa*, *Ancistragrostis*, *Bromidium*, *Hypseochloa*, and *Duthiea* s.s. need molecular study. A GenBank DNA sequence for *Pentapogon* suggests placement in Arundinoideae, but this needs corroboration since its morphology agrees with Poeae.

4.6 Aristidoideae

Kellogg (2015) and Soreng et al. (2015b) both recognized *Aristida, Sartidia*, and *Stipagrostis* in the Aristidoideae and the latter authors retained the tribe Aristideae. *Sartidia* now includes six species with the description of the Madagascar endemic, *S. isaloensis* Voronts., Razanatsoa & Besnard, and *Aristida* includes 305 species with the addition of *A. helleriana* M. Marchi, J. Mujica & R. L. Barbieri from Rio Grande do Sul, Brazil (Marchi et al., 2015; Vorontsova et al., 2015). Morphologically, Aristidoideae can be distinguished from other grasses in having 3-awned lemmas, a line of hairs for a ligule, 1-flowered spikelets, lemmas with overlapping margins (involute), and a sharp-pointed callus (GPWG, 2001; Cerros-Tlatilpa et al., 2011).

4.7 Panicoideae

In our new classification, subfamily Panicoideae consists of 3241 species in 247 genera and 13 tribes. Morphological trends within the Panicoideae include two-flowered, dorsally compressed spikelets with the lower floret staminate or sterile, although many of the basal tribes, such as the Centotheceae, Chasmanthieae, and Zeugiteae, have laterally compressed, multi-flowered spikelets.

Kellogg (2015) accepted eight tribes and 217 genera whereas Soreng et al. (2015b) accepted 12 tribes and 241 genera. Kellogg (2015) merged Zeugiteae into Chasmanthieae; Cyperochloeae and Thysanolaeneae into Centotheceae; and Arundinelleae into Andropogoneae as a subtribe. Soreng et al. (2015b) followed the classification of Sánchez-Ken & Clark (2010) in recognizing centothecoid tribes.

The genera placed in each of these tribes, or merged tribes, were the same with several exceptions. Kellogg (2015) placed *Arundoclaytonia* in Chasmanthieae whereas Soreng et al. (2015b) retained it in Steyermarkochloeae based on the similarity of the two genera in spikelet form and organization. DNA sequences obtained for *Arundoclaytonia* by Sánchez-Ken & Clark (2010) were incomplete and confusing for the regions sequenced. Therefore, Soreng et al. (2015b) were not prepared to accept the phylogenetic placement of *Arundoclaytonia* in Chasmanthieae. Kellogg (2015) placed *Chandrasekharania* and *Jansenella* in Tristachyideae whereas Soreng et al. (2015b) left these in *incertae sedis*. In Tristachyideae, Kellogg (2015) lumped *Dilophotriche*, *Loudetiopsis*, and *Zonotriche* in *Tristachya*, all historically accepted genera maintained by Soreng et al. (2015b). Kellogg merged *Bromuniola* in *Chasmanthium,* and *Pohlidium* in *Zeugites,* both accepted by Soreng et al. (2015b).

Kellogg (2015) recognized Panicoideae s.s. including Andropogoneae, Paniceae and Paspaleae tribes (and four *incertae sedis* genera) with Paniceae sister to Andropogoneae + Paspaleae, whereas Soreng et al. (2015b) grouped Paniceae and Paspaleae as supertribe Panicodae (a rank not used by Kellogg), and Arundinelleae + Andropogoneae as supertribe Andropogonodae. Each classification of Paniceae and Paspaleae included the same subtribes, except subtribe Dichantheliinae (Zuloaga et al., 2014) was not mentioned by Kellogg (2015). Alignments of genera were much the same, but Kellogg submerged several genera that were accepted by Soreng et al. (2015b). In Paspaleae Kellogg lumped *Achlaena* and *Altoparadisium* in *Arthropogon*, *Steinchisma* and *Plagiantha* in *Otachyrium*, *Baptorhachis* in *Axonopus*, and *Spheneria* in

Paspalum. In Paniceae Kellogg (2015) placed *Walwhalleya* in *Homopholis*, *Ancistrachne* and *Calyptochloa* in *Cleistochloa*, *Paraneurachne* in *Neurachne*, *Plagiosetum* in *Paractaenum*, *Scutachne* and *Megathyrsus* in *Urochloa*, *Mildbraediochloa* in *Melinis*, and *Yakirra* in *Panicum*. Also in Paniceae, *Adenochloa* (Zuloaga et al., 2014), accepted by Soreng et al. (2015b), was not accounted for by Kellogg (2015) except as African members of *Dichanthelium* s.l. Soreng et al. (2015b) placed *Snowdenia* in *Cenchrus* whereas Kellogg accepted it.

Whole plastid analyses align *Whiteochloa* within *Panicum,* rendering the latter genus paraphyletic, although they are not recommending reclassification until more species within *Whiteochloa* are analyzed (Burke et al., 2016). Soreng et al. (2015b), Kellogg (2015), and our current classification place *Whiteochloa* within the subtribe Cenchrinae. In an unpublished molecular analysis of plastid markers, all six species of *Whiteochloa* appear as a clade within the Cenchrinae (Zuloaga & Scataglini, unpublished data). Morphologically, *Whiteochloa* differs from *Panicum* in having laterally compressed spikelets, glumes with tubercle-based hairs forming rows along the veins, a deeply sulcate lemma, and cymbiform upper glumes with a hardened and constricted apex (Lazarides, 1978; Watson & Dallwitz, 1992; Kellogg, 2015).

Even though most members of subtribe Melinidinae appear monophyletic, the synflorescence structure of species and genera is highly diverse with different degrees of branching (Reinheimer & Vegetti, 2008; Reinheimer et al., 2009; Salariato et al., 2010). Preliminary molecular evidence supports a broad view for *Urochloa* and we follow this in our new classification while continuing to recognize *Megathyrsus* (two species) with open and lax panicles, and *Scutachne*, a Cuban monotypic genus with stipitate synflorescences and indurate upper glumes and lower lemmas (Clayton et al., 2016). In addition, we maintain a large *Eriochloa* with 24 species as opposed to Kellogg's (2015) view of restricting it to the type species. A detailed molecular study increasing the number of species sampled is needed before we can interpret the evolutionary history and realign the classification.

In Soreng et al. (2015b), the Andropogoneae included 12 subtribes excluding Arundinelleae (treated as a sister tribe to Andropogoneae, the two united as supertribe Andropogonodae), whereas Kellogg (2015) had eight subtribes including the Arundinellinae. Soreng et al. (2015b) accepted Arthraxoninae, Chinonachninae, and Coicinae, while genera of these were placed *incertae sedis* by Kellogg (2015). Soreng et al. (2015b) accepted Dimeriinae but noted it was nested in Ischaeminae, which is where Kellogg placed it. Sorghinae and Anthistiriinae were accepted by Soreng et al. (2015b) while Kellogg (2015) placed these within Saccharinae and Andropogoninae, respectively.

Within the Andropogoneae the genera accepted in each account in each subtribe, or *incertae sedis*, differ in so many cases, we hesitate to list them all. Soreng et al. (2015b) accepted 90 genera while Kellogg accepted 86 genera. Soreng et al. (2015b) accepted 11 genera that Kellogg treated as synonyms (*Erianthus*, *Hemisorghum*, *Miscanthidium*, *Narenga*, *Polytoca*, *Pseudopogonatherum*, *Ratzeburgia*, *Sclerachne*, *Sclerostachya*, *Trilobachne*), and two more she did not account for (*Tripidium* and *Veldkampia*) whereas she accepted five genera we placed in synonymy (*Cleistachne*, *Eremopogon*, *Hackelochloa*, *Hypogynium*, and *Sarga*), and four we did not account for (*Jardinea*, *Lakshmia*, *Lasiorhachis*, and *Leptatherum*). Some of the differences result from Kellogg lumping four genera in *Chinonachne* (which we placed in subtribe Chionachninae; she placed *Chionachne* in *incertae sedis*), and lumping three more genera in *Miscanthus* (*Miscanthidium*, *Narenga, Sclerostachya*). The classification of Soreng et al. (2015b) attempted to follow the subtribe and generic arrangements of Clayton & Renvoize (1986), in so far as molecular studies and GenBank DNA sequence data seemed to provide support. However, it was noted by Soreng et al. (2015b) that significant rearrangements were anticipated for which there was limited data available to us. Kellogg (2015) provided many rearrangements of genera and subtribes, and yet many more are anticipated based on a series of DNA studies she is currently pursuing. This is one of the most complex tribes of grasses, with many polyploidization and reticulation events blurring boundaries between traditional genera higher ranks.

Here we revise Panicodae to include only tribe Paniceae, and expand Andropogonodae to included Paspaleae. Trends within the supertribe Andropogonodae include a base chromosome number of $x = 10$ and the occurrence of paired spikelets, these commonly sessile and pedicelled. In supertribe Panicodae the base chromosome number is $x = 9$ and spikelets are mostly upaired. In our new classification we attempt to follow Kellogg (2015) for Andropogoneae, as far as we are comfortable in doing so while acknowledging Kellogg is far more knowledgeable of the tribe worldwide than any of our coauthors. Accordingly, Dimeriinae is placed in Ischaeminae, Sorghinae in Saccharinae, and Anthistiriinae in Andropogoninae. Gosavi et al. (2016) and Arthan et al. (2016) offer new insights in Rottboelliinae, and we now accept *Hackelochloa* (as did Kellogg). Kellogg (2015, p. 300) mentioned an unpublished DNA study where *Coelorachis* is placed in *Rottboellia* rather than *Mnesithea* as proposed by Veldkamp et al. (1986); and we now follow that here.

New DNA data allow placement of *Jansenella* in Arundinelleae in our new classification but we are not aware of any DNA data for *Chandrasekharania* (both of which Kellogg placed in Tristachyideae), so we leave the latter genus *incertae sedis*. We now have 98 accepted genera in the Andropogoneae and 247 genera for the subfamily. The following changes are accepted here. The monotypic tribe Lecomtelleae was resurrected by Besnard et al. (2013) as sister to Paniceae in various combinations with Paspaleae and Sacchareae (=Andropogoneae). The single species of *Lecomtella* occurs in Madagascar, occupying a phylogenetically and biogeographically interesting position. *Lecomtella madagascariensis* A. Camus has C_3 leaf anatomy, an external ligule, and a fertile upper lemma with wing-like rachilla appendages and a dense covering of trichomes on a papillate surface (Besnard et al., 2013). Silva et al. (2016) resurrected *Chasechloa* as another monotypic genus of Panicoideae from Madagascar, placing it in Boivinellinae of Paniceae, rather than in *Echinolaena* of Paspaleae as done by and Soreng et al. (2015b); *Chasechloa* was not mentioned by Kellogg (2015). *Kellochloa*, *Hildaea,* and *Oedochloa* are new genera, and *Setiacis* is tentatively accepted as a segregate of *Acroceras* (Chen & Phillips, 2006). New synonyms are: *Walwhalleya* now placed in *Homopholis*, *Mildbraediochloa* in *Melinis*, *Arthragrostis* in *Panicum*, *Leptocoryphium* in *Anthaenantia*, and *Spheneria* in *Paspalum*.

4.8 Arundinoideae

Soreng et al. (2015b) treated the Arundinoideae as having 16 genera aligning in two tribes, Arundineae and Molinieae, with the Crinipes group (*Crinipes, Lepatgrostis, Nematopoa, Piptophyllum, Styppeiochloa*, and *Zenkeria*) sensu Linder et al. (1997) and Barker et al. (1998) placed in the Molinieae. Kellogg (2015) accepted 18 genera plus "*Eragrostis walteri* Pilg." [=*Pratochloa walteri* (Pilg.) Hardion] without subtribe affiliation (Hardion et al, in press). Soreng et al. (2015b) placed *Alloeochaete, Danthonidium*, and *Phaenanthoecium* in the Danthonioideae but also included *Moliniopsis* in the Arundineae and reported that "*Eragrostis walteri*" belonged in the Arundinoideae.

