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Genera of New World Eragrostideae (Poaceae: Chloridoideae)

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ABSTRACT

Peterson, Paul M., Robert D. Webster, and Jesus Valdes-Reyna. Genera of New World Eragrostideae (Poaceae: Chloridoideae). *Smithsonian Contributions to Botany,* number 87, 50 pages, 1 table. 1997.—A comprehensive study of generic concepts, evaluation of taxonomic characters, and a revised classification is presented for the Eragrostideae of the New World. An original set of data, consisting of 88 characters recorded for 38 genera, was collected and analyzed to produce a dichotomous key, a synoptic key, and comparative descriptions. A detailed discussion is presented on the characters and the distribution of the character states. Remarks on the morphology, taxonomic history, and relationships among the species within each genus and among the genera of Eragrostideae are given. A new combination is proposed for *Neeragrostis contrerasii.*

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Contents

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Introduction

The Eragrostideae includes approximately 80 genera and 1000 species, or about one-tenth of all grasses. These taxa are primarily distributed in the subtropical to tropical regions in arid climates, with centers of distribution in the savannahs of southern Africa and north central Mexico. In the New World, or Western Hemisphere, this study recognizes 38 genera and about 427 species, with the highest concentration in north central Mexico and the southwestern United States.

Within the Eragrostideae there is considerable variation in morphology, anatomy, and cytology (Peterson, 1988, 1989; Peterson et al., 1989, 1993, 1995; Peterson and Annable, 1990, 1991, 1992; Valdes-Reyna and Hatch, 1991; Peterson and Herrera A., 1996). It is difficult, if not impossible, to select diagnostic characteristics that exclusively delimit the Eragrostideae from other tribes in the Chloridoideae; however, the tribe commonly has paniculate inflorescences (occasionally racemose), laterally compressed or terete (rarely dorsiventral) spikelets, lemmas 3-nerved (occasionally 1-nerved or more than 3-nerved), and disarticulation typically above the glumes (Peterson et al., 1995).

In the *Flora Capensis,* Stapf (1898) first used the tribal name Eragrostideae (Eragrosteae), where he placed four genera: *Desmostachya* (Hook.f.) Stapf, *Diplachne* Beauv. (= *Leptochloa* P. Beauv.), *Eragrostis* Wolf, and *Pogonarthria* Stapf. Stapf (1898:316) used the following characteristics to distinguish this tribe: "Spikelets variously panicled sometimes spicate or subspicate. Florets usually numerous and far exerted from glumes. Glumes and valves [lemmas] rather similar in appearance. Valves [lemmas] membranous to chartaceous, very often olive green or olive grey, entire or 3-cleft, 3-nerved; nerves evanescent above or excurrent into bristles [awns]; side-nerves submarginal, glabrous or pubescent or finely ciliate below. Paleas often persistent or subpersistent." Hubbard (1934) expanded the number of genera in the Eragrostideae to 38 and added the following characteristics, among others, to the circumscription: spikelets usually with two or more fertile florets, disarticulation above the glumes, and spikelets laterally compressed. Pilger (1956) increased the number of taxa in the Eragrostideae to include 53 genera in six subtribes. Five of the six Eragrostideae subtribes (Eragrostinae, Lycurinae, Muhlenbergiinae, Scleropogoninae, and Sporobolinae) used by Pilger contain indigenous New World genera. The following characteristics were used by Pilger to differentiate the Eragrostideae from five other tribes in his subfamily Eragrostoideae (= Chloridoideae, in part): spikelets in loose or contracted panicles, these often compounded in racemes or spikes, branches spirally inserted; empty glumes usually shorter than the lemma; upper floret in many-flowered spikelets often sterile; lemma usually 1–3-nerved, membranous to leathery; apex of the lemma entire, crenate, toothed, or lobed, if artistate, the awn arising from the midnerve; lemma nerves often hairy; stamens 2–3; fruits usually loosely surrounded by the palea, often becoming free; pericarp thin, often loosening and leaving the seeds naked; hilum small, basal; base chromosome number 10 or 8. A comparison of our classification of the Eragrostideae with that of Hitchcock and Chase (1951), Pilger (1954, 1956), Gould and Shaw (1983), Clayton and Renvoize (1986), and Watson and Dallwitz (1992) is given in Peterson et al., 1995.

It seems appropriate initially to make a general statement concerning the relative number of species in the New World genera of the Eragrostideae on a world-wide basis. Of the species currently recognized in the tribe, about 67% are contained in the three largest genera (*Eragrostis* (350),

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Muhlenbergia Schreb. (160), and *Sporobolus* R. Br. (160)). Eleven (about 29%) of the New World genera are monotypic. These include *Allolepis* Soderstr. & H.F. Decker, *Bealia* Scribn., *Dasyochloa* Willd. ex Rydb., *Neesiochloa* Pilg., *Redfieldia* Vasey, *Reederochloa* Soderstr. & H.F. Decker, *Scleropogon* Phil., *Sohnsia* Airy Shaw, *Swallenia* Soderstr. & H.F. Decker, *Tetrachne* Nees, and *Vaseyochloa* Hitchc. Fourteen (37%) of the New World genera contain two to four species. These include *Blepharidachne* Hack. (4), *Blepharoneuron* Nash (2), *Calamovilfa* (A. Gray) Hack. (4), *Chaboissaea* E. Fourn. (4), *Erioneuron* Nash (3), *Jouvea* E. Fourn. (2), *Lycurus* Kunth (3), *Monanthochloë* Engelm. (2), *Neeragrostis* Bush (2), *Neyraudia* Hook. (2), *Pereilema* C. Presl (4), *Steirachne* Ekman (2), *Triplasis* P. Beauv. (2), and *Uniola* L. (4). Therefore, 66% of the New World genera encompass about 6% of the species world wide. Five New World genera have five to 10 species. These include *Crypsis* W.T. Aiton (8), *Distichlis* Raf. (6), *Eleusine* Gaertn. (9), *Munroa* Torr. (5), and *Trichoneura* Andersson (7). The remaining five New World genera (*Dactyloctenium* Willd. (13), *Gouinia* E. Fourn. (12), *Leptochloa* (40), *Tridens* Roem. & Schult. (17), and *Tripogon* Roem. & Schult. (30)) have 11 to 40 species.

The objectives of this paper are to provide a synopsis of the 38 native and introduced New World genera of the Eragrostideae and to provide keys in English and Spanish for ease in determination. In addition to the refined generic concepts provided, remarks on nomenclature, number of species in each genus, and habitat preference have been included. A provisional classification recognizing seven subtribes is given to elucidate probable phylogenetic relationships among the New World genera.

Materials and Methods

The DELTA system (Dallwitz, 1974, 1980) was used in the collection and analysis of the taxonomic data presented in this paper. Initially, an ordered sequence of 89 characters and relevant character states was produced to account for all significant variation at the generic level for the New World Eragrostideae. Data for each of the characters were gathered in DELTA format on the 38 recognized genera from observations of all available specimens or from representative (20–50) specimens from each genus. All species of the smaller genera (1–15 species) or representative specimens of larger genera (more than 15 species) were examined. Recorded data were checked against specimens to insure correctness and uniformity in recording characters. These data were analyzed by the DELTA programs and were used for the production of the identification key, synoptic key, description of the tribe, generic descriptions, and some of the information contained in the remarks section for each genus. For additional information concerning these methods see Webster (1988), Webster and Valdes-Reyna (1988), Webster et al. (1989), and Webster (1992a, 1992b).

A reliability weight was given to each character and was used for the production of the identification key and for the selection of characters for the diagnosis within the descriptions. Assessment of reliability was based on the degree of consistency within a genus and on how well the character could be applied. For example, if a character was easy to determine and was consistent within a genus then it was given a higher reliability than a character that was difficult to determine and was variable between the species of the genus. This weight, the settings of other DELTA parameters (i.e., RBASE, ABASE, VARYWT, etc.), and how well the characters separated taxa into equal groups were important parameters influencing the design of the key and the selection of diagnostic characters. These weights, from five (relatively low) to nine (high), are given in the synoptic key following the feature description. For example, character 17 (ligule type) was given the relative weight of 8 and would be considered more taxonomically significant than a 7-weighted character and of less importance than a 9-weighted character.

The DELTA program KEY was used as an experimental tool to automatically generate numerous key designs. After experimentation and analysis a final key design was selected that satisfied the authors' concepts of character significance and placement of the genera, together with the program KEY requirements of mechanical efficiency and correctness. This character list was translated into Spanish for the production of the Spanish key. Finally, the keys were extensively edited to enhance the practical application of the couplets.

The data were converted into INTKEY format for database interrogation and information retrieval. One of the numerous forms of information retrieval is exemplified by the synoptic key for the characters and genera. Initially, an alphabetic list in numeric order is given for the genera and is followed by an ordered sequence of 88 taxonomic characters. This character sequence is identical to that used in the descriptions. Each character consists of the feature description (e.g., plants, spikelets, etc.) followed by the character states used in this study. Each character state is followed by the numbers of genera exhibiting that state. The numbers correspond to those in the list of genera. For example, in character one (plant sexuality), monoecious genera include *Blepharidachne* (species 3) and *Scleropogon* (species 27). The synoptic key is especially useful for understanding the distribution of taxa for the character states.

The description of the tribe was automatically generated by combining the data for all the recognized New World genera into a single description via INTKEY. In this description each character state is followed by a comment consisting of a whole number or a proportion that indicates the number of genera recorded for that state. For example, "plants hermaphroditic (30), dioecious (8)" indicates that 30 of the 38 genera are hermaphroditic, and eight of the 38 genera are dioecious. The statement "main axis glandular (4/37) or not glandular (34/37)" indicates that four of 37 genera have a glandular main axis, 34

of 37 genera have a nonglandular main axis. Evidently, for one genus this character does not apply. From the synoptic key we find that the inflorescence of *Monanthochloë* consists of a single spikelet and is neither a raceme nor a panicle; that is, the main axis does not exist and the character is inapplicable.

Generic descriptions were generated by CONFOR and then edited to enhance their aesthetic and scientific value. In these descriptions, characters are separated by semicolons, and commas are used where more than two character states apply. Additional information beyond that conveyed by the character list is treated as comments and is enclosed within parentheses. A period terminates a sequence of characters describing a primary feature. The descriptions are complete and are fully comparative. Any missing characters within a description are either data not applicable to the taxon or are information designated as implied. For example, if a genus lacks sterile florets then characters describing sterile florets will be inapplicable and will not occur in that description. Furthermore, character states designated as "implied" will not occur in the descriptions unless they are associated with additional information in the form of comments or other character states. Character states designated as implied are indicated within the synoptic key by an asterisk (*). An INTKEY analysis was performed to extract the diagnostic characters for each genus. The characters of this subset are underlined within each description. They are diagnostic in that the combination of these states is unique for the genus. For example, *Allolepis* is the only genus with the following subset of data: plants dioecious; ligule a ciliate membrane; florets 8–20 per spikelet; lemma 3-nerved. Selection of these characters by INTKEY was based on the identical parameters used in key production.

Each description is followed by a paragraph containing four distribution characters, including the distribution by continent, distribution for the political regions of North American and Mesoamerica, distribution for the geopolitical regions of the continental United States, and distribution for the countries of South America. Finally, a character is given as to whether the genus is native or introduced to the New World. Information on each genus is terminated by a "Remarks" section, which presents comments on relationships among the genera and on character similarities.

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The Characters and Their Variation

The purpose of this section is to present a discussion of the characters and character states applied in this study. Of the 88 characters initially selected, 21 describe the habit, 17 describe the inflorescence, and, other than distribution and chromosome number, the remaining characters describe various structures of the spikelets (i.e., general spikelet characters, glumes, rachilla, lemmas, paleas, and caryopses).

Plant sexuality (character 1) was recorded as hermaphroditic for plants with all perfect spikelets, dioecious for separate male and female plants, monoecious for separate male and female spikelets on the same plant, gynomonoecious for plants with pistillate and perfect spikelets, or andromonoecious for plants with staminate and perfect spikelets. The most common state for this character is hermaphroditic. The taxonomic significance of this character is the presence of the dioecious state, which is diagnostic for *Allolepis, Jouvea, Neeragrostis, Scleropogon,* and *Sohnsia. Scleropogon* is the only genus recorded to be either dioecious or monoecious. There are no genera exclusively monoecious, gynomonoecious, or andromonoecious. An assessment of whether the genera are annual or perennial (character 2) was based on gross morphological features. This character has limited taxonomic significance due to the wide range of overlap among the genera. *Bealia, Crypsis, Munroa, Neeragrostis, Neesiochloa,* and *Pereilema,* however, are exclusively annual, and 21 taxa are exclusively perennial. This character does not appear in the diagnostic characters. Stoloniferous (character 3) was based on the presence or absence of sterile, above ground, and horizontal culms. This character also has limited taxonomic value at the generic level and does appear in the diagnostic characters. Presence or absence of rhizomes (character 4), or horizontal underground culms, is not a taxonomically significant character because it is not used in any of the diagnostic descriptions. Twenty-two genera may possess a rhizome and 22 may lack rhizomes. Sixteen genera are exclusively rhizomatous and 16 are not. Six genera (*Allolepis, Eragrostis, Gouinia, Muhlenbergia, Sporobolus,* and *Tridens*) are variable for this character.