Recent whole chloroplast phylogenies (Cotton et al., 2015; Duvall et al., 2016, 2017) have corroborated generic relationships within Arundinoideae identified by previous analyses of chloroplast genes (GPWG II, 2011) and mixed morphological and molecular datasets (GPWG, 2001). Based on plastome analysis, Teisher et al. (in press) found that *Crinipes* and *Styppeiochloa* are sister and the remaining "crinipoid" grasses are polyphyletic, with *Nematopoa* aligning within the Chloridoideae, and *Alloeochaete* and *Dichaetaria* aligning within the Panicoideae. This latter placement is in contrast with Teisher's prior preliminary analyses that placed *Dichaetaria* in the Arundinoideae in a position sister to *Dregeochloa* (Soreng et al., 2015b).

In our new classification we recognize two tribes and two subtribes in Arundinoideae. The Arundineae is characterized by glumes that are typically as long as or longer than the lowest floret and contain 17 species in four genera: *Amphipogon, Arundo, Dregeochloa*, and *Monachather*. The Molinieae generally have glumes that are shorter than the lowest floret and contain 24 species in 11 genera. The Moliniinae consists of *Hakonechloa, Molinia, Moliniopsis* and *Phragmites* while the Crinipinae consists of *Crinipes, Elytrophorus, Styppeiochloa*, and "*Eragrostis walteri*." Three genera in this group, *Leptagrostis, Piptophyllum*, and *Zenkeria* still lack molecular data, and given the polyphyletic nature of the former crinipoid group, it is likely one or more of these genera are misplaced in Arundinoideae (Hardion et al., in press).

4.9 Micrairoideae

Soreng et al. (2015b) divided the Micrairoideae into four tribes: Micraireae, Eriachneae, Isachneae, and Hubbardieae whereas Kellogg (2015) did not recognize any subtribes below the rank of subfamily but did suggest, "if they are to be recognized, then Micraireae include only *Micraira*, Eriachneae include *Eriachne* and *Pheidochloa*, and Isachneae include the rest." New plastome phylogenies align *Hubbardia* and *Limnopoa* within Isachneae (Teisher, 2016; Duvall et al., 2017; Teisher et al., in press) and *Pheidochloa* considered a synonym of *Eriachne* (Teisher, 2016; Teisher et al., in press). Our current classification incorporates these changes, recognizing an unchanged Micraireae and Eriachneae, both monotypic, and an expanded Isachneae containing *Isachne, Coelachne, Heteranthoecia, Sphaerocaryum*, and *Hubbardia*. The Isachneae is by far the largest tribe in the subfamily (113 species) and is in need of a worldwide revision since *Isachne* is portrayed as paraphyletic (Teisher et al., in press). A salient morphological synapomorphy for this subfamily is lacking, although most species tend to have a line of hairs for a ligule, 2-flowered (1-flowered in *Sphaerocaryum* and one species of *Coelachne*), spikelets without a rachilla extension, both florets fertile in most, or the lower sterile (*Limnopoa, Hubbardia* and some *Isachne*), and caryopses with small embryos (Sánchez-Ken et al., 2007).

4.10 Danthonioideae

Soreng et al. (2015b) recognized the tribe Danthonieae with 17 genera whereas Kellogg (2015) included these same 17 genera within the Danthonioideae without a tribe. In addition, Soreng et al. (2015b) recognized *Alloeochaete, Danthonidium*, and *Phaenanthoecium* as *incertae sedis* in the subfamily. New molecular DNA results confirm that *Phaenanthoecium* is aligned within the Danthonieae and that, as previously mentioned, *Alloeochaete* aligns within the Panicoideae (Teisher et al., in press). *Phaenanthoecium koestlinii* (Hochst. ex A. Rich.) C.E. Hubb. has Danthonioideae-like characteristics with flattened awns inserted from the sinus of a bilobed lemma (Teisher et al., in press). In our new classification with the addition of *Phaenanthoecium* there are 18 genera in the Danthonieae and only *Danthonidium* remains as *incertae sedis* within the subfamily.

4.11 Chloridoideae

Kellogg's (2015) classification of the Chloridoideae is very similar to that of Soreng et al. (2015b), both recognize five tribes and about the same number of genera. However, Kellogg includes the Zoysiinae and Sporobolinae as synonyms in the Zoysieae, and within the Cynodonteae, the Aeluropodinae is omitted. As pointed out by Kellogg (2015), earlier studies render *Aeluropus* in an unresolved position (Peterson et al., 2010a); with additional data Peterson et al. (2016) found *Odyssea paucinervis* (Nees) Stapf to be a strongly supported sister [bootstrap (BS) = 100, posterior probability (PP) = 1.00] and therefore an additional member of the Aeluropodinae. In Kellogg, the Hilariinae, Monanthochloinae, Muhlenbergiinae, Scleropogoninae, and Traginae are placed as synonyms within Boutelouinae; and Cteniinae, Farragininae, Gymnopogoninae, Perotidinae, and Trichoneurinae are synonymized within Gouniinae. It is clear how she arrived at this since Peterson et al. (2010a, 2010b, 2014a, 2016) had found strong support for clades of the expanded Boutelouinae sensu Kellogg (BS = 93 or 94, PP = 1.00) and Gouiniinae sensu Kellogg (BS = 100, PP = 1.00). We describe two new supersubtribes for these clades in the taxonomy section.

In our new classification, subfamily Chloridoideae consists of 1602 species in 124 genera and five tribes. Most members of the Chloridoideae share two structural synapomorphies: C_4 leaf anatomy (except two species of *Ellisochloa*) and bicellular microhairs with a broad, short terminal cell the same thickness as the basal cell (Peterson et al., 2007). Morphological trends within the subfamily include a base chromosome number of $x = 10$ (a pleisiomorphy), caryopses with a nonlinear hilum that are usually punctiform or small, embryos with elongated mesocotyl internodes, two non-membranous (fleshy) lodicules (Soreng & Davis, 1998; GPWG, 2001; Peterson et al., 2007).

The largest tribe, Cynodonteae includes 850 species in 94 genera, followed by the Eragrostideae with 489 species in 14 genera, the Zoysieae with 233 species in four genera, the Triraphideae with 15 species in three genera, and the

Centropodieae with six species in two genera. We recognize 21 subtribes within the Cynodonteae and this includes three new subtribes: Dactylocteniinae, Orininae, Zaqiqahinae (Peterson et al., 2016). Species in the Dactylocteniinae (includes *Acrachne, Brachychloa, Dactyloctenium,* and *Neobouteloua*) have synflorescences composed of digitately arranged racemes or racemes borne on a central axis, caryopses usually with a free pericarp (excluding *Neobouteloua*), 1–9-flowered laterally compressed spikelets, glumes that are usually shorter than the spikelets (excluding a single species of *Dactyloctenium*), and (1–)3(–5)-veined lemmas (excluding a single species of *Dactyloctenium*) (Clayton et al., 2016). We have evidence of a possible hybridization event and subsequent genomic introgression between *Acrachne racemosa* (B. Heyne ex Roem. & Schult.) Ohwi and an unknown member of the Eleusininae since our plastid and nuclear DNA markers are not congruent (Peterson et al., 2015, 2016; Peterson & Romaschenko, unpublished data).

Species in the Orininae (includes *Cleistogenes* and *Orinus*) have paniculate synflorescences with racemose branches borne along a central axis, (1)2–8-flowered spikelets, glumes that are shorter than the adjacent florets, and 3–7-veined lemmas (Peterson et al., 2016). The two genera are often difficult to separate morphologically, and have been linked historically since the basionym of *Orinus kokonorica* (K.S. Hao) Tzvelev was described as a *Cleistogenes* (Hao, 1938). However, *Cleistogenes* (13 or 14 species ranging from southern Europe to Turkey and eastward through central Asia and China) has hidden cleistogamous spikelets concealed within the upper sheaths (not found in *Orinus*), a cespitose habit or very short rhizomes (vs. elongated rhizomes in *Orinus*), and 3–7-veined lemmas (vs. 3-veined lemmas in *Orinus*) (Chen et al., 2006).

The Zaqiqahinae includes a single species, *Zaqiqah mucronata* (Forssk.) P.M. Peterson & Romasch. [*Odyssea mucronata* (Forssk.) Stapf], a suffrutescent perennial with stiff, hard, much-branched culms up to 2 m tall, lemmas 4–5 mm long, and is found along the immediate coast bordering the Red Sea in sand dunes or plains (Peterson et al., 2016). Molecular analyses of the three species formerly placed in *Odyssea* confirmed that each one had a different evolutionary origin (Peterson et al., 2014b, 2016). *Odyssea paucinervis*, as previously mentioned, is sister to *Aeluropus,* and both genera have elongated rhizomes, stiff and pungent leaf blades, synflorescences composed of racemes born on a central axis, multiple-flowered spikelets, and mucronate lemmas (Clayton et al., 2016). In addition, we have evidence of a possible hybridization event and subsequent genomic introgression between *O. paucinervis* and an unknown member of Dactylocteniinae (Peterson et al., 2016). Morphologically, *Zaqiqah mucronata* and *Odyssea paucinervis* are very similar in having short, rigid to pungent leaf blades; narrow and contracted panicles; several-flowered spikelets with 1-veined glumes; lemmas that are 3-veined with silky villous veins, apices dentate and mucronate; and caryopses with free pericarps (Stapf, 1922; Phillips, 1951, 1995; Cope, 1999, 2007). The third species, *Odyssea jaegeri* (Pilg.) Robyns & Tournay, with smooth, glabrous, and unawned lemmas was placed in *Psilolemma* by Phillips (1974) and has recently been found to be sister to *Sporobolus*, a member of the tribe Zoysieae and Sporobolinae (Peterson et al., 2014b). Clearly, the morphological features of these three former species of *Odyssea* are a result of convergent evolution.

Since our last classification, new molecular DNA studies have aligned *Halopyrum* in the Tripogoninae, *Decaryella* (*Vorontsova 1398* in GenBank) and *Hubbardochloa* in the Hubbardochloinae (older name for the Gymnopogoninae), and *Pogononeura* in the Traginae (Peterson et al., 2015, 2016). New genera include: *Orthacanthus* (monotypic) in the Traginae, *Triplasiella* (monotypic) in the Gouiniinae, and *Tripogonella* (3 species) in the Tripogoninae (Peterson et al., 2016). Within the Eleusininae, *Chloris* now includes *Lintonia* as a synonym, *Microchloa* (includes syn. *Rendlia*), *Tetrapogon* (includes syn. *Saugetia*), and *Neostapfiella* (*Vorontsova 1486* in GenBank) is new to the subtribe (Peterson et al., 2015). Within the Orcuttiinae, *Orcuttia* now includes *Tuctoria* as a synonym, and within the Triodiinae, *Triodia* includes *Monodia* and *Symplectrodia* as synonyms (Crisp et al., 2015; Toon et al., 2015). *Nematopoa* (formerly placed in Molinieae of the Arundinoideae) is now a synonym of *Triraphis* in the Triraphideae (Teisher et al., in press). *Catalepis*, *Ectrosia, Harpachne, Nematopoa, Pogonarthria,* and *Psammagrostis,* are all synonyms of *Eragrostis* (Eragrostidinae). *Stiburus conrathii* Hack. [=*Eragrostis conrathii* (Hack.) S.M. Phillips] (formerly placed in Eragrostidinae) aligns with the Uniolinae (Peterson & Romaschenko, unpublished data) and requires further study. *Stiburus alopecuroides* (Hack.) Stapf (type) appears to be sister to *Eragrostis* (Peterson & Romaschenko, unpublished data).

Acknowledgements

We thank the National Geographic Society Committee for Research and Exploration (Grant Nos. 8848-10, 8087-06) for field and laboratory support, the Smithsonian Institution's Restricted Endowments Fund, the Scholarly Studies Program, Research Opportunities, Atherton Seidell Foundation, Biodiversity Surveys and Inventories Program, Small Grants Program, the laboratory of Analytical Biology, the Missouri Botanical Garden for supporting Tropicos, and the United States Department of Agriculture, all for financial support. We thank Heather Stimmel for Tropicos database support. We would also like to acknowledge Maria S. Vorontsova and Jerrold I Davis for providing helpful comments on the manuscript, and Jeffery M. Saarela for discussions on the classification.

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Supplementary Material

The following supplementary material is available online for this article at: http://onlinelibrary.wiley.com/doi/10.1111/jse.12262/suppinfo:

Doc. S1. Genera of Poaceae with authors, numbers of species, and subfamily codes (Ano = Anomochlooideae; Ari = Aristidoideae; Aru = Arundinoideae; Bam = Bambusoideae; Chl = Chloridoideae; Dan = Danthonioideae; Mic = Micrairoideae; Ory = Oryzoideae; Pan = Panicoideae, except PanA = tribe Andropogoneae; Pha = Pharoideae; Poo = Pooideae; Pue = Puelioideae). Accepted genera are in bold italic and important synonyms are listed.

Appendix 2 (searchable version): A worldwide phylogenetic classification of the Poaceae (Gramineae) II.

Appendix I. Comparison of the Poaceae suprageneric classifications of Kellogg (2015) and Soreng et al. (2015b); new treatment numbers of genera and species; *NA = not applied by Kellogg, considered superfluous, although used by Soreng et al.; a dash (–) = not accepted or not available.

Subfamily	Supertribe	Tribe	Supersubtribe	Subtribe	Kellog 2015 no. genera	Soreng et al. 2015 no. genera	New treatment no. genera	New treatment no. species
Totals		–			698		768	11506
Anomochlooideae					2		2	4
"		Anomochloeae			NA		1	2
"		Streptochaeteae			NA		1	3
Pharoideae					3		3	12
"		Phareae			NA		3	12
Pharoideae					2		2	11
"		Atractocarpeae			NA		1	5
"		Guaduelleae			NA		1	6
Oryzoideae					16		19	115
"		Streptogyneae			1, no subfamily		1	2
"		*incertae sedis*			1		1	1
"		Ehrharteae			1		4	38
"		Oryzeae			11		11	71
"		"	–	Oryzinae	4		4	44
"		"	–	Zizaniinae	7		7	27
"					2		2	3
Bambusoideae					114		125	1670
"	Arundinariodae				NA		–	–
"	"	Arundinarieae			28		31	581
"	"	"		Arundinariinae	NA		31	581
"	Olyrodae				NA		–	–
"	"	Olyreae			21		21	123
"	"	"	–	Buergersiochloinae	1		1	1
"	"	"	–	Olyrinae	18		17	88
"	"	"	–	Parianinae	2		3	34
"	Bambusodae				NA		–	–
"	"	Bambuseae			65		73	966
"	"	"	–	*incertae sedis*	–	–	2	2
"	"	"	–	Melocanninae	9	10	9	99
"	"	"	–	Hickeliinae	8	8	9	32
"	"	"	–	Bambusinae	26	29	17	324
"	"	"	–	Racemobambosinae	1	1	3	31
"	"	"	–	Dinochloinae	–	–	7	56
"	"	"	–	Greslaniinae	–	–	1	2
"	"	"	–	Holttumochloinae	–	–	3	6

Continued

Continued

Subfamily	Supertribe	Tribe	Supersubtribe	Subtribe	Kellog 2015 no. genera	Soreng et al. 2015 no. genera	New treatment no. genera	New treatment no. species
Bambusoideae	Bambusodae	Bambuseae	–	Temburongiinae	–	–	1	1
“	“	“	–	Chusqueinae	1	1	1	175
“	“	“	–	Guaduinae	5	5	5	53
“	“	“	–	Arthrostylidiinae	1	14	15	185
Pooideae					1	198	202	3968
“	–	Brachyelytreae			1	1	1	3
“	Nardodae				–	2	2	2
“	“	Nardeae			2	1	1	1
“	“	Lygeeae			in Nardeae	1	1	1
“	–	Duthieeae			in Phaenospermatideae	in Phaenospermatideae	8	16
“	–	Phaenospermateae			8	8	1	1
“	Melicodae				–	–	8	159
“	“	Brylkinieae			in Meliceae	2	1	1
“	“	Meliceae			8	6	7	158
“	Stipodae				NA	–	27	528
“	“	Ampelodesmeae			in Stipeae	1	1	1
“	“	Stipeae			28	28	28	527
“	–	Diarrheneae			1	2	2	5
“	–	Brachypodieae			1	1	1	22
“	Poodae				28	118	121	2562
“	“	Poeae			1	118	121	2562
“	“	“	–	*incertae sedis*	2	–	–	–
“	“	“	–	Torreyochloinae	2	2	2	16
“	“	“	–	Aveninae	7	15	18	343
“	“	“	–	Phalaridinae	1	1	1	17
“	“	“	–	Anthoxanthinae	1	1	1	42
“	“	“	Agrostidodinae		–	–	19	457
“	“	“	“	Brizinae	in Agrostideae	2	2	6
“	“	“	“	Calothecinae	in Agrostideae	2	1	22
“	“	“	“	Echinopogoninae	–	–	5	20
“	“	“	“	Agrostidinae	20	16	11	409
“	“	“	–	Scolochloinae	1	2	2	3
“	“	“	–	Sesleriinae	4	5	5	39
“	“	“	–	Holcinae	in Airinae	3	2	11
“	“	“	–	Airinae	10	7	7	43
“	“	“	–	Aristaveninae	in Airinae	in Airinae	1	51
“	“	“	Loliodinae		–	–	21	692

Continued

Continued

Subfamily	Supertribe	Tribe	Supersubtribe	Subtribe	Kellog 2015 no. genera	Soreng et al. 2015 no. genera	New treatment no. genera	New treatment no. species
Pooideae	Poodae	Poeae	Loliodinae	Loliinae	6	9	9	659
“	“	“	“	Dactylidinae	2	2	2	4
“	“	“	“	Cynosurinae	1	1	1	10
“	“	“	“	Ammochloinae	1	1	1	3
“	“	“	“	Parapholiinae	7	8	8	26
“	“	“	“	*incertae sedis*	–	–	1	1
“	“	“	“	Coleanthinae	11	10	10	156
“	“	“	Poodinae		–	–	31	681
“	“	“		*incertae sedis*	–	1	10	15
“	“	“	Poodinae	Poinae	25	30	1	550
“	“	“	“	Miliinae	in Poinae	1	1	5
“	“	“	“	Phleinae	in Poinae	in Poinae	1	16
“	“	“	“	Beckmanniinae	in Poinae	in Poinae	4	6
“	“	“	“	Cinninae	in Poinae	in Poinae	5	13
“	“	“	“	Alopecurinae	in Poinae	in Poinae	3	47
“	“	“	“	Ventenatinae	in Poinae	in Poinae	6	21
“	Triticodae				NA	29	29	29
“	“	Littledaleeae	–	–	–	1	1	4
“	“	Bromeae	–	–	2	1	1	165
“	“	Triticeae	–	–	20	27	27	501
“	“	“	–	Hordeinae	in Triticeae	22	in Triticeae	–
“	“	“	–	Triticinae	in Triticeae	5	in Triticeae	–
Aristidoideae					3	3	3	367
“		Aristideae			NA	3	3	367
Panicoideae					216	243	247	3241
“		*incertae sedis*			4	2	3	8
“		Thysanolaeneae			in Centotheceae	1	1	1
“		Cyperochloeae			in Centotheceae	2	2	2
“		Centotheceae			5	2	2	3
“		Chasmanthieae			6	2	1	7
“		Zeugiteae			in Chasmanthieae	5	4	17
“		Steyermarkochloeae			1	2	2	2
Panicoideae		Tristachyideae			7	8	8	87
“		Gynerieae			1	1	1	1
“		Lecomtelleae			–	–	1	1
“	Panicodae		–		71	84	82	1227
“	“	Paniceae			71	84	82	1227
“	“	“	–	*incertae sedis*	11	10	10	83

Continued

Continued

Subfamily	Supertribe	Tribe	Supersubtribe	Subtribe	Kellog 2015 no. genera	Soreng et al. 2015 no. genera	New treatment no. genera	New treatment no. species
Panicoideae	Panicodae	Paniceae	–	Anthephorinae	7	9	8	291
“	“	“	–	Dichantheliinae	–	2	2	76
“	“	“	–	Boivinellinae	14	15	18	146
“	“	“	–	Neurachninae	3	6	6	21
“	“	“	–	Melinidinae	11	14	13	166
“	“	“	–	Panicinae	3	4	2	157
“	“	“	–	Cenchrinae	22	24	24	287
“	Andropogonodae		–		NA	132	140	1885
“	“	Paspaleae			32	39	39	597
“	“	“	–	*incertae sedis*	–	1	1	1
“	“	“	–	Paspalinae	13	16	17	491
“	“	“	–	Otachyriinae	4	6	5	34
“	“	“	–	Arthropogoninae	14	16	16	71
“	“	Arundinellieae			in Andropogoneae	2	3	86
“	“	“	–	Arundinelliinae	2	–	–	–
“	“	Andropogoneae			87	91	98	1202
“	“	“	–	*incertae sedis*	21	10	6	85
“	“	“	–	Arthraxoninae	NA	1	1	27
“	“	“	–	Tripsacinae	6	2	7	59
“	“	“	–	Chinonachninae	NA	4	5	15
“	“	“	–	Coicinae	NA	1	1	4
“	“	“	–	Rottboelliinae	13	18	16	112
“	“	“	–	Ischaeminae	2	6	7	151
“	“	“	–	Dimeriinae	in Ischaeminae	1	in Ischaminae	–
“	“	“	–	Germainiinae	4	3	4	31
“	“	“	–	Sorghinae	in Saccharinae	7	in Saccharinae	–
“	“	“	–	Sacchariinae	14	16	26	179
“	“	“	–	Andropogoninae	25	6	25	514
“	“	“	–	Anthistiriinae	in Andropogoninae	16	in Andropgoninae	–
Arundinoideae			–		18	16	14	40
“		Arundineae			NA	3	4	17
“		Molinieae			NA	13	11	24
“		“	–	*incertae sedis*	–	–	3	7
“		“	–	Moliniinae	in Poinae	in Molinieae	4	7
“		“	–	Crinipinae	in Arundinoideae	in Molinieae	4	10
Micrairoideae					9	9	8	184
“		Micraireae			NA	1	1	15
“		Eriachneae			NA	2	1	50

Continued

Continued

Subfamily	Supertribe	Tribe	Supersubtribe	Subtribe	Kellog 2015 no. genera	Soreng et al. 2015 no. genera	New treatment no. genera	New treatment no. species
Micrairoideae		Isachneae			NA	5	6	119
“		Hubbardieae			NA	1	in Isachneae	–
Danthonioideae					17	20	19	292
“		*incertae sedis*			–	3	1	1
“		Danthonieae			NA	17	18	291
Chloridoideae					121	131	124	1602
“		*incertae sedis*			12	9	7	9
“		Centropodieae			2	2	2	6
“		Triraphideae			3	3	3	15
“		Eragrostideae			16	9	14	489
“		“	–	*incertae sedis*	2	–	–	–
“		“	–	Cotteinae	4	4	4	28
“		“	–	Eragrostidinae	5	11	5	451
“		Eragrostideae	–	Uniolinae	5	5	5	10
“		Zoysieae			8	4	4	233
“		“		Sporobolinae	NA	2	2	221
“		Zoysieae		Zoysiinae	NA	2	2	12
“		Cynodonteae			82	94	94	850
“		“	–	*incertae sedis*	11	15	4	4
“		“	–	Aeluropodinae	–	2	2	7
“		“	–	Dactylocteniinae	–	–	4	20
“		“	–	Eleusininae	24	31	27	231
“		“		Orcuttiinae	3	3	2	9
“		“		Orininae	–	–	2	20
“		“		Pappophorinae	3	3	3	25
“		“	–	Triodiinae	3	3	1	69
“		“	–	Tripogoninae	5	5	7	66
“		“	Boutelouodinae		–	–	20	299
“		“	–	*incertae sedis*	–	–	4	5
“		“	“	Boutelouinae	16	1	1	60
“		“	“	Hilariinae	in Boutelouinae	1	1	10
“		“	“	Monanthochloinae	in Boutelouinae	1	1	11
“		“	“	Muhlenbergiinae	in Boutelouinae	1	1	182
“		“	“	Scleropogoninae	in Boutelouinae	6	6	15
“		“	“	Traginae	in Boutelouinae	4	6	16
“		“	Gouiniodinae		–	–	21	100
“		“	“	Cteniinae	in Gouiniinae	1	1	20
“		“	“	Farragininae	in Gouiniinae	2	2	4