Flowering culm habit (character 5) was recorded in terms of erect, decumbent, or mat forming. A majority of the genera, 33, may be erect. None are exclusively decumbent, and only *Monanthochloë* is exclusively mat forming. This character does not appear in the diagnostic characters. Most of the genera may be caespitose (character 6); however, *Blepharidachne, Crypsis, Monanthochloë, Munroa, Neeragrostis,* and *Pereilema* are exclusively not caespitose. This character does not appear in the diagnostic characters. Flowering culms were recorded as either glabrous or hairy (character 7). A majority of the genera may be glabrous. *Blepharidachne, Lycurus, Munroa, Sohnsia,* and *Swallenia* are exclusively hairy. This character does not appear in the diagnostic characters. Type of hairs (character 8) associated with the flowering culms was recorded as pubescent for short scattered hairs, as pilose, or as villous. Of the 10

genera that may be hairy, only *Swallenia* is not pubescent. This character is not taxonomically significant. Whether the internodes are viscid or glaucous was the ninth character applied in this study. Viscid internodes are found in *Eragrostis,* and glaucous internodes are found in *Muhlenbergia;* however, character overlap occurs for both genera. Therefore, this character has limited diagnostic value at the generic level.

Whether the leaves are cauline or mostly basal (character 10) was also found to be highly variable. Thirty-one genera may have cauline leaves and 12 may possess mostly basal leaves. Genera recorded as exclusively with basal leaves include *Dasyochloa, Erioneuron, Munroa, Reederochloa, Scleropogon, Sohnsia,* and *Tripogon.* This character does not appear in the diagnostic characters. There is no overlap among the genera as to the presence of distinctly distichous leaves (character 11). This character appears in the diagnostic characters for *Distichlis, Jouvea,* and *Monanthochloë,* which are exclusively distichous. Character states for presence of leaf auricles (character 12) include the presence of sheath auricles, the presence of blade auricles, or the absence of auricles. The most common state is the absence of auricles, which occurs in 36 of the 38 genera. Blade auricles are only found in *Pereilema,* whereas sheath auricles may be found in *Bealia, Leptochloa,* and *Muhlenbergia* but are exclusive only in *Bealia.* This character does not appear in the diagnostic characters; however, it is useful for distinguishing *Bealia* from *Blepharoneuron.* Relative length of the sheaths and culm internodes (character 13) showed a high amount of overlap among the genera. This character has limited taxonomic value and does not appear in the diagnostic characters. Whether the sheaths are glandular or not (character 14) is particularly important for distinguishing *Neeragrostis* from all other genera except *Eragrostis,* for which this character is variable. Presence of a glandular sheath is one of the two diagnostic characters for *Neeragrostis.* Whether the sheath margins are smooth or scabrous (character 15) refers to the presence or absence of scabrosities on the margins. Character-state overlap exists among the genera for this character. Thus, it does not appear in the diagnostic characters and is relatively taxonomically insignificant for these genera. Presence or absence of a ciliate sheath (character 16) refers to the presence of the hairs on the sheath margins, especially toward the apex. Twenty-four genera are exclusively not ciliate, whereas eight are exclusively ciliate. Six genera are variable for this character, which was not selected for use in the diagnostic characters.

One of the most important vegetative characters is the type of ligule (character 17), which is described in terms of a membrane, a ciliate membrane, a line of hairs, or absent. This character occurs in 12 of the diagnostic subsets of characters. The ligule in eight genera is exclusively a membrane, and in eight genera it is a ciliate membrane. The taxonomic significance between these two states is minimal. The ligule in 16 genera is exclusively a line of hairs. No genera are recorded for both a membrane and a line of hairs; however, *Eragrostis* and *Tridens* are variable for ligule a ciliate membrane and ligule a line of hairs. Only *Blepharidachne* may lack a membrane. Shape of the leaf blades (character 18) was recorded in terms of filiform, linear, and triangular. The common recorded state was linear, which was present in 35 genera. Filiform leaves are found in seven genera but are exclusive only in *Redfieldia.* Triangular leaves are found in three genera but are exclusive only in *Neeragrostis.* This character is used in two subsets of diagnostic characters. Character states for shape of the leaf blades in cross section (character 19) include flat, conduplicate, involute, terete, and plicate. Plicate is only found in some species of *Blepharidachne,* whereas terete is only found in *Sporobolus.* Involute blades are found in 21 genera and are exclusively found in *Calamovilfa, Dasyochloa, Jouvea, Redfieldia, Reederochloa,* and *Tripogon.* Leaf blades conduplicate is exclusive in *Erioneuron* and *Monanthochloë.* The most common state is flat, which is found in 30 genera. This character was not used in the diagnostic characters, which is probably a result of the relatively low weight initially given the character. Leaf blades pungent or not (character 20) was determined by whether or not the tip or apex of the leaf blade was relatively hard and sharp pointed. The most common state was not pungent; however, pungent leaves were found in 12 genera and were exclusive in nine of these. This character does not appear in the diagnostic characters. A determination was made as to whether the leaf margins were thickened or not thickened (character 21). The most common state is lacking thickened margins. Thickened margins are found in seven genera and are exclusive in six (*Bealia, Dasyochloa, Erioneuron, Lycurus, Munroa,* and *Neesiochloa*). Only *Muhlenbergia* is recorded as variable for this character, which does not appear in the diagnostic characters.

Number of spikelets comprising the inflorescence (character 22) was grouped into three character states. The most common state is an inflorescence of more than three spikelets, which occurs in 36 genera. An inflorescence of two or three (four) spikelets is characteristic of *Jouvea* and *Reederochloa* but is exclusive only in *Reederochloa.* An inflorescence consisting of a single spikelet occurs in *Jouvea* and *Monanthochloë* and is exclusive in *Monanthochloë.* This character appears in the diagnostic subset of characters and is important in defining the generic limits of *Distichlis, Monanthochloë,* and *Reederochloa.* Type of inflorescence (character 23) was either a raceme or a panicle. A true spike does not occur in this group. The most common state is a panicle, which is characteristic of 35 genera. A raceme occurs in *Dasyochloa, Neesiochloa, Reederochloa, Scleropogon,* and *Tripogon* but is exclusive only in *Reederochloa* and *Tripogon.* This character is used in the diagnostic subset for *Chaboissaea, Eragrostis, Erioneuron, Leptochloa,* and *Tripogon.* Whether the inflorescence was exserted, partially included, or fully included in the upper leaf sheath (character 24) was recorded. The most common state, fully exserted, is found in 35 genera. There is a high amount of overlap between exserted and partially included; however,

Dasyochloa and *Monanthochloë* are exclusively partially included in the upper sheath. *Distichlis* and *Jouvea* are exserted or fully included. Only *Munroa* is exclusively fully included. This character does not appear in the diagnostic characters. The main axis of the inflorescence was recorded as glands present or absent (character 25). The implied state is not glandular, which is found in 34 genera. A glandular main axis is found in four genera but is exclusive in *Bealia, Neeragrostis,* and *Neesiochloa.* This character does not occur in the diagnostic characters. Whether the main axis was smooth, scabrous, or hairy (character 26) also does not occur in the diagnostic subset of characters. Most of the genera are either smooth or scabrous. A hairy main axis may be found in six genera but is exclusive in *Blepharidachne, Pereilema,* and *Sohnsia.*

Arrangement of primary branches on the main axis (character 27) was recorded as digitate or not digitate. The most common state is not digitate, which occurs in 35 genera. Digitate primary branches occur in *Dactyloctenium* and *Eleusine.* There is no overlap between these states. The degree of spreading of the primary branches (character 28) was recorded as appressed (an angle less than 10°), spreading (angle 10°–80°), divaricate (angle 80°–90°), or reflexed (angle greater than 90°). The typical states are appressed and spreading. Seven genera (*Dactyloctenium, Eragrostis, Gouinia, Muhlenbergia, Redfieldia, Sporobolus,* and *Tridens*) may be divaricate; however, only *Redfieldia* is exclusively divaricate. There are no genera with exclusively reflexed branches. This character does not occur in the diagnostic subset of characters. Whether the primary branches terminate in a spikelet or a bare point (character 29) is significant in defining *Dactyloctenium,* which is unique for exclusively possessing a naked point at the termination of the primary branches. One of the more important inflorescence characters is the degree of reduction in the primary branches (character 30). The character states include primary branches with appressed secondary branches or with spreading secondary branches and primary branches reduced to a fascicle of spikelets. Twenty-one genera may possess appressed secondary branches and 11 may have spreading secondary branches. Of these, seven (*Bealia, Calamovilfa, Eragrostis, Muhlenbergia, Sporobolus, Uniola,* and *Vaseyochloa*) are variable between these states. Three genera have the primary branches reduced to a fascicle of spikelets. Of these, *Dasyochloa* and *Pereilema* are exclusively reduced to a fascicle. This character appears in the diagnostic characters for *Erioneuron, Leptochloa,* and *Tridens.*

Pedicels were recorded as glandular or not (character 31). The character state pedicels glandular is included in the diagnosis for *Blepharoneuron.* Not glandular is the implied state and may occur in 32 genera. Four genera may be glandular, but this state is exclusive for *Bealia, Blepharoneuron,* and *Neesiochloa.* The absence of this character in the diagnostic subset of characters for *Bealia* and *Neesiochloa* indicates that higher weighted characters were chosen over this character, which was initially given a relatively low weight of six. Presence of hair on the pedicels (character 32) also was given a relatively low reliability. Twenty-nine of the genera may be glabrous; of these, only three are variable. Of the six genera with hairy pedicels only *Blepharidachne, Sohnsia,* and *Swallenia* are exclusive for that state. Character states for hair type (character 33) include pubescent, pilose, and villous. *Blepharidachne* and *Sohnsia* are exclusively pubescent, *Swallenia* is exclusively pilose, and no genus is exclusively villous. Hair type has limited taxonomic significance at the generic level. Surface ornamentation of the pedicels (character 34) was recorded as smooth or scabrous. The genera are about equally divided between these states, and only four (*Eragrostis, Muhlenbergia, Pereilema,* and *Tridens*) are variable. This character has limited diagnostic value but is used in one couplet of the identification key as a secondary character to separate *Erioneuron* and *Neesiochloa* from *Leptochloa* and *Trichoneura.*

Presence or absence of cleistogamous spikelets (character 35) is used in the identification key but does not occur in the subset of diagnostic characters. Of the six genera recorded as possessing cleistogamous spikelets, only two (*Steirachne* and *Triplasis*) are exclusive for this state. One of the highest weighted characters is the point of disarticulation (character 36). The two states are disarticulation above or below the glumes; the precise point is not defined. All of the genera except *Uniola* may have disarticulation above the glumes. Disarticulation below the glumes occurs in four genera but is variable in three (*Crypsis, Muhlenbergia,* and *Sporobolus*). This character is used in two of the diagnostic descriptions. Whether disarticulation is at the base of the florets or within the florets (character 37) determines whether the lemma and palea disarticulate as a unit or disarticulate separately. Typically, the lemma and palea separate as a unit; however, in four genera (*Crypsis, Eragrostis, Neeragrostis,* and *Neyraudia*) the lemma and palea disarticulate separately. The latter two of these four are not variable. This character occurs in the diagnostic characters and is especially useful for separating *Neyraudia* from similar genera.

The term callus is used to define a modification at the point of disarticulation. A hairy callus (character 38) may be found in 15 genera and is exclusive in 12 of these. A glabrous callus is the typical state and may be found in 26 genera. *Chaboissaea, Muhlenbergia,* and *Scleropogon* are the only genera variable for this character, which occurs in five of the diagnostic subsets of characters. This character is especially useful for making the final separation between *Neesiochloa* and *Tripogon, Triplasis* from *Leptochloa* and *Munroa,* and *Eragrostis* and *Redfieldia* from similar taxa. The only numeric character used in this study was spikelet length (character 39), which was divided into two artificial states (less than or equal to 4.9 mm long and greater than 4.9 mm long), resulting in minimal overlap among the genera. This character is used in the diagnostic characters of *Calamovilfa, Jouvea, Leptochloa,* and *Scleropogon.* Arrangement of spikelets (character 40) on the primary branch was

described in terms of solitary, paired, or clustered. *Lycurus* is the only genus with paired spikelets. Spikelets may be in clusters in five genera but are exclusively clustered in four (*Jouvea, Munroa, Neeragrostis,* and *Pereilema*). *Eragrostis* is the only variable taxon for this character. The remaining 32 genera are exclusively solitary. This character is especially useful for separating *Jouvea* and *Scleropogon* and for distinguishing *Munroa* from similar genera. Presence of sterile, bristle-like spikelets (character 41) is a unique characteristic of *Pereilema;* the remaining genera lack these structures. Spikelet compression (character 42) was recorded as laterally compressed, terete (for no compression), or dorsiventrally compressed. Thirty-two genera may be laterally compressed; however, five of these overlap with other states. Six genera are exclusively terete. *Muhlenbergia* is the only genus that overlaps all three character states. The terete state is especially useful for distinguishing *Sporobolus* from other genera with a 1-nerved lemma (*Calamovilfa* and *Crypsis*). Development of the pedicels (character 43) was recorded as sessile, subsessile (for pedicels less than 0.5 mm long), or pedicellate. Of the eight genera that lack pedicels, four (*Dactyloctenium, Eleusine, Jouvea,* and *Monanthochloë*) are exclusive for this state. Thirty-four genera are either subsessile or pedicellate, and a high degree of overlap exists between these states. This character was not in the diagnostic characters.