Continued

Continued

Subfamily	Supertribe	Tribe	Supersubtribe	Subtribe	Kellog 2015 no. genera	Soreng et al. 2015 no. genera	New treatment no. genera	New treatment no. species
Chloridoideae		Cynodonteae	Gouiniodinae	Gouiniinae	17	5	6	21
“		“	“	Gymopogoninae	in Gouiniinae	6	in Hubbardochloinae	–
“		“	“	Hubbardochloinae	–	*incertae sedis*	8	27
“		“	“	Perotidinae	in Gouiniinae	3	3	19
“		“	“	Trichoneurinae	in Gouiniinae	1	1	8
“		“	“	Zaqiqahinae	–	–	1	1

Appendix II. A world-wide phylogenetic classification of Poaceae (Gramineae) II.: cǎo (草), capim, çayır, çimen, darbha, ghaas, ghas, gish, gramas, graminius, gräser, grasses, gyokh, he-ben-ke, hullu, kasa, kusa, nyasi, pastos, pillu, pullu, zlaki, etc. Accepted suprageneric names appear in **bold** type. The indigenous range of each genus is colored as follows: Western Hemisphere, Eurasia (including genera that in Africa are exclusively Mediterranean, but not exclusively African), Australasia, Africa. Genera with bimodal distributions are bicolored, those with broader distributions tricolored, or are red if more widely distributed. Genera in synonymy (syn. – … ..) are colored if the accepted genus is more widely distributed, i.e., in more than one area. *Genera in italics have been sampled in DNA studies*. Comments and C_3 and C_4 photosynthetic pathways are in brackets { }. Publication dates for suprageneric taxa appear in square brackets [ ].

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superorder **Lilianae** Takht. order **Poales** Small
family **Poaceae** Barnhart [1895] (nom. alt.: Gramineae Juss. [1789])

subfamily **Anomochlooideae** Pilg. ex Potztal [1957] (syn. – Streptochaetoideae Butzin [1965]) {all C_3}:

tribe **Anomochloeae** C.E. Hubb. [1934]: *Anomochloa*.

tribe **Streptochaeteae** C.E. Hubb. [1934]: *Streptochaeta*.

subfamily **Pharoideae** L.G. Clark & Judz. [1996] (syn. – subfamily Leptaspidoideae C.O. Morales [1998], supertribe Pharodae L. Liu [1980]) {all C_3}:

tribe **Phareae** Stapf [1898] (syn. – Leptaspideae Tzvelev [1987]): *Leptaspis*, *Pharus*, Scrotochloa.

subfamily **Puelioideae** L.G. Clark, M. Kobay, S. Mathews, Spangler & E.A. Kellogg [2000] {all C_3}:

tribe **Atractocarpeae** Jacq.-Fél. ex Tzvelev [1987] (syn. – tribe Atractocarpeae Jacq.-Fél. [1962, nom. inval.], Puelieae Soderstr. & R.P. Ellis [1988], subtribe Atractocarpinae E.G. Camus [1913], Pueliinae Stapf [1917]): *Puelia* (syn. – *Atractocarpa*).

tribe **Guaduelleae** Soderstr. & R.P. Ellis [1988]: *Guaduella*.

"BOP" clade {Clark et al., 1995; Clark et al., 2000, as **BEP**} {all C_3}

subfamily **Oryzoideae** Kunth ex Beilschm. [1833] (syn. – Ehrhartoideae Caro [1982], Oryzoideae Caro [1982, isonym]; Ehrhartinae Link [1827, invalid], Oryzeae Burmeist. [1837, unranked]) {all C_3}:

incertae sedis: *Suddia* {probably Phyllorachideae}.

tribe **Streptogyneae** C. E. Hubb. ex C. E. Calderón & Soderstr. [1980] (syn. – tribe Streptogyneae C.E. Hubb. [1956, nom. inval.]; subtribe Streptogyninae Pilg. ex Potztal [1969]): *Streptogyna*.

tribe **Ehrharteae** Nevski [1937]: *Ehrharta*, *Microlaena*, *Tetrarrhena*, *Zotovia* {genera okay in Verboom et al., 2003, except for placement of one species of *Microlaena*; more study is needed}.

tribe **Oryzeae** Dumort. [1824] (syn. – Zizanieae Hitchc. [1920]):

subtribe **Oryzinae** Griseb. [1853] (syn. – Oryzeae Horan. [1847 {rank tribe or subtribe?}]): *Leersia*, *Maltebrunia*, *Oryza* (syn. – *Porteresia*), *Prosphytochloa*.

subtribe **Zizaniinae** Benth. [1881] (syn. – Luziolinae Terrell & H. Rob. [1974]): *Chikusichloa*, *Hygroryza*, *Luziola*, *Potamophila*, *Rhynchoryza*, *Zizania*, *Zizaniopsis*.

tribe **Phyllorachideae** C.E. Hubb. [1939] {may be better in Oryzeae as a subtribe}: *Humbertochloa*, Phyllorachis.

subfamily **Bambusoideae** Luerss. [1893] (syn. – Olyroideae Pilg. [1956], Parianoideae Butzin [1965]) {all C_3}:

Indigenous Ranges: Africa, Australasia, Eurasia, Western Hemisphere, Widespread.

tribe **Arundinarieae** Asch. & Graebn. [1902] (syn. – supertribe Arundinariodae L. Liu [1980]; tribes Chimonocalameae Keng f. [1982, nom. inval.], Shibataeeae Nakai [1933]):

subtribe **Arundinariinae** Nees ex Lindl. [1836] (syn. – Aruninariinae Benth. [1881, isonym], Hack. [1887, isonym], Phyllostachydinae Keng f. [1992], Pleioblastinae Keng & Keng f. [1959], Sasinae Keng. f. [1992], Shibataeinae Soderstr. & R.P. Ellis [1988], Sinobambusinae Z.B. Wang [1987], Thamnocalaminae Keng. f. [1992]): *Acidosasa*, *Ampelocalamus* (s.s.), *Arundinaria*, *Bashania*, *Bergbambos*, *Chimonobambusa* (syn. – *Menstruocalamus, Oreocalamus, Qiongzhuea*), *Chimonocalamus*, *Drepanostachyum*, *Fargesia* (syn. – *Borinda*, *Sinarundinaria*), *Ferrocalamus*, *Gaoligongshania*, *Gelidocalamus*, *Himalayacalamus*, *Indocalamus* (s.s.), *Indosasa*, *Kuruna*, *Oldeania*, *Oligostachyum*, *Phyllostachys* (s.s.), *Pleioblastus* (syn. – Nipponocalamus, Polyanthus), *Pseudosasa* (syn. – Yadakeya), *Sarocalamus*, *Sasa* (syn. – *Neosasamorpha*), *Sasaella*, *Sasamorpha*, *Semiarundinaria* (syn. – *Brachystachyum*), *Shibataea*, *Sinobambusa*, *Thamnocalamus* s.s, Vietnamocalamus, *Yushania*.

tribe **Olyreae** Kunth ex Spenn. [1825] (syn. – supertribe Olyrodae Soderstr. & R.P. Ellis [1987 {1988}]; tribes Buergersiochloeae S.T. Blake [1946], Parianeae C.E. Hubb. [1934]).

subtribe **Buergersiochloinae** L.G. Clark & Judz. [2007]: *Buergersiochloa*.

subtribe **Olyrinae** Kromb. [1875] (syn. – Olyreae Horan. [1847 {rank tribe or subtribe?}]: Agnesia, *Arberella*, *Cryptochloa*, *Diandrolyra*, Ekmanochloa, Froesiochloa, *Lithachne*, Maclurolyra, Mniochloa, *Olyra*, *Parodiolyra*, Piresiella, *Raddia*, *Raddiella*, Rehia, *Reitzia* (syn. – *Piresia*), *Sucrea*.

subtribe **Parianinae** Hack. [1887]: *Eremitis*, *Pariana*, *Parianella*.

tribe **Bambuseae** Kunth ex Dumort. [1829] (syn. – supertribe Bambusodae L. Liu [1980]; tribes Arthrostylidieae E.G. Camus [1913], Baccifereae E.G. Camus [1913, nom. inval.], Chusqueae E.G. Camus [1913], Hickelieae A. Camus [1935, nom. inval.], Oxytenanthereae Tzvelev [1987]):

subtribe **Melocanninae** Benth. [1881] (syn. – Schizostachydinae Soderstr. & R.P. Ellis [1988]): Annamocalamus, *Cephalostachyum* (syn. – *Leptocanna*), *Davidsea*, *Melocanna*, *Neohouzeaua*, *Ochlandra*, *Pseudostachyum*, *Schizostachyum* (syn. – *Dendrochloa*, *Teinostachyum*), Stapletonia.

subtribe **Hickeliinae** A. Camus [1924] (syn. – Nastinae Soderstr. & R.P. Ellis [1988]): *Cathariostachys*, *Decaryochloa*, *Hickelia* (syn. – Pseudocoix), *Hitchcockella*, *Nastus* (syn. – *Oreiostachys*), *Perrierbambus*, *Sirochloa*, *Sokinochloa*, *Valiha*.

subtribe **Bambusinae** J. Presl [1830] (syn. – Dendrocalaminae Benth. [1881]): *Bambusa* (syn. – *Dendrocalamopsis*, *Neosinocalamus*, Pseudobambusa), *Bonia*, Cochinchinochloa, *Dendrocalamus* (syn. – Klemachloa, Sellulocalamus, *Sinocalamus*), Fimbribambusa, *Gigantochloa*, *Maclurochloa*, *Melocalamus*, *Neomicrocalamus*, *Oreobambos*, *Oxytenanthera* (syn. – Houzeaubambus, Scirpobambus), *Phuphanochloa*, *Pseudoxytenanthera*, *Soejatmia*, *Thyrsostachys*, *Vietnamosasa*, *Yersinochloa*.

subtribe **Racemobambosinae** Stapleton [1984]: Chloothamnus (syn. – Oreiostachys), *Racemobambos* s.s., Widjajachloa.

subtribe **Dinochloinae** K.M. Wong & W.L. Goh [2016]: *Cyrtochloa*, *Dinochloa*, *Mullerochloa*, *Neololeba*, Pinga, Parabambusa, Sphaerobambos.

subtribe **Greslaniinae** K.M. Wong & W.L. Goh [2016]: *Greslania*.

subtribe **Holttumochloinae** K.M. Wong & W.L. Goh [2016]: *Holttumochloa*, *Kinabaluchloa*, Nianhochloa.

subtribe **Temburongiinae** K.M. Wong [2016]: *Temburongia*.

incertae sedis: Ruhooglandia, *Temochloa*.

subtribe **Chusqueinae** Soderstr. & R.P. Ellis [1988] (syn. – Neurolepidinae Soderstr. & R.P. Ellis [1988]): *Chusquea* (syn. – *Neurolepis*, *Platonia*, *Rettbergia*, *Swallenochloa*).

subtribe **Guaduinae** Soderstr. & R.P. Ellis [1988]: *Apoclada*, *Eremocaulon* (syn. – Criciuma), *Guadua*, *Olmeca*, *Otatea*.

subtribe **Arthrostylidiinae** Soderstr. & R.P. Ellis [1988]: *Actinocladum*, *Alvimia*, *Arthrostylidium*, Athroostachys, *Atractantha*, *Aulonemia* (syn. – *Matudacalamus*), *Cambajuva*, *Colanthelia*, *Didymogonyx*, *Elytrostachys*, *Filgueirasia*, *Glaziophyton*, *Merostachys*, *Myriocladus*, *Rhipidocladum*.

subfamily **Pooideae** Benth. [1861] (syn. – Secaloideae Rouy [1913]; Agrostidoideae Kunth ex Beilschm. [1833]; Hordeaceae Burmeist. [1837, unranked], Phalarideae Burmeist. [1837, unranked], Stipaceae Burmeist. [1837, unranked]) {all C_3}:

Indigenous Ranges: Africa, Australasia, Eurasia, Western Hemisphere, Widespread.

tribe **Brachyelytreae** Ohwi [1941] (syn. – subtribe Brachyelytrinae Ohwi [1942]): *Brachyelytrum*.

supertribe **Nardodae** Soreng [2017] {Nardeae + Lygeeae}:

tribe **Nardeae** W.D.J. Koch. [1837] (syn. – subtribe Nardinae Kromb. [1875]): ***Nardus***.

tribe **Lygeeae** J. Presl [1846] (syn. – subtribe Lygeinae Röser [2009], Spartineae Trin. [1824, nom. inval., based on *Lygeum*]): *Lygeum*.

tribe **Duthieeae** Röser & Jul.Schneider [2011], subtribe Duthieinae Pilg. ex Potztal [1969]): *Anisopogon*, *Danthoniastrum*, *Duthiea* s.s. (s.l., syn. – *Triavenopsis*), *Metcalfia*, *Pappagrostis*, *Pseudodanthonia*, *Sinochasea*, *Stephanachne*.

tribe **Phaenospermateae** Renvoize & Clayton [1985]: *Phaenosperma* {reticulate; see Hochbach et al., 2015}.

supertribe **Melicodae** Soreng [2017] {Brylkineae + Meliceae}:

tribe **Brylkinieae** Tateoka [1960] {sister to Meliceae} (syn. – subtribe Brylkiniinae Ohwi [1941]): *Brylkinia*.

tribe **Meliceae** Link ex Endl. [1830] (syn. – Glycerieae Link ex Endl. [1830] {sister to Brylkinieae}; subtribe Glyceriinae Dumort. [1869], Melicinae Fr. [1835]): *Glyceria*, *Koordersiochloa* (syn. – *Streblochaete*), *Lycochloa*, *Melica*, *Pleuropogon*, *Schizachne*, *Triniochloa*.

supertribe **Stipodae** L. Liu [1980] {Stipeae + Ampelodesmeae}:

tribe **Ampelodesmeae** Tutin [1978] (syn. – Ampelodesminae Conert [1961]): *Ampelodesmos* {reticulate, apparently an ancient hybrid between parents from Stipeae and Duthieeae; see Romaschenko et al., 2012; Hochbach et al. 2015}.

tribe **Stipeae** Dumort. [1824] (syn. – subtribe Stipinae Griseb. [1846]; Aciachninae Caro [1982], Ortachninae Caro [1982]): *Achnatherum* (syn. – *Aristella*) {Eurasian/African only, Western Hemisphere species are in limbo, none belong in *Achnatherum* s.s., most are *Eriocoma* but not yet transferred}, *Aciachne*, *Amelichloa* {nested within *Nassella*, but an intergeneric hybrid origin has not been ruled out}, *Anatherostipa* (syn. – *Nicoraella*), *Anemanthele*, *Austrostipa*, *Celtica*, *Eriocoma* {incl. most American spp. of *Achnatherum*}, *Hesperostipa*, *Jarava*, *Lorenzochloa*, *Macrochloa*, *Nassella*, *Oloptum*, *Ortachne*, *Orthoraphium*, *Oryzopsis*, *Pappostipa*, *Patis*, *Piptochaetium*, *Piptatheropsis*, *Piptatherum*, *Psammochloa*, *Ptilagrostis*, *Stipa*, *Stipellula* (*Stipella* nom. illeg. hom.), *Timouria*, *Trikeraia*.

tribe **Diarrheneae** C.S. Campb. [1985] (syn. – subtribe Diarrheninae Ohwi [1941]): *Diarrhena*, *Neomolinia*.

tribe **Brachypodieae** Harz [1880] (syn. – subtribe Brachypodiinae Hack. [1887]; Brachypodieae Hayek [1925, isonym]): *Brachypodium* (syn. – *Trachynia*).

supertribe **Poodae** L. Liu [1980] (syn. – Poodae T.D. Macfarl. & L. Watson [1982], isonym {tribe Poeae only}):

tribe **Poeae** R.Br. [1814] (syn. – Agrostideae Martinov [1820] {as Koleno = tribe, indirect ref. to Kunth}, Agrostideae Dumort. [1824], Airopsideae Gren. & Godr. [1855], Alopecureae W.D.J. Koch[1837], Anthoxantheae Link ex Endl. [1830], Aveneae Dumort. [1824], Beckmannieae Nevski [1937], Calamagrostideae Trin. [1824], Cinneae Ohwi [1941], Coleantheae Husn. [1896], Cynosureae Dumort. [1824], Dupontieae A. Löve & D. Löve, [1961, nom. nud.], Festuceae Dumort. [1824], Gaudinieae Rouy [1913], Graphephoreae Hyl. [1953], Hainardieae Greuter [1967], Holceae J. Presl [1846], Lolieae Link ex Endl. [1830], Koelerieae Schur [1866, nom. nud.], Milieae Link ex Endl. [1830], Phalarideae Kunth [1829], Phleeae Dumort. [1824], Scolochloeae Tzvelev [1968], Seslerieae W.D.J. Koch [1837], Triseteae Gren. & Godr. [1855], Vilfeae Trin. [1824]):

Poeae CHLOROPLAST GROUP 1 (Aveneae type) {Soreng et al., 2007}:

subtribe **Torreyochloinae** Soreng & J.I Davis [2003]: *Amphibromus*, *Torreyochloa*.

subtribe **Aveninae** J. Presl [1830] (syn. – Gaudiniinae Holub ex Tzvelev [1976, nom. nud.], Graphephorinae Asch. & Graebn. [1900], Koeleriinae Asch. & Graebn. [1900]): *Acrospelion*, *Arrhenatherum*, *Avellinia*, *Avena*, *Cinnagrostis* (syn. – *Leptophyllochloa*) {"Deyeuxia" of Western Hemisphere p.p.}, *Gaudinia* (syn. – *Trichaeta*), *Graphephorum* {reticulate}, *Helictotrichon* s.s. (syn. – *Pseudarrhenathrum*; excl. *Avenula* and *Helictochloa*), *Koeleria* (syn. – *Parafestuca*), *Lagurus*, *Peyritschia*, *Rostraria* s.s. {reticulate in type spp. only}, *Sphenopholis*, *Tricholemma*, *Trisetaria* s.s., *Trisetum* s.s., *Trisetopsis* {reticulate}, *Tzveleviochloa* {reticulate}.

subtribe **Phalaridinae** Fr. [1835]: *Phalaris* (syn. – *Baldingera*, *Phalaroides*, *Typhoides*).

subtribe **Anthoxanthinae** A. Gray [1856] (syn. – Foenodorinae Krause [1909, nom. inval.]): *Anthoxanthum* (syn. – *Ataxia*, *Hierochloe*).

supersubtribe: **Agrostidodinae** Soreng [2017]: {Brizinae + Calothecinae + Dichelachninae + Agrostidinae}:

subtribe **Brizinae** Tzvelev s.s. [1968]: *Airopsis*, *Briza* (syn. – *Macrobriza*; excl. *Brizochloa*).

Indigenous Ranges: Africa, Australasia, Eurasia, Western Hemisphere, Widespread.

subtribe **Echinopogoninae** Soreng [2017] **subtribe nov.**: Ancistragrostis {tentatively placed here}, *Dichelachne* {apparently reticulate with *Calamagrostis* s.s.}, *Echinopogon*, *Pentapogon* {GenBank DNA data for placement among Danthonioid or Arundinoid needs verification}, *Relchela*.

subtribe **Calothecinae** Soreng [2015]: *Chascolytrum* (syn. – *Calotheca*, *Erianthecium*, *Gymnachne*, *Lombardochloa*, *Microbriza*, *Poidium*, *Rhombolytrum*).

subtribe **Agrostidinae** Fr. [1835] (syn. – Calamagrostidinae Lindl. [1836, nom. nud.], Vilfinae Steud. [1854]; Chaeturaceae Link [1827, unranked]): *Agrostis* (syn. – *Chaetopogon*, *Neoschischkinia*, *Notonema*), Bromidium {may be related to *Dichelachne*}, *Calamagrostis* p.p. (syn. – *Ammophila*, *Deyeuxia*) {polyphyletic in Western Hemisphere, see *Cinnagrostis*, *Deschampsia*}, *Chaetotropis* {reticulate}, Hypseochloa {odd here}, *Gastridium*, *Lachnagrostis* {reticulate}, *Limnodea*, *Podagrostis* {reticulate}, *Polypogon* {reticulate}, *Triplachne*.

Poeae CHLOROPLAST GROUP 2 (Poeae type) {Soreng et al., 2007}:

subtribe **Scolochloinae** Tzvelev [1987] {this subtribe seems to share plastids with the classical Poeae and nrDNA with early GROUP 1 Aveninae}: *Dryopoa*, *Scolochloa*.

subtribe **Sesleriinae** Parl. [1845] (syn. – Miborinae Asch. & Graebn. [1899]) {this subtribe seems to share plastids with the old Poeae and nrDNA with early Avenineae GROUP 1 above}: *Mibora*, *Echinaria*, *Oreochloa*, *Sesleria*, *Sesleriella*.

subtribe **Airinae** Fr. [1835] (syn. – Corynephorinae V. Jirásek & Chrtek [1962]) {a heterogenous subtribe with no satisfactory resolution}: *Aira*, *Antinoria*, *Avenella*, *Corynephorus*, *Helictochloa* {incl. *Avenula* p.p. non-typica, *A.* subg. *Pratavenastrum*}, *Molineriella*, *Periballia*.

subtribe **Holcinae** Dumort. [1868]: *Holcus*, *Vahlodea*.

subtribe **Aristaveninae** F. Albers & Butzin [1977] (syn. – Deschampsinae Holub [1958, nom. nud.], Scribneriinae Soreng & J.I. Davis [2003]): *Deschampsia* s.s. (syn. – *Aristavena*, *Scribneria*, *Stylagrostis*) {excl. *Avenella*}.

supersubtribe **Loliodinae** Soreng [2017] {Loliinae + Dactylidinae + Cynosurinae + Ammochloinae + Parapholiinae}:

subtribe **Loliinae** Dumort. [1829] (syn. – Festucinae J. Presl [1830], Psilurinae Pilg. ex Potztal [1969]): *Castellia*, *Drymochloa*, *Festuca* (syn. – *Ctenopsis*, *Dielsiochloa*, *Helleria* E. Fourn., *Hellerochloa*, *Loliolum*, *Micropyrum*, *Narduroides*, *Psilurus*, *Vulpia*, *Wangenheimia*), *Leucopoa* (syn. – *Xanthochloa*), *Lolium* (syn. – *Micropyropsis*, *Schedonorus*), *Megalachne*, *Patzkea*, *Podophorus*, Pseudobromus {the latter seems odd here. DNA data show a long branch, but outgroup selection has not clarified its placement}.

subtribe **Dactylidinae** Stapf [1898]: *Dactylis*, *Lamarckia*.

subtribe **Cynosurinae** Fr. [1835]: *Cynosurus*.

subtribe **Ammochloinae** Tzvelev [1976]: *Ammochloa*.

subtribe **Parapholiinae** Caro [1982] (syn. – Monerminae Tzvelev [1987, nom. inval.]): Agropyropsis, *Catapodium*, *Cutandia*, *Desmazeria*, *Hainardia*, *Parapholis*, *Sphenopus*, *Vulpiella*.