Presence or absence of glumes (character 44) is only useful for separating *Monanthochloë,* which always lack glumes. Presence of glumes is the implied state and occurs in 37 genera. *Jouvea* and *Munroa* are variable for this character. The relative length of the glumes and spikelets (character 45) was separated into three states. Glumes shorter than the spikelets occurs in 30 genera, and glumes about equal to the spikelets occurs in 13 genera. Six genera overlap between these states. Only in *Bealia* and *Muhlenbergia* can the glumes exceed the spikelets. This character is especially useful for distinguishing between *Leptochloa* and *Trichoneura.* Relative length of the glumes (character 46) was defined by two states, unequal and more or less equal. The genera are about equally split between the states. Variable genera include *Blepharoneuron, Eragrostis, Erioneuron, Muhlenbergia, Munroa, Pereilema,* and *Tridens.* This character is especially useful for distinguishing *Crypsis* from *Calamovilfa* and *Sporobolus* and distinguishing *Chaboissaea* from *Leptochloa.* Surface ornamentation of the glumes (character 47) was recorded as smooth or scabrous. This character has little or no diagnostic value at the generic level and does not appear in the diagnostic characters. The glumes of most of the genera are smooth, 11 may be scabrous, and eight are exclusively scabrous. Presence of hairs on the glumes (character 48) also does not appear in the diagnostic characters. Thirty-five may be glabrous and four may be hairy. Only *Bealia* and *Lycurus* are exclusively hairy. Number of nerves on the first glume (character 49) ranges from 0- to 8-nerved. Only *Jouvea* always lacks nerves on the first glume. A 1-nerved first glume is the most common state and may occur in 30 genera. No genera are exclusively 2-, 3-, 4-, or 5-nerved. *Reederochloa* is the most variable genus, with 2–8-nerved first glumes. *Swallenia* is exclusively 7-nerved. This character is especially useful for separating *Lycurus* from *Chaboissaea* and *Muhlenbergia.* Relative length of the second glume to the lower lemma (character 50) was divided into three states. Four genera are recorded as having a second glume longer than the lemma, but only *Dasyochloa* is exclusive for this state. The typical morphology is for the second glume to be shorter than the lemma; however, they may be more or less equal in 15 genera This character was not used in the diagnostic characters. Whether the second glume was awned or unawned (character 51) was not used in the diagnostic characters; however, this character was used as a secondary character in the identification key. The typical state is unawned, but nine genera may possess an awn, and six (*Dactyloctenium, Dasyochloa, Lycurus, Neesiochloa, Pereilema,* and *Trichoneura*) of these are exclusively awned. This character is useful for separating *Neesiochloa* from *Tripogon* and *Erioneuron, Trichoneura* from *Leptochloa,* and *Dasyochloa* from similar genera. Number of nerves on the second glume (character 52) ranges from one to 11. Twenty-eight genera may be 1-nerved, and five of these are variable. A 3-nerved second glume occurs in 10 genera and is exclusive in *Allolepis.* No genera are exclusively 5-, 7-, or 9-nerved. *Swallenia* and *Vaseyochloa* are characterized by a high number of nerves. This character has diagnostic value in separating *Gouinia* and *Chaboissaea.*

Rachilla pronounced or not pronounced between the florets (character 53) was weighted as a taxonomically important character but was not selected in the analysis for diagnostic characters nor was it used in the identification key. The absence of a pronounced rachilla is implied and occurs in nine genera. Only two of these, *Allolepis* and *Chaboissaea,* overlap for the states. Rachilla hairy or glabrous (character 54) does appear in the diagnostic descriptions and key. No genera are variable for these states. A glabrous rachilla is the most common state. This character is useful for separating *Neesiochloa* and *Steirachne* from similar genera. The number of florets per spikelet (character 55) is one of the more taxonomically important characters. Of the nine genera characterized by a solitary floret, only *Chaboissaea* (with 1–3 florets) is variable. This character does not give a clear separation among the remaining 30 genera. Five genera (*Allolepis, Eragrostis, Jouvea, Neeragrostis,* and *Uniola*) may have more than 20 florets. The highest number of florets is found in *Eragrostis* and *Neeragrostis.* This character is used in 22 of the diagnostic descriptions and is therefore the most significant character for defining New World generic concepts in this tribe. The presence or absence of sterile florets (character 56) was not used in the diagnostic descriptions. Sterile florets may be absent in eight genera and are always absent in six (*Bealia, Blepharoneuron, Calamovilfa, Crypsis, Muhlenbergia,* and *Sporobolus*). *Chaboissaea* and *Eragrostis* are variable. This character is of secondary importance for distinguishing between *Lycurus* and *Muhlen-*

bergia. Location of the sterile florets (character 57) does not occur in the diagnostic description but is used in the identification key. Three genera (*Blepharidachne, Neyraudia,* and *Tetrachne*) only possess sterile florets below the fertile ones. *Uniola* is the only variable genus for this character. Whether the sterile florets are morphologically similar or dissimilar (character 58) was not selected as a diagnostic character; however, it is used in the key to separate *Munroa* from *Sohnsia* and *Triplasis.* Only *Munroa* and *Pereilema* are exclusively heteromorphic.

Shape of the lemma apex (character 59) was defined with four states. Twenty-six genera may be entire, which is the most common state. Of these, only *Leptochloa* and *Muhlenbergia* overlap. Eleven genera may be emarginate or lobed. The most taxonomically important state is cleft, which is exclusive for *Blepharidachne, Neyraudia,* and *Sohnsia* and which can be used to separate these from morphologically similar genera. This character occurs in numerous diagnostic descriptions. Presence of an apical appendage (character 60) was defined in terms of awned, mucronate, and unawned. Fourteen genera are exclusively awned, and 17 genera are either mucronate or unawned. This character is particularly valuable for separating *Bealia* from *Blepharoneuron.* Presence of hairs on the lemma (character 61) was not used in the diagnosis, and the genera are evenly divided between the states. Type of hairs on the lemma (character 62) include pubescent, pilose, and villous. This character has limited diagnostic value; however, *Erioneuron* and *Sohnsia* are exclusively pilose, and *Bealia, Blepharidachne, Blepharoneuron, Dasyochloa, Neyraudia, Swallenia,* and *Triplasis* are exclusively villous. Surface ornamentation of the lemma (character 63) was described as smooth or scabrous. This character has little diagnostic value at the generic level and does not appear in the diagnostic subset of characters. Most of the taxa are smooth, but 11 are exclusively scabrous. Number of nerves on the lemma (character 64) varies from 1- to 13-nerved. Three genera (*Calamovilfa, Crypsis,* and *Sporobolus*) are 1-nerved and do not vary. Genera with many-nerved lemmas include *Distichlis, Monanthochloë, Reederochloa, Uniola,* and *Vaseyochloa.* The remaining genera are 3–5-nerved. This character is used extensively in the diagnostic descriptions. Texture of the lemma (character 65) varies from hyaline to indurate. *Neeragrostis* is the only genus exclusively with a hyaline lemma. This state is shared with four genera that overlap with state lemma membranous. Exclusively dense-textured lemmas are characteristic of *Allolepis, Distichlis, Monanthochloë, Reederochloa,* and *Scleropogon.* This character is useful for the final separation of *Chaboissaea* from *Bealia* and *Blepharoneuron.* Whether the lemma nerves are glabrous or hairy (character 66) has little diagnostic value. Genera that are variable for the states of this character include *Calamovilfa, Leptochloa, Muhlenbergia,* and *Sohnsia.* Whether the palea is hairy or glabrous (character 67) is valuable for making the final separation of *Dasyochloa* from *Munroa* and *Neyraudia.* The typical state for the presence or absence of an awned palea (character 68) is unawned. Only three genera (*Chaboissaea, Gouinia,* and *Muhlenbergia*) may possess an awned palea. This character is specifically valuable for making the final separation of *Gouinia* from *Eleusine, Leptochloa,* and *Tridens.* Texture of the palea (character 69) varies from hyaline to indurate. *Crypsis* and *Neeragrostis* are exclusively hyaline. The most common states are membranous and chartaceous, which are found in 34 taxa. Genera with relatively dense-textured paleas are *Allolepis* and *Monanthochloë.* Recording data for whether or not the palea margins enfold the fruit (character 70) tended to be subjective, and the distinction between the states was obscure. As a result, the character was initially given a low weight and thus was not used in the key and diagnostic descriptions. At present, 11 genera are coded as palea enfolding the fruit and the others are coded as the alternative, with no overlap between the states. Additional studies are needed to precisely define the differences between the states of this character. Whether the palea keels are ciliate or not (character 71) does not appear in the diagnostic characters but is used as a secondary character in the key. A ciliate palea occurs in 11 genera but is exclusive for nine genera. *Eragrostis* and *Gouinia* are the only variable taxa. Surface ornamentation of the palea (character 72) was recorded as smooth or scabrous. The character has limited taxonomic significance at the generic level and was not used in the key or the diagnostic characters. Those genera recorded as always scabrous are *Chaboissaea, Eleusine, Gouinia, Lycurus, Pereilema,* and *Steirachne.*

Presence or absence of lodicules (character 73) was given a relatively low weight due to the difficulty in correctly making the interpretation. The common or typical condition is for the lodicules to be present, which occurs in 35 genera. It appears to be always absent in *Blepharidachne, Crypsis,* and *Monanthochloë.* Variable genera are *Munroa, Scleropogon,* and *Sporobolus.* Whether or not the lodicules are adnate to the palea (character 74) also was given a relatively low weight. Only two genera (*Erioneuron* and *Tridens*) are recorded as adnate, and there are no variable genera for this character. Shape of the lodicule apex (character 75) also was low weighted and was not used as a diagnostic character. The most common state is truncate, which occurs in 25 genera. At present, data for this character are suspect.

Number of stamens (character 76) varies between one and three. No genus exclusively has only one stamen. One or three stamens are found in *Erioneuron,* and one to three stamens are found in *Tripogon.* Only *Steirachne* is recorded as exclusively possessing two stamens. Three stamens occur in 37 genera. Anther color (character 77) was grouped into three states (yellow, reddish purple, and olivaceous plumbeous). Twenty-four genera are coded as yellow, and of these, 16 are exclusively yellow. Twenty were considered to be reddish purple. Six genera (*Eragrostis, Jouvea, Leptochloa, Lycurus, Redfieldia,* and *Tetrachne*) are variable between these states. *Neesiochloa* and *Reederochloa* are exclusively olivaceous

plumbeous. Because the distinction between these states can be somewhat subjective, the character was given a relatively low weight and was not used in the identification key or diagnostic characters. Number of stigmas (character 78) is consistently two for all genera except *Munroa,* which varies between two or three stigmas. Whether the pericarp is free or adnate (character 79) to the fruit was weighted relatively high. Thirty-one taxa possess the implied state of an adnate pericarp. A free pericarp is found in seven genera and no taxa vary between these states. This character is useful for separating *Eleusine* from other genera with a ciliate membrane ligule and for separating *Tetrachne* from genera with a similar ligule and overlapping number of florets per spikelet. Compression of the caryopsis (character 80) was not considered to be a highly reliable character. The typical condition is terete, which is characteristic of 27 genera. Exclusively dorsiventrally compressed caryopses are found in *Munroa, Neesiochloa, Trichoneura, Tridens,* and *Triplasis,* whereas the caryopsis in *Blepharidachne, Pereilema,* and *Reederochloa* is exclusively laterally compressed. Presence of persistent style bases (character 81) was high weighted. The typical condition is for persistent style bases to be absent. The presence of these persistent bases is diagnostic of *Swallenia* and *Vaseyochloa,* which may be then separated on shape of the base (character 82). A short and blunt base is characteristic of *Swallenia,* and a sharp-pointed base is characteristic of *Vaseyochloa.* Base chromosome number (character 83) for this tribe is typically eight, nine, or 10. A base number of seven is found in *Blepharidachne* and *Munroa,* but the latter may have a base number of eight.