PPAM clade {Gillespie et al. 2008, 2010; Soreng et al. 2015b} {Coleanthinae + Poodinae + *Avenula*}:

incertae sedis: *Avenula* (syn. – *Homalotrichon*, *Neoholubia*) {s.s., p.p. typica – *A. pubescens*; excl. *Helictochloa*. *Avenula* s.s. is a floater, apparently allied to the set of Coleanthinae and Poodinae}.

subtribe **Coleanthinae** Rouy [1913] (syn. – Puccinelliinae Soreng & Davis [2003]): *Catabrosa*, *Catabrosella*, *Coleanthus*, *Colpodium* (syn. – *Keniochloa*), *Hyalopoa* {apparently heterogenous}, *Paracolpodium* {apparently heterogenous}, *Phippsia*, *Puccinellia* (syn. – *Pseudosclerochloa*), *Sclerochloa*, *Zingeria* {probably best united with *Colpodium* s.s.}.

supersubtribe **Poodinae** Soreng & L.J. Gillespie [2017] {Poinae + Miliinae + Phleinae + Beckmanniinae + Cinninae + Alopecurinae + Ventenatinae + DAD & HSAQN clades + *Arctopoa* + *Brizochloa*}:

-incertae sedis: *Arctopoa* {an ancient hybrid genus with a *Poa* plastid and nrDNA from something related to *Cinna*}, *Brizochloa* {usually placed in *Briza*}; DAD clade {hybrid between an ancient taxon allied to Alopecurinae and an ancient Poodinae taxon sensu Soreng et al. 2015b}: *Arctophila*, *Dupontia*, *Dupontiopsis*; HSAQN clade {Gillespie et al. 2010, Kellogg 2015}: *Arctagrostis*, *Hookerochloa* (syn. – *Festucella*), *Nicoraepoa* {one known hybrid with *Poa*}, *Saxipoa*, *Sylvipoa*.

subtribe **Poinae** Dumort. **s.s.** [1829]: *Poa* (syn. – *Anthochloa*, *Aphanelytrum*, *Austrofestuca*, *Dissanthelium*, *Eremopoa*, *Libyella*, *Lindbergella*, *Neuropoa*, *Ochlopoa*, *Oreopoa*, *Parodiochloa*, *Raimundochloa*, *Tovarochloa*, *Tzvelevia*).

Indigenous Ranges: Africa, Australasia, Eurasia, Western Hemisphere, Widespread.

subtribe **Miliinae** Dumort. [1829] {sister to *Poa* or *Phleum* in plastid analyses; nrDNA analyses are equivocal for placing it within Poodinae versus sister to Coleanthinae}: *Milium*.

subtribe **Phleinae** Dumort. [1868]: *Phleum* (syn. – *Maillea*).

subtribe **Beckmanniinae** Nevski [1937]: *Beckmannia*, *Pholiurus*, *Pseudophleum*, *Rhizocephalus*.

subtribe **Cinninae** Caruel. [1892]: Agrostopoa {tentatively placed here}, *Aniselytron* {ancient hybrid, with *Cinna* like plastids and different copies of nrDNA aligning near *Cinna* and early *Poa*}, *Cinna*, *Cyathopus*, *Simplicia*.

subtribe **Alopecurinae** Dumort. [1829]: *Alopecurus*, *Cornucopiae*, *Limnas*.

subtribe **Ventenatinae** Holub ex L.J. Gillespie, Cabi & Soreng : *Apera*, *Bellardiochloa*, *Gaudiniopsis*, *Nephelochloa*, *Parvotrisetum*, *Ventenata* (syn. – *Pilgerochloa*).

supertribe **Triticodae** T.D. Macfarl. & L. Watson [1982] {Littledaleeae + Bromeae + Triticeae}:

tribe **Littledaleeae** Soreng & J.I. Davis [2015] (syn. – subtribe Littledaleinae Röser [2009]: *Littledalea* {this isolated genus appears to be the sister to Bromeae plus Triticeae}. {reticulate}

tribe **Bromeae** Dumort. [1824] (syn. – subtribe Brominae Dumort. [1829]): *Bromus* (syn. – *Anisantha*, *Boissiera*, *Bromopsis*, *Ceratochloa*, *Nevskiella*, *Stenofestuca*, *Trisetobromus*).

tribe **Triticeae** Dumort. [1824] (syn. – tribes Aegilopineae Orb. [1841], Hordeeae Kunth ex Spenn. [1825], Frumenteae E.H.L. Krause [1903, nom. illeg.], Secaleinae Rchb. [1828, unranked]; – subtribesAegilopinae Nevski [1933]), Agropyrinae Nevski [1933], Clinelyminae Nevski [1933, nom. illeg.], Elyminae Benth. [1881], Henrardiinae C.E. Hubb. [1948], Hordeinae Dumort. [1829], Roegneriinae Nevski [1933], Triticinae Fr. [1835]) {many of the genera are reticulate in origin}: *Agropyron*, *Anthosachne* {reticulate}, *Australopyrum*, *Connorochloa* {reticulate}, *Crithopsis*, *Douglasdewya* {reticulate}, *Elymus* (syn. – *Campeiostachys*, *Elytrigia*, *Hystrix*, *Roegneria*, *Sitanion*) {reticulate}, *Eremopyrum*, *Festucopsis*, *Henrardia*, *Heteranthelium*, *Hordelymus* {reticulate}, *Hordeum* (syn. – *Critesion*), *Kengyilia* {reticulate}, *Leymus* (syn. – *Aneurolepidium*, *Eremium*, *Macrohystrix*, *Microhystrix*) {reticulate}, *Pascopyrum* {reticulate}, *Peridictyon*, *Psathyrostachys*, *Pseudoroegneria*, *Secale*, *Stenostachys* {reticulate}, *Taeniatherum*; (*Triticum* subclade): *Aegilops*, *Amblyopyrum*, *Dasypyrum*, *Thinopyrum* {reticulate}, *Triticum* {reticulate}.

"PACMAD" clade

{Sánchez-Ken & Clark, 2010; also known as PACC (Davis & Soreng, 1993), PACCAD (GPWG, 2001), or PACCMAD (Sánchez-Ken et al. 2007)} {Cotton et al. 2015 resolve Panicoideae at the base of PACMAD and Aristidoideae as sister to sister to CMAD but a basal position for Aristidoideae was resolved by Teisher (2016, 2017) and others, see also Burke et al. 2016}

subfamily **Aristidoideae** Caro [1982]:

tribe **Aristideae** C.E. Hubb. [1960]: *Aristida* {C_4, one C_3}, *Sartidia* {C_3}, *Stipagrostis* {C_4}.

subfam. **Panicoideae** A. Braun [1864] (syn. – Andropogonoideae Rouy [1913], Centothecoideae Soderst. [1981]; Andropogineae Burmeist. [1837, unranked], Paniceae Burmeist. [1837, unranked], Paniceae Link [1827, unranked], Rottboelliaceae Burmeist. [1837, unranked], Panicinae Horan. [1847 {rank tribe or subfam.?}]):

incertae sedis {clade at base of Panicoideae; fide Teisher 2017}: *Alloeochaete*, *Dichaetaria*.

incertae sedis: Chandrasekharania {C_3} {treated in Arundinellae by Clayton & Renvoize, 1986}.

tribe **Thysanolaeneae** C.E. Hubb. [1934] {possibly better as subtribe within Centotheceae} {C_3}: *Thysanolaena*.

tribe **Cyperochloeae** L. Watson & Dallwitz ex Sánchez-Ken & L.G. Clark [2010] (syn. – Cyperochloeae L. Watson & Dallwitz [1992, nom. nud.]) {possibly better as subtribe within Centotheceae} {C_3}: *Cyperochloa*, *Spartochloa*.

tribe **Centotheceae** Ridl. [1907] (subtribe Centothecinae Benth. [1881]) {C_3}: *Centotheca*, *Megastachya*.

tribe **Chasmanthieae** W.V. Br. & B.N. Smith ex Sánchez-Ken & L.G. Clark [2010] {C_3}: *Chasmanthium* (syn. – *Gouldochloa*, *Bromuniola*).

tribe **Zeugiteae** Sánchez-Ken & L.G. Clark [2010] (syn. – subtribe Zeugitinae Caro [1982]) {sister to Chasmanthieae} {C_3}: Chevalierella, *Lophatherum*, *Orthoclada*, *Zeugites* (syn. – Calderonella, *Pohlidium*).

Indigenous Ranges: Africa, Australasia, Eurasia, Western Hemisphere, Widespread.

tribe **Steyermarkochloeae** Davidse & R.P. Ellis [1984] {DNA places with Chasmanthieae s.l. or Tristachyideae, the placement remains tentative} {C_3}: *Arundoclaytonia*, *Steyermarkochloa*.

tribe **Tristachyideae** Sánchez-Ken & L.G. Clark [2010] (syn. – subtribe Trichopteryginae Jacq.-Fél. [1962, nom. inval.]) {C_4}: *Danthoniopsis*, Dilophotriche, *Gilgiochloa*, *Loudetia*, *Loudetiopsis*, *Trichopteryx*, *Tristachya*, *Zonotriche*.

tribe **Gynerieae** Sánchez-Ken & L.G. Clark [2001] {C_3}: *Gynerium*.

tribe **Lecomtelleae** Pilg. ex Potztal [1957] (syn. – subtribe Lecomtellinae Pilg. [1940]): *Lecomtella* {possibly sister to Panicodae + Andropogonodae} {C_3}.

Supertribe **Panicodae** L. Liu [1980]:

tribe **Paniceae** R.Br. [1814] (syn. – Cenchreae Rchb. [1828, unranked], Digitarieae J.J. Schmitz & Regel[1841], Paniceae Horan. [1847{rank tribe or subtribe?}], Spinificeae Dumort. [1829], Melinideae Hitchc. [1920], Boivinelleae A. Camus [1925], Anthephoreae Pilg. ex Potztal [1957], Trachideae Pilg. Ex Potztal [1957], Cyphochlaeneae Bosser [1965], Neurachneae S.T. Blake [1972]):

incertae sedis: Chloachne {C_3}, Hydrothauma {C_3}, *Hylebates* {C_4}, *Kellochloa* {C_3}, Oryzidium {C_4}, *Sacciolepis* {C_3}, Thedachloa, *Trichanthecium* {C_3}.

subtribe **Anthephorinae** Benth. [1881] (syn. – Digitariinae Butzin [1972]; Trachidinae Pilg. [1940, nom. inval.], Trachydastrae Stapf [1917]): *Anthephora* {C_4}, *Chaetopoa* {C_4}, *Chlorocalymma* {C_4}, *Digitaria* (syn. – *Megaloprotachne*) {C_4}, Taeniorhachis {$C_4^?$}, *Tarigidia* {C_4}, Thyridachne {C_3}, *Trachys* {C_4}.

subtribe **Dichantheliinae** Zuloaga [2014] {C_3}: *Adenochloa*, *Dichanthelium*.

subtribe **Boivinellinae** Pilg. [1940]: *Acroceras* {C_3}, *Alloteropsis* (syn. – Coridochloa) {mixed C_3 C_4}. *Amphicarpum* {C_3}, *Chasechloa*, *Cyphochlaena* {C_3}, Cyrtococcum {C_3}, *Echinochloa* {C_4}, *Entolasia* {C_3}, *Lasiacis* {C_3}, *Mayariochloa* {C_4}, *Morronea* {C_3}, *Microcalamus* {C_3}, *Oplismenus* {C_3}, Ottochloa {C_3}, *Parodiophyllochloa* {C_3}, *Poecilostachys* {*p.p*} {C_3}, *Pseudechinolaena* {C_3}, *Setiacis* {segregate of *Acroceras*, GenBank DNA odd}.

subtribe **Neurachninae** Clayton & Renvoize [1986]: *Ancistrachne* {C_3}, *Calyptochloa* {C_3}, *Cleistochloa* {C_3}, *Neurachne* {C_4 and mixed C_3 C_4}, *Paraneurachne* {C_4}, *Thyridolepis* {C_3}.

incertae sedis {clade of ambiguous placement among latter set of subtribes}: *Homopholis* (syn. – *Walwhalleya* {C_4}) {C_3 and C_4}.

subtribe **Melinidinae** Stapf [1917, as Melinidastrae] (syn. – Brachiariinae Butzin [1970], Thuarinae Ohwi [1942], Tristegininae Harv. [1869, nom. illeg.]; Melinidinae Pilg. [1940]) {C_4}: *Chaetium*, *Eccoptocarpha*, *Eriochloa*, Leucophrys, *Megathyrsus* (syn. – , *Pseudobrachiaria*?), *Melinis* (syn. – *Mildbraediochloa*, *Rhynchelytrum*), Moorochloa, *Rupichloa*, *Scutachne*, *Thuarea* Tricholaena, Urochloa (syn. – *Brachiaria* s.s), *Yvesia*.

subtribe **Panicinae** Fr. [1835]: *Louisiella* {C_4}, *Panicum* (syn. – *Arthragrostis* {C_4}, *Yakirra* {C_4}) {all C_4, some C_3 & C_4?}.

subtribe **Cenchrinae** Dumort. [1829] (syn. – Pennisetinae Rchb. [1828, unranked], Setariinae Dumort. [1829]; Pseudoraphidinae Keng & Keng f. [1990], Snowdeniinae Butzin [1972], Spinificinae Owhi [1942], Uranthoeciinae Butzin [1970], Xerochloinae Butzin [1970]): *Acritochaete* {C_3}, *Alexfloydia* {C_4}, Cenchrus (syn. – Cenchropsis, *Echinaria* Heist. ex Fabr., *Kikuyuochloa*, *Nastus* Lunell, *Odontelytrum*, Pennisetum, *Snowdenia*) {C_4}, Chamaeraphis {C_4}, *Dissochondrus* {Hawaii} {C_4}, *Holcolemma* {C_3}, *Hygrochloa* {C_4}, *Ixophorus* {C_4}, Paractaenum, {C_4} *Paratheria* {C_4}, *Plagiosetum* {C_4}, *Pseudochaetochloa* {C_4}, *Pseudoraphis* {C_4}, *Setaria* (syn. – Camusiella, *Paspalidium*) {C_4}, *Setariopsis* {C_4}, *Spinifex* {C_4}, Stenotaphrum {C_4}, *Stereochlaena* {C_4}, *Streptolophus* {C_4}, *Uranthoecium* {C_4}, *Whiteochloa* {C_4}, *Xerochloa* {C_4}, *Zuloagaea* {C_4}, *Zygochloa* {C_4}.

supertribe **Andropogonodae** L. Liu [1980] {Paspaleae + Arundinelleae + Andropogoneae}:

tribe **Paspaleae** J. Presl [1830] (syn. – Arthropogoneae Pilg. ex Butzin [1972]):

incertae sedis: *Reynaudia* {basal to the other subtribes} {C_4}.

subtribe **Paspalinae** Griseb. [1846] (syn. – Paspalinae Griseb.[1853], Paspalidinae Keng & Keng f, ex S.L. Chen & Y.X. Jin [1984], Reimarochloinae Caro [1982]): *Aakia* {C_4}, *Acostia* {C_4}, *Anthaenantia* (syn. –*Leptocoryphium*) {C_4}, *Anthaenantiopsis* {C_4}, *Axonopus* (syn. – *Centrochloa*, *Ophiochloa*) {C_4}, *Baptorhachis* {C_4}, *Echinolaena* {C_3}, *Gerritea* {C_3}, *Hildaea* {C_3}, *Hopia* {C_4}, Ichnanthus {C_3}, *Ocellochloa* {C_3}, *Oedochloa* {C_3}, *Osvaldoa* {C_4}, *Paspalum* (syn. – *Thrasya*, *Thrasyopsis*, *Reimarochloa*, *Spheneria*) {C_4}, *Renvoizea* {C_3}, *Streptostachys* {C_3}.

Indigenous Ranges: Africa, Australasia, Eurasia, Western Hemisphere, Widespread.

subtribe **Otachyriinae** Butzin [1970]: *Hymenachne* (syn. – *Aconisia*, *Dallwatsonia*) {C_3}, *Otachyrium* {C_3}, *Plagiantha* {C_3}, *Rugoloa* {C_3}, *Steinchisma* (syn. – Cliffordiochloa, Fasciculochloa) {C_3 and mixed C_3 C_4}.

subtribe **Arthropogoninae** Butzin [1972]: *Achlaena* {C_4}, *Altoparadisium* {C_4}, *Apochloa* {C_3}, *Arthropogon* {C_4}, *Canastra* {C_3}, *Coleataenia* (syn. – *Sorengia*) {C_4}, *Cyphonanthus* {C_4}, *Homolepis* {C_3 and mixed C_3 C_4?}, *Keratochlaena* (syn. – *Sclerochlamys*) {C_4}, *Mesosetum* {C_4}, *Oncorachis* {C_4}, *Oplismenopsis* {C_3}, *Phanopyrum* {C_3}, *Stephostachys* {C_3}, *Tatianyx* {C_4}, *Triscenia* {C_3}.

tribe **Arundinelleae** Stapf [1898] (syn. – tribe Garnotieae Tateoka [1957]; subtribe Arundinellinae Honda [1930], Garnotiinae Pilg. [1956]): *Arundinella* {C_4}, *Garnotia* {C_4}, *Jansenella* {C_3}.

tribe **Andropogoneae** Dumort. [1824] (syn. – Sacchareae Dumort. [1824], Coiceae Nakai [1943], Euchlaeneae Nakai [1943], Imperateae Godr. & Gren. [1855], Maydeae Dumort. [1824, nom. illeg.], Ophiureae Dumort. [1824], Rottboellieae Kunth [1829], Saccharinae Rchb. ex Horan. [1847{rank tribe or subfam.?}], Tripsaceae C.E. Hubb. ex Nakai [1943], Zeeae Rchb. [1828, unranked], Zeeae Nakai [1943]) {Papers by Hodkinson et al., 2002, Skendzic et al., 2007, and Estep, et al.2014, portend lots of problems for classification within this tribe} {all C_4}:

incertae sedis: *Apluda* {subtribe Apludinae Hook.f. [1896]) entangled with Saccharinae}, *Chrysopogon* (syn. – *Vetiveria*) {*Chrysopogon* and *Thelepogon* appear to be sisters and isolated from other tribes}, *Eulaliopsis*, *Microstegium* (syn. – Ischnochloa), *Sehima*, *Thelepogon*.

subtribe **Arthraxoninae** Benth. [1881]: *Arthraxon*.

subtribe **Tripsacinae** Dumort. [1829] (syn. – Maydinae Harv. [1868, nom. illeg.], Vossiastae Stapf [1917], Zeinae Tzvelev [1968]): *Elionurus* {orth. var. *Elyonurus*}, *Oxyrhachis*, *Rhytachne*, *Tripsacum*, *Vossia*, *Urelytrum*, *Zea* (syn. – *Euchlaena*).

subtribe **Chionachninae** Clayton [1981]: *Chionachne*, *Cyathorhachis*, *Polytoca*, *Sclerachne*, Trilobachne.

subtribe **Coicinae Rchb. ex** Clayton & Renvoize [1986] (syn. – Coicinae Rchb. [1828, unranked]) {Apparently sister to Rottboelliinae}: *Coix*.

subtribe **Rottboelliinae** J. Presl [1830] {probably polyphyletic}: *Chasmopodium*, *Eremochloa*, *Glyphochloa*, *Hackelochloa*, *Hemarthria*, *Heteropholis*, Jardinea {a segregate of *Phacelurus*}, Lasiurus, Loxodera, *Manisuris*, *Mnesithea*, *Ophiuros*, *Phacelurus* (syn. – Thyrsia) {apparently polyphyletic}, Ratzeburgia, *Rottboellia* (syn. – *Coelorachis*), *Thaumastochloa*.

subtribe **Ischaeminae** J. Presl [1830] (syn. – Dimeriinae Hack ex C.E. Hubb. [1934], Dimeriinae Hack [1887, nom. nud.]): *Andropterum*, *Dimeria*, *Ischaemum*, *Kerriochloa*, Nanooravia {possibly = *Dimeria*}, Pogonachne, Triplopogon.

subtribe **Germainiinae** Clayton [1972] (syn. – Apocopidinae Keng [1939, nom. inval.]): *Apocopis*, *Germainia*, Lophopogon, *Pogonatherum*.

subtribe **Saccharinae** Griseb. [1846] (syn. – Amphilophiastrae Stapf [1917], Erianthinae Hack. [1883]; Polliniastrae Stapf [1917], Sorghinae Stapf [1917] as Sorghastrae; Sorgha Bluff, Nees & Schauer [1836, unranked]): Agenium, Asthenochloa, *Cleistachne*, *Erianthus*, *Eriochrysis* (syn. – Leptosaccharum), *Euclasta* (syn. – Indochloa), *Eulalia* s.s. {s.l. is apparently polyphyletic}, Hemisorghum { = *Sorghum*?}, Homozeugos, *Imperata*, *Lasiorhachis*, *Leptatherum* (syn. – *Polliniopsis*), *Miscanthidium*, *Miscanthus* (syn. – Diandranthus, Rubimons, Triarrhena, Tenacistachya), *Narenga*, *Polytrias*, Pseudodichanthium, *Pseudopogonatherum*, *Pseudosorghum* {= *Eulalia*?}, *Saccharum* s.s., *Sclerostachya*, Veldkampia, *Sorghastrum*, *Sorghum* (syn. – *Sarga*, *Vacoparis*), *Tripidium* {seems related to *Imperata* and *Erianthus* s.s., probably reticulate}, *Trachypogon*.

subtribe **Andropogoninae** J. Presl [1830] (syn. – Anadelphiastrae Stapf [1917], Anthistiriinae J. Presl [1830], Bothriochloinae Keng [1939, nom. inval.], Heteropogonastrae Stapf [1917], Hyparrheniastrae Stapf [1917], Hypogyniastrae Stapf [1917], Schizachyriastrae Stapf [1917], Themedastrae Stapf [1917]): Anadelphia, *Andropogon* (syn. – Hypogynium), *Bhidea*, *Bothriochloa*, *Capillipedium*, Clausospicula, *Cymbopogon*, Dichanthium, *Diectomis*, *Diheteropogon*, Elymandra, *Eremopogon*, *Exotheca*, *Heteropogon*, *Hyparrhenia*, *Hyperthelia*, *Iseilema*, *Lakshimia*, *Monocymbium*, Parahyparrhenia, Pseudanthistiria, *Schizachyrium*, Spathia, *Spodiopogon* (syn. – Eccoilopus), *Themeda*.

subfamily **Arundinoideae** Kunth ex Beilschm. [1833] (syn. – tribe Arundinoideae Tateoka [1957, isonym], Phragmitoideae Parodi [1958, nom. inval.], Phragmitoideae Parodi ex Caro [1982]; Arundinaceae Burmeist. [1837, unranked], {sister to Micrairoideae} {C_3}:

tribe **Arundineae** Dumort. [1824] (syn. – tribe Amphipogoneae L. Watson & T.D. Macfarl. [2002]; subtribe Arundininae Miq. [1857]): *Amphipogon* (syn. – *Diplopogon*), *Arundo*, *Dregeochloa* {fide Teisher 2017}, *Monachather*.