Distribution was described under four characters (distribution by continent (character 84), in North America and Mesoamerica (character 85), in regions of the United States (character 86), and in South America (character 87)). Specific data on these characters are discussed following each generic description.

Key to the Eragrostideae of the New World

1. Florets 1 per spikelet . . . 2
   Florets 2 or more per spikelet . . . 12
2(1). Lemma 1-nerved; ligule a line of hairs or absent; fruit with free pericarp . . . 3
   Lemma 3-nerved or more; ligule a membrane or a ciliate membrane; fruit with adnate pericarp . . . 5
3(2). Spikelets ≥ 5–10 mm long; lemma chartaceous; callus hairy; palea hairy . . . 5. ***Calamovilfa***
   Spikelets up to 4.9 mm long; lemma hyaline to membranous; callus glabrous; palea glabrous . . . 4
4(3). Glumes very unequal; spikelets usually terete; glumes smooth . . . 29. ***Sporobolus***
   Glumes more or less equal; spikelets strongly laterally compressed; glumes scabrous . . . 7. ***Crypsis***
5(2). Spikelets subtended by sterile bristles and in small clusters; blade auricles prominent and usually ciliate . . . 24. ***Pereilema***
   Spikelets not subtended by sterile bristles and occurring solitarily or in pairs; blade auricles absent . . . 6
6(5). Lemma apex entire . . . 7
   Lemma apex emarginate to lobed . . . 11
7(6). First glume 1-nerved and occasionally 1-awned . . . 8
   First glume 2- or 3-nerved and 2(–3)-awned . . . 10
8(7). Lemma with densely appressed to spreading silky, whitish hairs on midnerve and margins, hairs often appearing as ridges on surface at ×20; pedicels minutely glandular, capillary, wiry, and flexuous, usually nodding and reflexed; paleas densely silky villous between nerves . . . 4. ***Blepharoneuron***
   Lemma glabrous or with appressed to spreading hairs on midnerve and margins but without silky, whitish hairs appearing as ridges on surface at ×20; pedicels not minutely glandular, appressed or spreading, occasionally capillary to nodding and reflexed; paleas glabrous or with appressed to spreading hairs between nerves . . . 9

9(8). Spikelets with 1, 2, or occasionally 3 florets, lowermost perfect, upper pedicelled florets usually staminate, reduced, and/or sterile; lemma chartaceous and plumbeous to grayish yellow, mottled . . . . . 6. ***Chaboissaea***

Spikelets with 1 floret, or when occasionally 2–3-flowered, upper floret fertile; lemma hyaline or membranous, rarely chartaceous, plumbeous or mottled . . . . . 19. ***Muhlenbergia***

10(7). Spikelets paired; sterile florets present, lower spikelet with floret short pedicellate, usually staminate, occasionally sterile or perfect, upper spikelet with floret usually long pedicellate and perfect; inflorescence a spiciform panicle, branches < 0.6 cm long . . . . . 17. ***Lycurus***

Spikelets solitary or paired; sterile florets absent; inflorescence a contracted panicle, branches 1–3.7 cm long . . . . . 19. ***Muhlenbergia***

11(6). Lemma apex deeply bilobed, lobes 1–1.4 mm long, rounded to obtuse; awn crisped-curled to flexuous, borne between lobes; pedicels minutely glandular; single annual species in Chihuahua and Durango, Mexico . . . . . 2. ***Bealia***

Lemma apex not deeply bilobed (except in perennials *Muhlenbergia argentea* and *M. lucida*), sometimes emarginate to shallowly lobed, teeth < 1 mm long, usually acuminate to aristate; awn straight to flexuous; pedicels not glandular; wide ranging in North and South America to Southeast Asia . . . . . 19. ***Muhlenbergia***

12(1). Caryopsis with persistent styles bases 13

Caryopsis lacking persistent style bases 14

13(12). Ligule a membrane or a ciliate membrane; caryopsis with pronounced sharp-pointed style bases, deeply concave on ventral side; leaf blades not pungent; glumes very unequal . . . . . 38. ***Vaseyochloa***

Ligule a line of hairs; caryopsis with relatively short and blunt style bases, not deeply concave on ventral side; leaf blades pungent; glumes more or less equal . . . . . 31. ***Swallenia***

14(12). Inflorescence a raceme with stalked or pedicelled spikelets placed along central axis 15

Inflorescence a panicle with at least primary branches, these rebranched, or primary branches often racemosely inserted along elongated central axis or digitately arranged from central point 19

15(14). Second glume 1-nerved; plants hermaphroditic; lemma emarginate, lobed, or cleft; lemma membranous 16

Second glume 3–8-nerved, nerves often indistinct; plants dioecious or monoecious; lemma entire; lemma coriaceous 18

16(15). Ligule a line of hairs; palea extending into awns; leaf blades pungent; plants stoloniferous . . . . . 9. ***Dasyochloa***

Ligule a ciliate membrane; palea not extending into awns; leaf blades not pungent; plants lacking stolons 17

17(16). Lemmas oblate (much wider than long) to fan-shaped, apex truncate; spikelets 3–5.5 mm wide; glumes more or less equal; second glume awned; rachilla hairy . . . . . 22. ***Neesiochloa***

Lemmas elliptic to ovate-lanceolate, apex acute; spikelets < 1.5 mm wide; glumes very unequal; second glume unawned; rachilla glabrous . . . . . 36. ***Tripogon***

18(15). Lemmas of pistillate spikelets unawned; ligule a membrane; staminate culms 3–11 cm tall; sheaths ciliate; leaf blades tightly involute; glumes very unequal . . . . . 26. ***Reederochloa***

Lemmas of pistillate spikelets with 3 terminal awns 3–15 cm long; ligule a line of hairs; culms mostly 10–25 cm tall; sheaths not ciliate; leaf blades flat or conduplicate; glumes more or less equal . . . . . 27. ***Scleropogon***

19(14). Disarticulation below glumes, spikelets falling entire; lemmas strongly keeled, coriaceous, 3–9-nerved; lower 2–6 florets of each spikelet sterile . . . . . 37. ***Uniola***

Disarticulation above glumes, spikelets not falling entire; lemmas not strongly keeled, or if keeled then hyaline, membranous, or chartaceous, usually 3-nerved; lower florets of each spikelet usually fertile 20

20(19). Lemma and palea usually disarticulating separately; keels of palea usually ciliolate; palea longitudinally bowed out . . . . . 12. ***Eragrostis***

Plants lacking above combination of character states 21

21(20). Ligule a membrane or a ciliate membrane 22

Ligule a line of hairs or absent 39

22(21). Lemma entire 23

Lemma emarginate, lobed, or cleft 33

23(22). Fruit with free pericarp; inflorescence with primary branches digitate or of 1-sided racemes loosely spaced along central axis 24

Fruit with adnate pericarp; inflorescence with primary branches not digitate or of 1-sided racemes along central axis 26

24(23). Inflorescence with 6–16 racemosely arranged primary branches; sterile florets present below fertile ones . . . . . 32. ***Tetrachne***

Inflorescence with 1–17 digitately or subdigitately arranged primary branches; sterile florets present above fertile ones 25

25(24). Second glume 1-nerved and awned; primary branches terminating in a bare point; plants often stoloniferous . . . . . 8. ***Dactyloctenium***

Second glume 3–5-nerved and unawned; primary branches terminating in a spikelet; plants lacking stolons . . . . . 11. ***Eleusine***

26(23). Leaves distinctly distichous; leaf blades pungent 27

Leaves not distinctly distichous; leaf blades not pungent 28

27(26). Inflorescence consisting of a solitary spikelet borne in axils of fascicled leaves; leaf blades 0.5–1.5 cm long, conduplicate and subulate; glumes absent; plants stoloniferous; spikelets sessile . . . . . 18. ***Monanthochloë***

Inflorescence normally consisting > 3 spikelets borne on exserted to partially included axis without fascicled leaves; leaf blades 2–8 cm long, flat or involute, linear; glumes present; plants usually lacking stolons; spikelets pedicellate . . . . . 10. ***Distichlis***

28(26). Plants hermaphroditic 29

Plants dioecious or andromonoecious 32

29(28). Spikelets < 5 mm long 30

Spikelets ≥ 5 mm long 31

30(29). Glumes very unequal; inflorescence with racemose primary branches along elongated central triquetrous main axis; lemma membranous, greenish to stramineous, not mottled; palea membranous and smooth . . . . . 16. ***Leptochloa***

Glumes more or less equal; inflorescence with distant, alternate, rebranched primary branches, secondary branches usually strongly appressed; lemma chartaceous and plumbeous to grayish yellow, mottled; palea chartaceous and scabrous . . . . . 6. ***Chaboissaea***

31(29). Lemmas awned, awns 5–20 mm long; callus hairy; sheaths with scabrous margins; glumes and palea scabrous . . . . . 14. ***Gouinia***

Lemmas unawned or with awns < 3.5 mm long; callus glabrous; sheaths with smooth margins; glumes and palea smooth . . . . . 16. ***Leptochloa***

32(28). Spikelets 1.8–4.7 mm long; second glume 1-nerved; plants lacking stolons; spikelets laterally compressed, usually with 2, or occasionally 3, florets, lowermost perfect, upper pedicellate florets usually staminate, reduced, and/or sterile; lemma chartaceous and plumbeous to grayish yellow, mottled . . . . . 6. ***Chaboissaea***

Spikelets 9–25 mm long; second glume 2-nerved or more; plants stoloniferous; spikelets terete or dorsiventrally compressed, with 6–20 florets, upper ones often sterile; lemma coriaceous and stramineous or lustrous, not mottled . . . . . 1. ***Allolepis***

33(22). Sterile florets reduced, sterile florets below fertile floret; spikelets always 4-flowered, 2 sterile, 1 fertile, 1 reduced; fertile lemma 3-awned; pedicels hairy; lodicules absent . . . . . 3. ***Blepharidachne***

Sterile florets only above fertile florets; spikelets usually > (2–)4–20-flowered; fertile lemma usually 1-awned; pedicels glabrous; lodicules present 34

34(33). Lemma awned 35

Lemma unawned or mucronate 38

35(34). Callus hairy; palea ciliate; leaf blades with thickened margins; pedicels smooth 36

Callus glabrous; palea not ciliate; leaf blades without thickened margins; pedicels scabrous 37

36(35). Lemmas ovate to lanceolate, apex acute to obtuse; second glume unawned; rachilla glabrous; primary branches with appressed secondary branches; pedicels < 4 mm long . . . . . 13. ***Erioneuron***

Lemmas oblate (much wider than long) to fan-shaped, apex truncate; second glume awned; rachilla hairy; primary branches with spreading secondary branches; pedicels 5–20 mm long . . . . . 22. ***Neesiochloa***

37(35). Glumes shorter than spikelet, very unequal, smooth; second glume unawned; rachilla completely glabrous; lateral nerves of lemma not ciliate, often pubescent, hairs < 0.6 mm long . . . . . 16. ***Leptochloa***

Glumes about equaling spikelet, more or less equal, scabrous; second glume awned; rachilla with a tuft of hairs at summit; lateral nerves of lemma long-ciliate, hairs 1–3 mm long . . . . . 33. ***Trichoneura***

38(34). Inflorescence with racemose primary branches along elongated central triquetrous rachis, spikelets mostly appressed; lemmas mostly glabrous to puberulent along nerves below . . . . . 16. ***Leptochloa***

Inflorescence with paniculate primary branches with mostly spreading secondary branches; lemmas mostly short hairy along nerves below . . . . . 34. ***Tridens***

39(21). Lemma entire 40

Lemma emarginate, lobed, or cleft 45

40(39). Plants hermaphroditic 41

Plants dioecious or monoecious 43

41(40). Sterile florets below fertile florets; inflorescence with racemose primary branches separated by about their own length along central axis; plants introduced to New World . . . . . 32. ***Tetrachne***

Sterile florets above fertile florets; inflorescence with paniculate primary branches; plants native to New World 42

42(41). Callus glabrous; glumes more or less equal in length; cleistogamous spikelets near base or upper leaf axils; spikelets 6–13-flowered; lemma membranous; keels of palea bowed out, finely ciliate-scabrid . . . . . 30. ***Steirachne***

Callus hairy; glumes very unequal in length; cleistogamous spikelets absent; spikelets 1–6-flowered; lemma chartaceous; keels of palea not bowed out, glabrous . . . . . 25. ***Redfieldia***

43(40). Disarticulation with lemma and palea falling separately; leaf blades not pungent; plants annual; sheaths glandular; plants lacking stolons; lemma hyaline; staminate florets with ciliolate palea keels; pistillate florets with palea < 1/2 length of lemma . . . . . 21. ***Neeragrostis***

Disarticulation with lemma and palea falling as unit; leaf blades pungent; plants perennial; sheaths not glandular; plants stoloniferous; lemma chartaceous to coriaceous; staminate florets without ciliolate palea keels; pistillate florets with palea about as long as lemma 44

44(43). Pistillate spikelets 8–30 mm long; lemmas of pistillate spikelets unawned; second glume 1-nerved; pistillate spikelets in clusters in axils of leaves; spikelets sessile . . . . . 15. ***Jouvea***

Pistillate spikelets 20–40 mm long; lemmas of pistillate spikelets with 3 terminal awns 3–15 cm long; second glume 3–5-nerved; pistillate spikelets solitary, usually exserted; spikelets pedicellate . . . . . 27. ***Scleropogon***

45(39). Tall, reed-like, culms 1–3 m tall, panicles plumose; lemma margins villous near base, hairs 3–5 mm long; sterile florets below fertile florets; disarticulation with lemma and palea falling separately; introduced to New World . . . . . 23. ***Neyraudia***

Short caespitose to taller but not reed-like, culms 0.4–1.7 m tall, panicles not plumose; lemmas ciliate near base, hairs usually < 3 mm long; sterile florets above fertile florets; disarticulation with lemma and palea falling as unit; native to New World 46

46(45). Lemma unawned or mucronate, with apex entire or emarginate; culms 20–170 cm tall, erect . . . . . 34. ***Tridens***

Lemma with awns ≥ 1.5 mm long, with apex emarginate, lobed, or cleft, if emarginate then plants decumbent, with culms not more than 15 cm tall; culms 4–100 cm tall, decumbent, mat forming, or erect 47

47(46). Palea extending into awns; second glume awned; second glume longer than lower lemma; palea ciliate on margins . . . . . 9. ***Dasyochloa***

Palea not extending into awns; second glume unawned; second glume shorter than lower lemma to about same length as lower lemma; palea glabrous on margins 48

48(47). Leaf blades pungent; plants stoloniferous, bearing fascicles of leaves; spikelets in capitate clusters of 2–4, partially hidden in fascicles of leaves at branch tips; sterile florets heteromorphic . . . . . 20. ***Munroa***

Leaf blades not pungent; plants lacking stolons and fascicles of leaves; spikelets solitary, exserted; sterile florets homomorphic 49

49(48). Plants hermaphroditic; pistillate lemmas 1-awned, awns up to 2.5 mm long; glumes very unequal in length; cleistogamous spikelets present in upper and lower sheaths . . . . . 35. ***Triplasis***

Plants dioecious; pistillate lemmas 3-awned, awns up to 6 mm long; glumes more or less equal in length; cleistogamous spikelets absent . . 28. ***Sohnsia***

Clave para Eragrostideae del Nuevo Mundo

1. Flosculos 1 por espiguilla 2

Flosculos 2 o mas por espiguilla 12

2(1). Lema 1-nervada; ligula una fimbra de pelos o ausente; fruto con el pericarpio libre 3

Lema con 3 o mas nervios; ligula una membrana o una membrana ciliada; fruto con el pericarpio soldado 5

3(2). Espiguillas 5–10 mm o mas de longitud; lema cartacea; callo piloso; palea pilosa . . . . . 5. ***Calamovilfa***
Espiguillas hasta 4.9 mm de longitud; lema hialina a membranosa; callo glabro; palea glabra 4
4(3). Glumas desiguales; espiguillas rollizas; glumas lisas . . . . . 29. ***Sporobolus***
Glumas casi iguales; espiguillas marcadamente comprimidas lateralmente; glumas escabrosas . . . . . 7. ***Crypsis***
5(2). Espiguillas con cerdas esteriles subyacentes y presentandose agrupadas; hojas con auriculas en el limbo prominetes y usualmente ciliadas . . . . . 24. ***Pereilema***
Espiguillas sin cerdas esteriles subyacentes y presentandose solitarias o en pares; hojas sin auriculas 6
6(5). Lema entera 7
Lema emarginada o lobada 11
7(6). Primera gluma 1-nervada y ocasionalmente con una arista 8
Primera gluma con 2(–3) nervios y 2(–3) aristas 10
8(7). Lema con pelos densamente apresados o extendidos, sedosos y blanquecinos sobre el nervio central y margenes, los pelos presentandose acanalados sobre la superficie a ×20; pedicelos con glandulas diminutas, capillares, flexuosos, usualmente colgantes y reflexos; paleas densamente sedoso villosas entre los nervios . . . . . 4. ***Blepharoneuron***
Lema glabra o con pelos apresados o extendidos sobre el nervio central y margenes pero sin presentarse sedosos y blanquecinos, ni acanalados sobre la superficie a ×20; pedicelos sin glandulas diminutas, apresados o extendidos, ocasionalmente capilares o colgantes y reflexos; paleas glabras o con pelos adpresos a ascendentes entre los nervios 9
9(8). Espiguillas con 1, 2, ocasionalmente 3 flosculos, con el mas inferior perfecto, los flosculos superiores usualmente estaminados, reducidos, y/o esteriles; lema cartacea y moteada de color gris hasta verde amarillo . . . . 6. ***Chaboissaea***
Espiguillas con 1 flosculo, o cuando ocasionalmente es 2–3-floscular, el superior es fertil; lema hialina o membranosa, raramente cartacea y moteada de color gris . . . . . 19. ***Muhlenbergia***
10(7). Espiguillas en pares; flosculos esteriles presentes, la espiguilla inferior con un flosculo corto pedicelado, usualmente estaminado, ocasionalmente esteril o perfecto, la espiguilla superior con un flosculo usualmente largo pedicelado y perfecto; inflorescencia una panicula espiciforme, con las ramificaciones menores de 0.6 cm de longitud . . . . . 17. ***Lycurus***
Espiguillas solitarias o en pares; flosculos esteriles ausentes; inflorescencia una panicula contraida, las ramificaciones 1–3.7 cm de longitud . . . . . 19. ***Muhlenbergia***
11(6). Lema profundamente bilobada, los lobulos 1–1.4 mm de longitud, redondeados a obtusos; arista curvada a flexuosa, naciendo entre los lobulos; pedicelos con glandulas diminutas; una sola especie anual de Chihuahua y Durango, Mexico . . . . . 2. ***Bealia***
Lema no profundamente bilobada (excepto en las perennes *Muhlenbergia argentea* y *M. lucida*), algunas veces emarginada a levemente lobada, con los lobulos menores de 1 mm long, y usualmente acuminado o aristados; arista recta o flexuosa; pedicelos sin glandulas; con amplia distribucion en Norte y Sur America hasta el sureste de Asia . . . . . 19. ***Muhlenbergia***
12(1). Cariopsis con las bases del estilo persistentes 13
Cariopsis con las bases del estilo no persistentes 14
13(12). Ligula una membrana o una membrana ciliada; cariopsis con la bases del estilo pronunciadas en puntas, marcadamente concavas en la cara ventral; limbos con apice no punzante; glumas desiguales . . . . . 38. ***Vaseyochloa***

Ligula una fimbra de pelos; caryopsis con las bases del estilo relativamente cortas y obtusas, no marcadamente concavas en la cara ventral; limbos con apice punzante; glumas casi siguales . . . . . 31. ***Swallenia***

14(12). Inflorescencia un racimo con espiguillas pediceladas a lo largo del eje central 15

Inflorescencia una panicula con las ramificaciones primarias ramificadas o con las ramificaciones primarias racemosas o espigadas o digitadas 19

15(14). Segunda gluma 1-nervada; plantas hermafroditas; lema emarginada, lobada, o partida; lema membranosa 16

Segunda gluma 3–8-nervada, los nervios a menudo indistintos; plantas dioicas o monoicas; lema entera; lema coriacea 18

16(15). Ligula una fimbra de pelos; palea con los nervios pronunciados en aristas; limbo con apice punzante; plantas estoloniferas . . . . . 9. ***Dasyochloa***

Ligula una membrana ciliada; palea con los nervios no pronunciados en aristas; limbos con apice no punzante; plantas sin estolones 17

17(16). Lemas oblatas (mas anchas que largo) a forma de abanico, apice truncado; espiguillas 3–5.5 mm ancho; glumas casi iguales; segunda gluma aristada; raquilla pilosa . . . . . 22. ***Neesiochloa***

Lemas elipticas a ovado-lanceoladas, apice agudo; espiguilla menores de 1.5 mm ancho; glumas desiguales; segunda gluma sin arista; raquilla glabra . . . . . 36. ***Tripogon***

18(15). Lemas de espiguillas pistiladas sin arista; ligula una membrana; culmos staminados 3–11 cm altura; vainas ciliadas; limbos marcadamente involutos; glumas desiguales . . . . . 26. ***Reederochloa***

Lemas de espiguilla pistiladas con 3 aristas terminales de 3–15 cm long; ligula una fimbra de pelos; culmos usualmente 10–25 cm altura; vainas no ciliadas; limbos planos o conduplicados; glumas casi iguale . . . . . 27. ***Scleropogon***

19(14). Desarticulacion debajo de las glumas, las espiguillas cayendo enteras; lema marcadamente aquilladas, coriaceas, 3–9-nervada; flosculos inferiores 2–6 de cada espiguilla esteriles . . . . . 37. ***Uniola***

Desarticulacion arriba de las glumas, las espiguillas no cayendo enteras; lema no marcadamente aquilladas o si aquilladas, entonces hialinas, membranosas, o cartaceas, usualmente con 3 nervios; flosculos inferiores de cada espiguilla usualmente fertiles 20

20(19). Lema y palea usualmente desarticulando separadamente; quillas de la palea usualmente cilioladas; palea curvada longitudinalmente . . . . 12. ***Eragrostis***

Plantas sin la combinacion de caracteres citados arriba 21

21(20). Ligula una membrana o una membrana ciliada 22

Ligula una fimbra de pelos o ausente 39

22(21). Lema entera 23

Lema emarginada, lobada, o partida 33

23(22). Fruto con el pericarpio libre; inflorescencia con las ramas primarias digitadas o con racimos unilaterales laxamente dispuestos a lo largo del eje central 24

Fruto con el pericarpio soldado; inflorescencia con las ramas primarias no digitadas ni con racimos unilaterales a lo largo del eje central 26

24(23). Inflorescencia con 6–16 ramas primarias dispuestas racemosamente; flosculos esteriles presentes debajo de los fertiles . . . . . 32. ***Tetrachne***

Inflorescencia con 1–17 ramas primarias dispuestas digitada o subdigitadamente; flosculos esteriles presentes arriba de los fertiles 25

25(24). Segunda gluma 1-nervada y aristada; inflorescencia con las ramificaciones primarias terminando en un punto desnudo; plantas a menudo estoloniferas . . . . . 8. ***Dactyloctenium***

Segunda gluma 3–5-nervada y sin arista; inflorescencia con las ramificaciones primarias terminando en una espiguilla; plantas no estoloniferas . . . . . 11. ***Eleusine***

26(23). Hojas claramente disticas; limbos con apice punzante 27
Hojas no claramente disticas; limbos con apice no punzante 28

27(26). Inflorescencia consistiendo de una sola espiguilla, presentandose solitaria en las axilas de limbos fasciculados; limbos 0.5–1.5 cm de longitud, conduplicados y subulados; glumas ausentes; plantas estoloniferas; espiguillas sesiles . . . . . 18. ***Monanthochloë***
Inflorescencia consistiendo de mas de 3 espiguillas, presentandose sobre un eje exerto o parcialmente incluido, sin limbos fasciculados; limbos 2–8 cm de longitud, lineares, planos o involutos; glumas presentes; plantas usualmente no estoloniferas; espiguillas pediceladas . . . . . 10. ***Distichlis***

28(26). Plantas hermafroditas 29
Plantas dioicas o andromonoicas 32

29(28). Espiguillas hasta 4.9 mm de longitud 30
Espiguillas 5 o mas mm de longitud 31

30(29). Glumas desiguales; inflorescencia con ramificaciones primarias racemosas; lema membranosa, de color verde o paja; palea membranosa y lisa . . . . . 16. ***Leptochloa***
Glumas casi iguales; inflorescencia con ramificaciones primarias ramificadas, alternas, distantes, ramificaciones secundarias usualmente apresadas; lema cartacea, de color gris o amarillo grisaceo; palea cartacea y escabrosa . . . . . 6. ***Chaboissaea***

31(29). Lemas con aristas 5–20 mm long; callo piloso; vainas con margenes escabrosos; glumas y paleas escabrosas . . . . . 14. ***Gouinia***
Lemas mucronadas o muticas, aristas hasta 3.5 mm long; callo glabro; vainas con margenes lisos; glumas y palea lisas . . . . . 16. ***Leptochloa***