Indigenous Ranges: Africa, Australasia, Eurasia, Western Hemisphere, Widespread.

tribe **Molinieae** Jirásek [1966]:

incertae sedis: Leptagrostis, Piptophyllum, *Zenkeria*. {Hardion et al. in press, indicate this is near *Micraira*}

subtribe **Crinipinae** Conert, [1961] {emend Linder et al. (1997) on the Crinipoid group; emend Teisher here}: *Crinipes*, *Elytrophorus*, *Styppeiochloa*, and *Pratochloa* (syn. – *Eragrostis walteri*).

subtribe **Moliniinae** Ohwi [1941] (syn. – Phragmiteae Horan. [1847 {rank tribe or subtribe?}] {emend Teisher here}: *Hakonechloa*, *Molinia*, *Moliniopsis*, *Phragmites*.

subfamily **Micrairoideae** Pilg. [1956] {sister to Arundinoideae}:

tribe **Micraireae** Pilg. [1956] {C_3}: *Micraira*.

tribe **Eriachneae** Eck-Borsboom [1980]: *Eriachne* (syn. – Massia, *Pheidochloa* {fide Teisher 2016}) {C_4}.

tribe **Isachneae** Benth. [1881] (syn. – tribe Hubbardieae C.E. Hubb. [1960]; subtribe Isachninae Stapf [1898]) {C_3}: Coelachne, Heteranthoecia, Hubbardia, Isachne, Limnopoa, Sphaerocaryum.

subfamily **Danthonioideae** H.P. Linder & N.P. Baker [2001] {sister to Chloridoideae} {C_3}:

incertae sedis: Danthonidium.

tribe **Danthonieae** Zotov. [1963] (syn. – Cortaderieae Zotov. [1963]; subtribe Cortaderinae Conert [1961], Danthoniinae Fr. [1835]): *Austroderia*, *Capeochloa*, *Chaetobromus*, *Chimaerochloa*, *Chionochloa*, *Cortaderia* (syn. – *Lamprothyrsus*), *Danthonia*, *Geochloa*, *Merxmuellera*, *Notochloe*, *Pentameris* (syn. – *Pentaschistis*, *Poagrostis*, *Prionanthium*), *Phaenanthoecium* {fide Teisher 2017}, *Plinthanthesis*, *Pseudopentameris*, *Rytidosperma* (syn. – *Monostachya*, *Notodanthonia*, *Pyrrhanthera*), *Schismus* (syn. – *Karroochloa*), *Tenaxia*, *Tribolium*.

subfamily **Chloridoideae** Kunth ex Beilschm. [1833] (syn. – tribe Eragrostoideae Pilg. [1956]; Chlorideae Burmeist [1837, unranked], Pappophorae Burmeist. [1837, unranked]) {sister to Danthonioideae}:

incertae sedis: Gossweilerochloa, Indopoa, Lepturopetium, Myriostachya, Pogonochloa, Pseudozoysia, Silentvalleya.

tribe **Centropodieae** P.M. Peterson, N.P. Barker & H.P. Linder [2011]: *Centropodia* {C_4}, *Ellisochloa* {C_3}.

tribe **Triraphideae** P.M. Peterson [2010] (syn. – subtribe Triraphidinae Stapf [1917]) {C_4}: *Habrochloa*, *Neyraudia*, *Triraphis* (syn. – *Nematopoa*).

tribe **Eragrostideae** Stapf [1898] (syn. – supertribe Eragrostodae L. Liu [1980]; tribe Unioleae Roshev. ex C.S. Campb. [1985]) {C_4}:

subtribe **Cotteinae** Reeder [1965]: *Cottea*, *Enneapogon*, *Kaokochloa*, Schmidtia.

subtribe **Eragrostidinae** J. Presl [1830]: *Cladoraphis*, *Eragrostis* (syn. – *Acamptoclados*, *Catalepis*, *Diandrochloa*, *Ectrosia*, *Ectrosiopsis*, *Harpachne*, *Heterachne*, *Neeragrostis*, *Planichloa*, *Pogonarthria*, *Psammagrostis*, *Viguierella*), Richardsiella, Steirachne, *Stiburus* (syn. – *Triphlebia* Stapf).

subtribe **Unioliinae** Clayton [1982]: *Entoplocamia*, *Fingerhuthia*, *Tetrachaete*, *Tetrachne*, *Uniola* (syn. – Leptochloopsis).

tribe **Zoysieae** Benth. [1881] (syn. – Spartineae Steele [1847], Sporoboleae Stapf [1898]) {C_4}:

subtribe **Sporobolinae** Benth. [1881] (syn. – Crypsidinae Maire & Weiler [1953, nom. inval.], Spartininae Maire & Weiler [1953, nom. inval.]): *Psilolemma*, *Sporobolus* (nom. cons.; syn. – *Calamovilfa*, *Crypsis*, *Heleochloa*, *Spartina*, *Thellungia*).

subtribe **Zoysiinae** Benth. [1878]: *Urochondra*, *Zoysia*.

tribe **Cynodonteae** Dumort. [1824] (syn. – Aeluropodieae Nevski ex Bor [1965], Chlorideae Rchb. [1828, unranked], Chlorideae Trin. [1824, nom. illeg. superfl, later than Dumort., and included *Cynodon*], Jouveae Pilg. [1956], Leptureae Dumort. [1824, as Lepiureae], Monermeae C.E. Hubb. [1948, nom. inval.], Nazieae Hitchc. [1920, nom. illeg.], Pappophoreae Kunth [1829], Perotideae C.E. Hubb. [1960], Pommereulleae Bor [1960], Trageae Hitchc. [1927], Triodieae S.W.L. Jacobs [2004] {C_4}:

incertae sedis: Kampochloa, *Lepturidium*, *Sclerodactylon*, Vietnamochloa.

Indigenous Ranges: Africa, Australasia, Eurasia, Western Hemisphere, Widespread.

subtribe **Aeluropodinae** P.M. Peterson [2010] (syn. – Aeluropodinae Jacq.-Fél. [1962, nom. inval.]): *Aeluropus*, *Odyssea* s.s. {reticulate}.

subtribe **Dactylocteniinae** P.M. Peterson, Romasch. & Y. Herrera [2016]: *Acrachne* {reticulate}, *Brachychloa*, *Dactyloctenium*, *Neobouteloua*.

subtribe **Eleusininae** Dumort. [1829] (syn. – Astreblinae Clayton [1982], Chloridinae J. Presl [1830], Cynodontinae Tzvelev [1968], Diplachninae Rouy [1913], Lepturinae Benth. [1881], Monerminae Janch. [1953, nom. nud.], Pommereullinae Potztal [1969]): *Afrotrichloris*, *Apochiton*, *Astrebla*, *Austrochloris*, *Chloris* (syn. – *Lintonia*, *Ochthochloa*), *Chrysochloa*, *Coelachyrum* (syn. – *Coelachyropsis*), *Cynodon*, (syn. – *Brachyachne*) *Daknopholis*, *Dinebra* {reticulate} (syn. – *Drake-Brockmania*, *Heterocarpha*, *Oxydenia*), *Diplachne*, *Disakisperma* (syn. – *Cypholepis*), *Eleusine*, *Enteropogon*, *Eustachys*, *Harpochloa*, *Leptochloa* (syn. – *Trichloris*), *Lepturus*, *Micrachne*, *Microchloa* (syn. – *Rendlia*), *Neostapfiella*, *Oxychloris*, *Pommereulla*, *Rheochloa*, *Schoenefeldia*, *Stapfochloa*, *Tetrapogon* (syn. – *Saugetia*).

subtribe **Orcuttiinae** P.M. Peterson & Columbus [2007]: *Neostapfia*, *Orcuttia* (syn. – *Tuctoria*).

subtribe **Orininae** P.M. Peterson, Romasch. & Y. Herrera [2016]: *Cleistogenes* (syn. – *Kengia*), *Orinus*.

subtribe **Pappophorinae** Dumort. [1829] (syn. – Tridentinae Keng & Keng f. [1960]): *Neesiochloa*, *Pappophorum*, *Tridens* s.s. (syn. – *Antonella*).

subtribe **Triodiinae** Benth. [1881]: *Triodia* (syn. – *Monodia*, *Plectrachne*, *Symplectrodia*).

subtribe **Tripogoninae** Stapf [1917]: *Desmostachya*, *Eragrostiella*, *Halopyrum*, *Melanocenchris*, *Oropetium*, *Tripogon*, *Tripogonella*.

supersubtribe **Boutelouodinae** P.M. Peterson & Romasch. [2017] {Boutelouinae + Hilariinae + Monanthochloinae + Muhlenbergiinae + Scleropogoninae + Traginae}:

incertae sedis: *Allolepis*, *Jouvea*, *Kalinia*, *Sohnsia* {each genus has recently been placed in the following montotypic subtribe: Allolepiinae, Jouveinae, Kaliniinae, and Sohnsiinae (Peterson et al., 2017)}.

subtribe **Boutelouinae** Stapf [1917]: *Bouteloua* (syn. – *Buchloe*, *Buchlomimus*, *Cathestecum*, *Chondrosum*, *Cyclostachya*, *Griffithsochloa*, *Opizia*, *Pentarrhaphis*, *Pringleochloa*, *Soderstromia*).

subtribe **Hilariinae** P.M. Peterson & Columbus [2007]: *Hilaria* (syn. – *Pleuraphis*).

subtribe **Monanthochloinae** Pilg. ex Potztal [1969] (syn. – Distichlinae Parodi [1946, nom. nud.]): *Distichlis* (syn. – *Monanthochloe*, *Reederochloa*).

subtribe **Muhlenbergiinae** Pilg. [1956] (syn. – Lycurinae Pilg. [1956]): *Muhlenbergia* (syn. – *Aegopogon*, *Bealia*, *Blepharoneuron*, *Chaboissaea*, *Lycurus*, *Pereilema*, *Redfieldia*, *Schaffnerella*, *Schedonnardus*).

subtribe **Scleropogoninae** Pilg. [1956] (syn. – Munroinae Parodi ex P.M. Peterson [1995]): *Blepharidachne*, *Dasyochloa*, *Erioneuron*, *Munroa*, *Scleropogon*, *Swallenia*.

subtribe **Traginae** P.M. Peterson & Columbus [2007] (syn. – Lappagininineae Link ex Endl. [1830, nom. illeg.], Tragineae Rchb. [1845, unranked]): *Monelytrum*, *Orthacanthus*, *Pogononeura*, *Polevansia*, *Tragus*, *Willkommia* (syn. – *Willbleibia*).

supersubtribe **Gouiniodinae** P.M. Peterson & Romasch. [2017] {Cteniinae + Farragininae + Gouiniinae + Hubbardochlinae + Perotidinae + Trichoneurinae + Zaqiqahinae}:

subtribe **Cteniinae** P.M. Peterson, Romasch. & Y. Herrera [2014]: *Ctenium*.

subtribe **Farragininae** P. M. Peterson, Romasch. & Y. Herrera [2014]: *Craspedorhachis*, *Farrago*.

subtribe **Gouiniinae** P.M. Peterson & Columbus [2007]): *Gouinia*, *Schenckochloa*, *Tridentopsis*, *Triplasiella*, *Triplasis*, *Vaseyochloa*.

subtribe **Hubbardochloinae** Auquire [1980] (syn. – Gymnopogoninae P. M. Peterson, Romasch. & Y. Herrera [2014]): *Bewsia*, *Decaryella*, *Dignathia*, *Gymnopogon*, *Hubbardochloa*, *Leptocarydion*, *Leptothrium* (syn. – *Latipes*), *Lophacme*.

subtribe **Perotidinae** P.M. Peterson, Romasch. & Y. Herrera [2014]: *Mosdenia*, *Perotis* (syn. – *Lopholepis*, *Toliara*), *Trigonochloa*.

subtribe **Trichoneurinae** P.M. Peterson, Romasch. & Y. Herrera [2014]: *Trichoneura*.

subtribe **Zaqiqahinae** P.M. Peterson, Romasch. & Y. Herrera [2016]: *Zaqiqah*.

Indigenous Ranges: Africa, Australasia, Eurasia, Western Hemisphere, Widespread.