32(28). Espiguillas 1.8–4.7 mm long; segunda gluma 1-nervada; plantas no estoloniferas; espiguillas comprimidas lateralmente, usualmente con 2, ocasionalmente 3 flosculos, el mas inferior perfecto, los flosculos superiores pedicelados, usualmente estaminados, reducidos y/o esteriles; lema cartacea, de color gris o amarillo grisaceo . . . . . 6. ***Chaboissaea***
Espiguillas 9–25 mm long; segunda gluma 2 o mas nervios; plantas estoloniferas; espiguillas rollizas, o comprimidas dorsalmente, con 6–20 flosculos, los flosculos superiores generalmente esteriles; lema coriacea, lustrosa . . . . . 1. ***Allolepis***

33(22). Flosculos esteriles 2, debajo del fertil; espiguillas con 4 flosculos, 2 esteriles, 1 fertil, 1 reducido; pedicelos pilosos; lema del flosculo fertil con 3 aristas; lodiculas ausentes . . . . . 3. ***Blepharidachne***
Flosculos esteriles arriba de los fertiles; espiguillas usualmente (2–)4–20 flosculos; pedicelos glabros; lema del flosculo fertil usualmente con 1 arista; lodiculas presentes 34

34(33). Lema aristada 35
Lema mutica o mucronada 38

35(34). Callo piloso barbado; palea ciliada; limbos con margenes engrosados; pedicelos lisos 36
Callo glabro; palea no ciliada; limbos con margenes no engrosados; pedicelos escabrosos 37

36(35). Lemas ovadas a lanceoladas, apice agudo u obtuso; segunda gluma sin arista; raquilla glabra; inflorescencia con ramificaciones secundarias adpresas; pedicelos 4 mm o menos de longitud . . . . . 13. ***Erioneuron***

Lemas oblatas a forma de abanico, apice truncado; segunda gluma aristada; raquilla pilosa; inflorescencia con ramificaciones secundarias extendidas; pedicelos 5–20 mm de longitud . . . . . 22. ***Neesiochloa***

37(35). Glumas mas cortas que las espiguillas, desiguales, lisas; segunda gluma sin arista; raquilla glabra; nervios laterales de la lema no ciliados, a menudo pubescenctes, los pelos menos de 0.6 mm de longitud . . . . 16. ***Leptochloa***

Glumas casi igualando las espiguillas, casi iguales, escab rosas; segunda gluma aristada, raquilla con un fasciculo de pelos en el apice; nervios laterales de la lema largo ciliados, los pelos 1–3 mm de longitud . . . . . 33. ***Trichoneura***

38(34). Inflorescencia con ramificaciones primarias racemosas; espiguillas usualmente adpresas a lo largo de un raquis central triquetro; lema generalmente glabras o puberulentas en la parte inferior de los nervios . . . . . 16. ***Leptochloa***

Inflorescencia con ramificaciones primarias ramificadas; espiguillas usualmente extendidas a lo largo de las ramificaciones secundarias; lema generalmente pilosas en la parte inferior de los nervios . . . . . 34. ***Tridens***

39(21). Lema entera 40

Lema emarginada, lobada, o partida 45

40(39). Plantas hermafroditas 41

Plantas dioicas o monoicas 43

41(40). Flosculos esteriles debajo de los fertiles; inflorescencia con las ramificaciones primarias racemosas; plantas introducidas para el Nuevo Mundo . . . . . 32. ***Tetrachne***

Flosculos esteriles arriba de los fertiles; inflorescencia con las ramificaciones primarias ramificadas; plantas nativas para el Nuevo Mundo 42

42(41). Callo glabro; glumas casi iguales; espiguillas cleistogamas presentes en la base o en las axilas de los limbos superiores; espiguillas 6–13 flosculos; lema membranosa; palea con las quillas curvadas, finamente escabrido-ciliada . . . . . 30. ***Steirachne***

Callo piloso; glumas desiguales; espiguillas cleistogamas ausentes; espiguillas 1–6 flosculos; lema cartacea; palea con las quillas no curvadas, glabra . . . . . 25. ***Redfieldia***

43(40). Desarticulacion con la lema y palea cayendo separadamente; limbos con apice no punzante; vainas glandulas; plantas no estoloniferas; lema hialina; flosculos estaminados con paleas con las quillas cilioladas; flosculos pistilados con una palea menos de la mitad de longitud de la lema; plantas anuales . . . . . 21. ***Neeragrostis***

Desarticulacion con la lema y palea cayendo como una unidad; limbos con apice punzante; vainas no glandulas; plantas estoloniferas; lema cartacea o coriacea; flosculos estaminados sin paleas con las quillas cilioladas; flosculos pistilados con una palea casi tan larga como la lema; plantas perennes 44

44(43). Espiguillas pistiladas 0.8–3 mm de longitud; lemas de las espiguillas pistiladas sin arista; segunda gluma 1-nervada; espiguillas pistiladas agrupadas en las axilas de los limbos; espiguillas sesiles . . . . . 15. ***Jouvea***

Espiguillas pistiladas 20–40 mm de longitud; lemas de las espiguillas pistiladas con 3 aristas de 3–15 cm de longitud; segunda gluma 3–5-nervada; espiguillas pistiladas solitarias, usualmente exsertas; espiguillas pediceladas . . . . . 27. ***Scleropogon***

45(39). Culmos cespitosos, lenosos como carrizos, 1–3 m de altura; inflorescencia una panicula plumosa; lemas con los margenes largo-vellosos cerca de la base, los pelos 3–5 mm de longitud; flosculos esteriles debajo de los fertiles; desarticulacion con la lema y palea cayendo separadamente; plantas introducidas para el Nuevo Mundo . . . . . 23. ***Neyraudia***

Culmos herbaceos, cespitosos, pero no lenosos como carrizos, 0.4–1.7 m de altura; inflorescencia una panicula no plumosa; lemmas ciliadas cerca de la base, los pelos usualmente menores de 3 mm de longitud; flosculos esteriles arriba de los fertiles; desarticulacion con la lema y palea cayendo como una unidad; plantas nativas para el Nuevo Mundo 46

46(45). Lema sin arista o mucronada, con un apice entero o emarginado; culmos 20–170 cm de altura, erectos . . . . . 34. ***Tridens***

Lema aristada, aristas 1.5 mm o mas de longitud, con un apice emarginado, lobado, o partido, cuando emarginado, entonces las plantas son decumbentes, con culmos de no mas de 15 cm de altura; culmos 4–100 cm de altura, decumbentes, o erectos 47

47(46). Palea con los nervios pronunciados hasta aristas; segunda gluma aristada y mas larga que la lema mas inferior; palea ciliada . . . . . 9. ***Dasyochloa***

Palea con los nervios no pronunciados hasta aristas; segunda gluma sin arista y mas corta o casi igual que la lema mas inferior; palea glaba 48

48(47). Limbos con apice punzante; plantas estoloniferas, presentando fasciculos de hojas; espiguillas agrupadas en capitulos de 2–4, casi ocultas en los fasciculos distales de las hojas; flosculos esteriles heteromorficos . . . . . 20. ***Munroa***

Limbos con apice no punzante; plantas no estoloniferas, ni presentando fasciculos de hojas; espiguillas solitarias, exertas; flosculos esteriles homomorficos 49

49(48). Plantas hermafroditas; lemas con 1 arista hasta 2.5 mm de longitud; glumas desiguales; espiguillas cleistogamas presentes en las vainas superiores e inferiores . . . . . 35. ***Triplasis***

Plantas dioicas; lemas de las espiguillas pistiladas con 3 aristas hasta 6 mm de longitud; glumas casi iguales; espiguillas cleistogamas ausentes . . . . . 28. ***Sohnsia***

Synoptic Key to the New World Genera of the Eragrostideae

1. *Allolepis*
2. *Bealia*
3. *Blepharidachne*
4. *Blepharoneuron*
5. *Calamovilfa*
6. *Chaboissaea*
7. *Crypsis*
8. *Dactyloctenium*
9. *Dasyochloa*
10. *Distichlis*
11. *Eleusine*
12. *Eragrostis*
13. *Erioneuron*
14. *Gouinia*
15. *Jouvea*
16. *Leptochloa*
17. *Lycurus*
18. *Monanthochloë*
19. *Muhlenbergia*
20. *Munroa*
21. *Neeragrostis*
22. *Neesiochloa*
23. *Neyraudia*
24. *Pereilema*
25. *Redfieldia*
26. *Reederochloa*
27. *Scleropogon*
28. *Sohnsia*
29. *Sporobolus*
30. *Steirachne*
31. *Swallenia*
32. *Tetrachne*
33. *Trichoneura*
34. *Tridens*
35. *Triplasis*
36. *Tripogon*
37. *Uniola*
38. *Vaseyochloa*

1. Plants (8)
   - *1. hermaphroditic = 2–9, 11–14, 16, 17, 19, 20, 22–25, 29–38
   2. dioecious = 1, 10, 15, 18, 21, 26–28
   3. monoecious = 3, 27
   4. gynomonoecious = 20
   5. andromonoecious = 6
2. Plants (6)
   1. annual = 2–4, 6–8, 11, 12, 16, 19–22, 24, 29, 33, 35
   2. perennial = 1, 3–6, 8–19, 23, 25–38
3. Plants (7)
   1. stoloniferous = 1, 8, 9, 12, 13, 15, 18, 20, 26, 27, 29, 37
   2. lacking stolons = 2–7, 10–14, 16, 17, 19, 21–25, 28–36, 38
4. Plants (7)
   1. rhizomatous = 1, 3, 5, 10–12, 14, 15, 18, 19, 23, 25, 28–32, 34–38
   2. lacking rhizomes = 1, 2, 4, 6–9, 12–14, 16, 17, 19–22, 24, 26, 27, 29, 33, 34
5. Flowering culms (6)
   1. erect = 1, 2, 4–14, 16, 17, 19, 22–38

2. decumbent = 3, 4, 6, 7, 9, 12, 15, 19–21, 24
3. mat forming = 3, 7, 8, 10, 12, 15, 18–21, 27, 29

6. Flowering culms (5)
1. caespitose = 1, 2, 4–6, 8–17, 19, 22, 23, 25–38
2. not caespitose = 3, 4, 6, 7, 12, 13, 18–21, 24

7. Flowering culms (6)
1. glabrous = 1, 2, 4–16, 18, 19, 21–27, 29, 30, 32–38
2. hairy = 2–4, 17, 19–21, 28, 31, 35

8. Flowering culms (5)
1. pubescent = 2–4, 17, 19–21, 28, 35
2. pilose = 19, 21, 31
3. villous = 19, 21

9. Flowering culms (6)
1. with viscid internodes = 12
2. with glaucous internodes = 19
*3. with neither viscid nor glaucous internodes = 1–38

10. Leaves (5)
1. cauline = 1–8, 10–12, 14–19, 21–25, 29–35, 37, 38
2. mostly basal = 3, 4, 9, 12, 13, 19, 20, 26–28, 32, 36

11. Leaves (8)
1. distinctly distichous = 10, 15, 18
*2. not distinctly distichous = 1–9, 11–14, 16, 17, 19–38

12. Leaves (7)
1. with sheath auricles = 2, 16, 19
2. with blade auricles = 24
3. without auricles = 1, 3–23, 25–38

13. Sheaths (5)
1. longer than internodes = 2, 4, 5, 10–12, 14–16, 18, 19, 24–26, 28, 29, 31, 37, 38
2. shorter than internodes = 1, 3, 4, 6–9, 11–17, 19–24, 27–30, 32–36

14. Sheaths (8)
1. glandular = 12, 21
*2. not glandular = 1–20, 22–38

15. Sheaths (5)
1. with smooth margins = 1–7, 9–13, 15, 16, 18, 19, 22–27, 29–34, 36–38
2. with scabrous margins = 2, 4, 8, 12, 14, 17, 19–21, 24, 28, 35

16. Sheaths (6)
1. not ciliate = 1, 2, 4–8, 10–12, 14–16, 18, 19, 21–23, 25, 27–30, 32–38
2. ciliate = 3, 9, 10, 12–14, 17, 19–21, 24, 26, 29, 31

17. Ligule (8)
1. a membrane = 2, 4, 6, 8, 14, 16, 17, 19, 24, 26, 33
2. a ciliate membrane = 1, 3, 10–14, 16, 18, 19, 22, 34, 36, 38
3. a line of hairs = 5, 7, 9, 12, 15, 20, 21, 23, 25, 27–32, 34, 35, 37
4. absent = 3

18. Leaf blades (7)
1. filiform = 4, 5, 12, 19, 25, 29, 36
2. linear = 1–11, 13–20, 22–24, 26–38
3. triangular = 3, 12, 21

19. Leaf blades (6)
1. flat = 1–4, 6–8, 10–12, 14, 16, 17, 19–24, 27–35, 37, 38
2. conduplicate = 6, 12, 13, 17–21, 27, 37
3. involute = 2–7, 9, 10, 12, 14, 15, 19, 25, 26, 28, 29, 32, 34, 35, 36, 38
4. terete = 29
5. plicate = 3

20. Leaf blades (7)
1. pungent = 3, 9, 10, 12, 13, 15, 18–20, 26, 27, 31
2. not pungent = 1, 2, 4–8, 11–14, 16, 17, 19, 21–25, 28–30, 32–38

21. Leaf blades (6)
1. with thickened margins = 2, 9, 13, 17, 19, 20, 22
*2. without thickened margins = 1, 3–8, 10–12, 14–16, 18, 19, 21, 23–38

22. Inflorescence (8)
1. consisting of a single spikelet = 15, 18
2. consisting of 2 or 3 spikelets = 15, 26
*3. consisting of more than 3 spikelets = 1–17, 19–25, 27–38

23. Inflorescence (9)
1. a spike = no taxa
2. a raceme = 9, 22, 26, 27, 36
*3. a panicle = 1–17, 19–25, 27–35, 37, 38

24. Inflorescence (6)
1. exserted = 1–8, 10–17, 19, 21–38
2. partially included in upper sheath = 3, 6, 7, 9, 12, 18, 19, 21, 24, 26, 29, 31, 35
3. fully included in upper sheath = 10, 15, 20

25. Main axis (6)
1. glandular = 2, 12, 21, 22
*2. not glandular = 1, 3–17, 19, 20, 23–38

26. Main axis (5)
1. smooth = 1, 2, 4–9, 11–13, 15, 19, 21–23, 25, 26, 29, 32, 34, 37
2. scabrous = 2, 4, 6, 10, 12, 14, 16, 17, 19, 20, 27, 30, 31, 33–36, 38
3. hairy = 3, 12, 19, 21, 24, 28

27. Primary branches (7)
1. digitate = 8, 11
*2. not digitate = 1–7, 9, 10, 12–17, 19–38

28. Primary branches (6)
1. appressed to main axis = 1, 3, 5–7, 9, 10, 12, 13, 15–17, 19–21, 24, 27–29, 31, 32, 34, 36, 37

2. spreading from main axis = 2, 4–6, 8, 11–14, 16, 19, 22–24, 26, 28–30, 33–35, 37, 38
3. divaricate = 8, 12, 14, 19, 25, 29, 34
4. reflexed = 8, 19, 29

29. Primary branches (8)
1. terminating in a spikelet = 1–7, 9–17, 19–38
2. terminating in a bare point = 8

30. Primary branches (7)
1. with appressed secondary branches = 1–3, 5, 6, 10, 12, 13, 15, 16, 19, 21, 23, 27–31, 35, 37, 38
2. with spreading secondary branches = 2, 4, 5, 12, 19, 22, 25, 29, 34, 37, 38
3. reduced to fascicle of spikelets = 9, 12, 24

31. Pedicels (6)
1. glandular = 2, 4, 21, 22
*2. not glandular = 1, 3, 5–7, 9, 10, 12–14, 16, 17, 19–21, 23–38

32. Pedicels (6)
1. glabrous = 1, 2, 4–6, 9, 10, 12–14, 16, 17, 19–27, 29, 30, 32–35, 37, 38
2. hairy = 3, 19, 21, 24, 28, 31

33. Pedicels (5)
1. pubescent = 3, 19, 21, 28
2. pilose = 19, 21, 24, 31
3. villous = 19, 21, 24

34. Pedicels (5)
1. smooth = 1, 3–5, 9, 12, 13, 19, 21, 22, 24–26, 29, 32, 34, 37
2. scabrous = 2, 6, 10, 12, 14, 16, 17, 19, 20, 23, 24, 27, 28, 30, 31, 33–35, 38

35. Cleistogamous spikelets (7)
1. present = 12, 16, 19, 29, 30, 35
*2. absent = 1–29, 31–34, 36–38

36. Disarticulation (9)
1. below glumes = 7, 19, 29, 37
2. above glumes = 1–36, 38

37. Disarticulation (8)
1. lemma and palea falling as a unit = 1–20, 22, 24–36, 38
2. lemma and palea falling separately = 7, 12, 21, 23

38. Callus (7)
1. hairy = 2, 3, 5, 6, 13, 14, 19, 22, 24, 25, 27, 28, 31, 35, 38
2. glabrous = 1, 4, 6–12, 15–21, 23, 26, 27, 29, 30, 32–34, 36, 37

39. Spikelets (8)
1. up to 4.9 mm long = 2, 4, 6–8, 12, 16, 17, 19, 24, 29, 32, 34, 36
2. greater than 4.9 mm long = 1, 3, 5, 8–16, 18–23, 25–28, 30–38

40. Spikelets (7)
1. in clusters = 12, 15, 20, 21, 24
2. paired = 17
3. solitary = 1–14, 16, 18, 19, 22, 23, 25–38

41. Spikelets (8)
1. subtended by sterile, bristle-like spikelets = 24
*2. not subtended by sterile, bristle-like spikelets = 1–23, 25–38

42. Spikelets (7)
1. laterally compressed = 2, 3, 5–16, 18–23, 25–28, 30–32, 34–38
2. terete = 1, 2, 4, 12, 16, 17, 19, 24, 27, 29, 33
3. dorsiventrally compressed = 19

43. Spikelets (7)
1. sessile = 7, 8, 11, 12, 15, 18, 21, 24
2. subsessile = 3, 6, 7, 12, 14, 16, 19–21, 24, 29, 32, 33, 36
3. pedicellate = 1–6, 9, 10, 12–14, 16, 17, 19–31, 33–35, 37, 38

44. Glumes (8)
*1. present = 1–17, 19–38
2. absent = 15, 18, 20

45. Glumes (8)
1. shorter than spikelets = 1, 4, 6–8, 10–17, 19–26, 28–30, 32, 34–38
2. equalling spikelets = 2–7, 13, 19, 27, 28, 31, 33, 34
3. exceeding spikelets = 2, 19

46. Glumes (7)
1. unequal = 4, 5, 8, 11–16, 19–21, 23–26, 29, 34–36, 38
2. more or less equal = 1–4, 6, 7, 9, 10, 12, 13, 17, 19, 20, 22, 24, 27, 28, 30, 31–34, 37

47. Glumes (5)
1. smooth = 1–5, 8–10, 12, 13, 15, 16, 19–32, 34, 37, 38
2. scabrous = 2, 6, 7, 11, 12, 14, 17, 19, 33, 35, 36

48. Glumes (7)
1. glabrous = 1, 3–16, 19–38
2. hairy = 2, 17, 19, 21

49. First glume (8)
1. up to 1-nerved = 1–9, 11–16, 19–25, 27–30, 32–36
2. greater than 1-nerved = 10, 14, 17, 19, 26, 27, 31, 37, 38

50. Second glume (7)
1. shorter than lower lemma = 1, 4, 6, 8, 10–17, 19–21, 23–26, 28, 30, 32, 34, 37, 38
2. subequal to lower lemma = 2–5, 7, 19, 22, 27–29, 31, 33–36
3. longer than lower lemma = 2, 9, 13, 19

51. Second glume (7)
1. awned = 6, 8, 9, 17, 19, 22, 24, 27, 33

2. unawned = 1–7, 10–16, 19–21, 23, 25–32, 34–38

52. Second glume (8)
    1. up to 1-nerved = 2–9, 12, 13, 15–17, 19–25, 28–30, 32–36
    2. greater than 1-nerved = 1, 10, 11, 14, 16, 17, 19, 21, 26, 27, 31, 34, 37, 38

53. Rachilla (8)
    1. pronounced between florets = 1, 3, 6, 8–16, 18, 20–23, 25–28, 30–38
    *2. not pronounced between florets = 1, 2, 4–6, 17, 19, 24, 29

54. Rachilla (7)
    1. hairy = 3, 22, 23, 28, 30, 31, 38
    2. glabrous = 1, 6, 8–16, 18, 20, 21, 25–27, 32–37

55. Florets (9)
    1. up to 1 per spikelet = 2, 4–7, 17, 19, 24, 29
    2. 2–4 per spikelet = 3, 6, 8, 12, 14, 16, 18, 20, 23, 25–28, 31, 34, 35
    3. more than 4 per spikelet = 1, 8–16, 18, 20–23, 25–28, 30–34, 36–38

56. Sterile florets (7)
    1. present = 1, 3, 6, 8–18, 20–28, 30–38
    *2. absent = 2, 4–7, 12, 19, 29

57. Sterile florets (8)
    1. above fertile florets = 1, 6, 8–16, 18, 20–22, 25–28, 30, 31, 33–38
    2. below fertile florets = 3, 23, 32, 37

58. Sterile florets (7)
    *1. homomorphic = 1, 3, 6, 8–18, 21–23, 25–28, 30–38
    2. heteromorphic = 20, 24

59. Lemma (8)
    1. entire = 1, 4–8, 10–12, 14–19, 21, 24–27, 29–32, 37, 38
    2. emarginate = 13, 16, 19, 20, 22, 33, 34, 36
    3. lobed = 2, 9, 13, 16, 20, 35
    4. cleft = 3, 9, 23, 28

60. Lemma (8)
    1. awned = 2, 3, 6, 8, 9, 13, 14, 16, 17, 19–24, 27, 28, 33, 35, 36
    2. mucronate = 6, 8, 12, 16, 19, 21, 25, 30, 34
    3. unawned = 1, 4–7, 10–12, 15, 16, 18, 19, 26, 27, 29, 31, 32, 37, 38

61. Lemma (7)
    1. glabrous = 1, 5, 7, 8, 10–12, 15, 16, 18, 19, 21, 22, 26–30, 32, 33, 36, 37
    2. hairy = 2–6, 9, 13, 14, 16, 17, 19–21, 23–25, 28, 29, 31, 34, 35, 38

62. Lemma (6)
    1. pubescent = 6, 16, 17, 19, 21, 24, 25, 29, 34, 38
    2. pilose = 13, 14, 19, 21, 24, 28, 29, 38
    3. villous = 2–4, 9, 14, 19, 21, 23, 31, 35

63. Lemma (5)
    1. smooth = 1, 3–5, 8–10, 12, 13, 15, 16, 18, 19, 21–23, 25–29, 31, 32, 34, 35, 37, 38
    2. scabrous = 2, 6, 7, 11, 12, 14, 17, 19, 20, 24, 30, 33, 36

64. Lemma (9)
    1. up to 1-nerved = 5, 7, 29
    2. with more than 1 nerve = 1–4, 6, 8–28, 30–38

65. Lemma (7)
    1. hyaline = 7, 12, 19, 21, 34
    2. membranous = 2–4, 7–9, 11–14, 16, 17, 19, 20, 22–24, 28–30, 32–36
    3. chartaceous = 5, 6, 12, 15, 17, 19, 25, 31, 38
    4. coriaceous = 1, 10, 12, 18, 20, 26, 27, 37
    5. cartilaginous = no taxa
    6. indurate = 12, 18

66. Lemma (6)
    1. with glabrous nerves = 1, 5, 7, 8, 10–12, 14–19, 21, 25–30, 32, 36–38
    2. with hairy nerves = 2–6, 9, 13, 16, 19, 20, 22–24, 28, 31, 33–35

67. Palea (7)
    1. glabrous = 1, 6–8, 10–12, 14–16, 18–21, 23, 25–30, 32–34, 37, 38
    2. hairy = 2–5, 9, 12, 13, 17, 19, 21, 22, 24, 31, 34, 35

68. Palea (8)
    1. extending into awns = 6, 14, 19
    2. not extending into awns = 1–13, 15–38

69. Palea (6)
    1. hyaline = 7, 12, 19, 21, 34
    2. membranous = 2–4, 8–14, 16, 17, 19, 20, 22–24, 27–30, 32–36
    3. chartaceous = 5, 6, 10, 12, 15, 19, 25–27, 31, 37, 38
    4. coriaceous = 1, 18
    5. cartilaginous = no taxa
    6. indurate = 18

70. Palea (5)
    *1. margins enfolding fruit = 1, 2, 4, 6, 10, 12, 17–19, 24, 26
    2. margins not enfolding fruit = 3, 5, 7–9, 11, 13–16, 20–23, 25, 27–38

71. Palea (7)
    1. ciliate = 1, 3, 5, 9, 12–14, 21, 22, 31, 37
    *2. not ciliate = 2, 4, 6–8, 10–12, 14–20, 23–30, 32–36, 38

72. Palea (6)
    1. smooth = 1–5, 7–10, 12, 13, 15, 16, 18–23, 25–29, 31–38

2. scabrous = 6, 11, 12, 14, 17, 19, 24, 30

73. Lodicules (6)
*1. present = 1, 2, 4–6, 8–17, 19–38
2. absent = 3, 7, 18, 20, 27, 29

74. Lodicules (6)
1. adnate to palea = 13, 34
*2. not adnate to palea = 1, 2, 4–6, 8–12, 14–17, 19–38

75. Lodicules (5)
1. truncate = 2, 4–6, 8, 10, 12, 14–17, 19–21, 24, 27–32, 35–38
2. rounded = 25, 33, 34
3. cuneate = 1, 13
4. acuminate = 11, 22, 23

76. Stamens (6)
1. up to 2 = 3, 7, 12, 13, 16, 20, 24, 29, 30, 36
2. greater than 2 = 1–29, 31–38

77. Anther (6)
1. yellow = 1, 3, 5, 8–13, 15–21, 23–25, 27, 29, 32, 36, 37
2. reddish purple = 2, 4, 6, 7, 12, 14–17, 19, 25, 28–35, 38
3. olivaceous plumbeous = 6, 19, 22, 26, 29

78. Stigmas (5)
1. up to 2 = 1–25, 27–38
2. greater than 2 = 20

79. Fruit (8)
1. with free pericarp = 5, 7, 8, 11, 29, 32, 37
*2. with adnate pericarp = 1–4, 6, 9, 10, 12–28, 30, 31, 33–36, 38

80. Caryopsis (6)
1. dorsiventrally compressed = 16, 20, 22, 33–35
2. terete = 2, 4–15, 17–19, 21, 23, 25, 27, 29–32, 36–38
3. laterally compressed = 3, 12, 16, 19, 24, 26

81. Caryopsis (9)
1. with persistent style bases = 31, 38
*2. lacking persistent style bases = 1–30, 32–37

82. Caryopsis (8)
1. with pronounced, sharp-pointed style bases = 38
2. with relatively short and blunt style bases = 31

83. Base chromosome number, x = (5)
1. 7 = 3, 20
2. 8 = 2, 4, 6, 7, 9, 13, 20
3. 9 or more = 1, 5, 7, 8, 10–12, 14–17, 19, 21, 24–27, 29, 31, 33–37

84. Distribution by continent (5)
1. North America = 1–13, 16–21, 23–29, 31–38
2. Central America = 7, 8, 10–12, 14–21, 23, 24, 29, 34–37
3. South America = 3, 6, 8, 10–14, 16–20, 22, 24, 27, 29, 30, 32–34, 36, 37
4. Africa = 7, 8, 11, 12, 16, 29, 32–34, 36
5. Europe = 7, 8, 11, 12, 16, 29
6. Asia = 7, 8, 11, 12, 16, 19, 29, 33, 36
7. Australia = 8, 10–12, 16, 29
8. Pacific Islands = 11, 12, 16, 19, 29, 33

85. Distribution for North America and Mesoamerica (5)
1. Greenland = no taxa
2. Alaska = 10, 19
3. Canada = 10, 12, 19, 20, 29, 35
4. United States = 1, 3–5, 7–13, 16–21, 23, 25, 27, 29, 31–38
5. Mexico = 1–4, 6–21, 23, 24, 26–29, 33–37
6. Central America = 8, 11, 12, 14–17, 19, 24, 29, 35, 37
7. West Indies = 8, 11, 12, 14, 16, 18, 19, 29, 36, 37

86. Regions of the United States divided by states (5)
1. Northern Pacific Region = 7, 8, 10–12, 16, 19, 29
2. California Region = 7, 8, 10–12, 16, 18–20, 27, 29, 31
3. Southwestern Region = 4, 5, 8–13, 16, 17, 19, 20, 25, 27, 29, 34, 35
4. Northern Plains Region = 8–13, 16, 19–21, 25, 29, 35
5. Central Plains Region = 3, 5, 8–13, 16, 19–21, 25, 29, 34, 35
6. Texan Region = 1, 3–5, 8–13, 16, 18–21, 25, 27, 29, 33–38
7. Southeastern Region = 8, 10–12, 16–19, 21, 23, 29, 34, 35, 37
8. Midsouth Region = 8, 11, 12, 16, 19, 21, 29, 37
9. Great Lakes Region = 7, 8, 11, 12, 16, 19, 21, 29
10. North Atlantic Region = 8, 10–12, 16, 19, 29
11. Central Atlantic Region = 8, 10–12, 16, 19, 29, 32, 37
12. Alaskan Region = 11, 12, 19

87. Distribution for South America (5)
1. Colombia = 11, 12, 17, 19, 24, 29, 37
2. Venezuela = 11, 12, 16, 19, 24, 29, 30
3. Guiana, Surinam, or French Guiana = 11, 12, 24, 29, 30
4. Ecuador = 10–12, 17, 19, 24, 29, 33, 37
5. Peru = 11–13, 19, 24, 29, 33
6. Brazil = 11, 12, 14, 16, 19, 22, 24, 29, 30
7. Bolivia = 6, 10–14, 16, 17, 19, 20, 29, 34
8. Paraguay = 11, 12, 14, 16, 29
9. Uruguay = 8, 11, 12, 16, 29
10. Chile = 8, 10–12, 19, 20, 27, 29, 36
11. Argentina = 3, 6, 8, 10–14, 16–20, 27, 29, 32, 34, 36

88. Whether native or introduced (6)
1. Native to New World = 1–6, 9–22, 24–31, 33–38
2. Introduced to New World = 7, 8, 11, 12, 16, 23, 29, 32

Taxonomy

ERAGROSTIDEAE Stapf, Fl. Cap. 7:316. 1898.

Plants hermaphroditic (30), dioecious (8), monoecious (2), gynomonoecious (1), or andromonoecious (1); annual (17) or perennial (32); stoloniferous (12) or lacking stolons (29); rhizomatous (22) or lacking rhizomes (22). Flowering culms erect (33), decumbent (11), or mat forming (12); caespitose (32) or not caespitose (11); glabrous (33) or hairy (10); pubescent (9/10), pilose (3/10), or villous (2/10); with viscid internodes (1), glaucous internodes (1), or with neither viscid nor glaucous internodes (38). Leaves cauline (31) or mostly basal (12); distinctly distichous (2) or not distinctly distichous (36); with sheath auricles (3), with blade auricles (1), or without auricles (36). Sheaths longer (19) or shorter than internodes (29); glandular (2) or not glandular (37); with smooth (31) or with scabrous margins (12); not ciliate (30) or ciliate (14). Ligule a membrane (11), a ciliate membrane (14), a line of hairs (18), or absent (1). Leaf blades filiform (7), linear (35), or triangular (3); flat (30), conduplicate (10), involute (21), terete (1), or plicate (1); pungent (12) or not pungent (29); with (7) or without thickened margins (32). Inflorescence consisting of a single spikelet (2), two or three spikelets (2), or more than three spikelets (36); a raceme (5/37) or a panicle (35/37); exserted (35), partially included in upper sheath (13), or fully included (3). Main axis glandular (4/37) or not glandular (34/37); smooth (22/37), scabrous (18/37), or hairy (6/37). Primary branches digitate (2/37) or not digitate (35/37); appressed to main axis (24/37), spreading from main axis (23/37), divaricate (7/37), or reflexed (3/37); terminating in a spikelet (36/37) or terminating in a bare point (1/37); with appressed secondary branches (21/27), with spreading secondary branches (11/27), or reduced to fascicle of spikelets (3/27). Pedicels glandular (4/34) or not glandular (31/34); glabrous (29/32) or hairy (6/32); pubescent (4/6), pilose (4/6), or villous (3/6); smooth (17/32) or scabrous (19/32). Cleistogamous spikelets present (6) or absent (36). Disarticulation below glumes (4) or above glumes (37); lemma and palea falling as a unit (35/37) or lemma and palea falling separately (4/37). Callus hairy (15) or glabrous (26).

Spikelets in clusters (5), paired (1), or solitary (33); subtended by sterile, bristle-like spikelets (1) or not subtended by sterile, bristle-like spikelets (37); laterally compressed (32), terete (11), or dorsiventrally compressed (1); sessile (8), subsessile (14), or pedicellate (31); 0.5–40 (average 9.06) mm long. Glumes present (37) or absent (3); shorter than spikelets (30/36), about equalling spikelets (13/36), or much exceeding spikelets (2/36); unequal (21/37) or more or less equal (23/37); smooth (29/37) or scabrous (11/37); glabrous (35/37) or hairy (4/37). First glume 0–8-nerved (usually 2). Second glume shorter than lower lemma (25/37), about same length as lower lemma (15/37), or longer than lower lemma (4/37); awned (9/37) or unawned (31/37); 1–11-nerved (usually 2). Rachilla pronounced between florets (30/37) or not pronounced between florets (9/37); hairy (7/30) or glabrous (23/30). Florets 1–60 (usually 7) per spikelet. Sterile florets present (32) or absent (8); above fertile florets (27/30) or below fertile florets (4/30); homomorphic (30/32) or heteromorphic (2/32). Lemma entire (26), emarginate (8), lobed (6), or cleft (4); awned (20), mucronate (9), or unawned (19); glabrous (22) or hairy (22); pubescent (10/20), pilose (8/20), or villous (10/20); smooth (27) or scabrous (13); 1–4–13-nerved; hyaline (5), membranous (25), chartaceous (9), coriaceous (8), or indurate (2); with glabrous nerves (24) or with hairy nerves (18). Palea glabrous (26/37) or hairy (15/37); extending into awns (3) or not extending into awns (37); hyaline (5), membranous (26), chartaceous (12), coriaceous (2), or indurate (1); margins enfolding fruit (11) or margins not enfolding fruit (27); ciliate (11) or not ciliate (29); smooth (32) or scabrous (8). Lodicules present (35) or absent (6); adnate to palea (2/35) or not adnate to palea (34/35); truncate (25/33), rounded (3/33), cuneate (2/33), or acuminate (3/33). Stamens 1 (2), 2 (9), or 3 (37). Anther yellow (24), reddish purple (20), or olivaceous plumbeous (5). Stigmas 2 (37/37) or 3 (1/37). Fruit with free pericarp (7) or with adnate pericarp (31). Caryopsis dorsiventrally compressed (6/36), terete (27/36), or laterally compressed (6/36); with persistent style bases (2) or lacking persistent style bases (36). Caryopsis with pronounced, sharp-pointed style bases (1/2) or with relatively short and blunt style bases (1/2). Base chromosome number of x = 7 (2/32), x = 8 (7/32), x = 9 (4/32), x = 10 (18/32), x = 12 (1/32), x = 20 (3/32), or x = 30 (1/32).

DISTRIBUTION.—North America (34) (Alaska (2/36), Canada (6/36), United States (29/36), Mexico (31/36), or West Indies (7/36)), Central America (20), South America (23) (Colombia (7/23), Venezuela (7/23), Guiana, Surinam, French Guiana (5/23), Ecuador (9/23), Peru (7/23), Brazil (9/23), Bolivia (12/23), Paraguay (5/23), Uruguay (5/23), Chile (9/23), or Argentina (18/23)), Africa (10), Europe (6), Asia (9), Australia (6), or Pacific Islands (6). Regions of United States divided by states: Northern Pacific Region (8/29), Californian Region (12/29), Southwestern Region (17/29), Northern Plains Region (13/29), Central Plains Region (16/29), Texan Region (24/29), Southeastern Region (14/29), Midsouth Region (8/29), Great Lakes Region (8/29), North Atlantic Region (7/29), Central Atlantic Region (9/29), or Alaskan Region (3/29). Genus native to the New World (34) or genus introduced to the New World (8).

1. ***Allolepis*** Soderstr. & H.F. Decker, Madrono 18:36. 1965.—Type: *Allolepis texana* (Vasey) Soderstr. & H.F. Decker.

Plants dioecious; perennial; stoloniferous (5–25 cm long, 1–4 mm wide, glabrous); rhizomatous or lacking rhizomes. Flowering culms erect (10–70 cm long, nodes 3 or more); caespitose; glabrous. Leaves cauline; without auricles. Sheaths shorter than internodes; with smooth margins; not ciliate. Ligule a ciliate membrane (0.5–1.4 mm long). Leaf blades

linear; flat (5–30 cm long, 2.5–6 mm wide, sometimes involute toward tip); not pungent; without thickened margins (edges scabrous). Inflorescence a panicle (3–23 cm long, 1–6 cm wide); narrow; exserted. Main axis smooth. Primary branches appressed to main axis (usually floriferous to base); terminating in a spikelet; with appressed secondary branches. Pedicels glabrous; smooth. Disarticulation above glumes; lemma and palea falling as a unit. Callus glabrous. Spikelets 9–25 mm long; solitary (ovate to lanceolate-linear, stamineous, lustrous); terete (female spikelets slightly compressed); pedicellate. Glumes shorter than spikelets; more or less equal; smooth; glabrous. First glume 1-nerved (up to 4 to 5 additional faint nerves present in female spikelet). Second glume shorter than lower lemma; unawned; 3-nerved (additional 1 or 2 pairs of faint nerves sometimes present in female spikelet). Rachilla pronounced or not pronounced between florets; glabrous. Florets 6–20 per spikelet. Sterile florets present; above fertile florets. Lemma entire; unawned; glabrous; smooth; strongly 3-nerved; coriaceous; with glabrous nerves. Palea glabrous; not extending into awns; coriaceous; ciliate; smooth. Lodicules cuneate. Stamens 3. Anthers yellow. Stigmas 2. Base chromosome number of x = 20.

DISTRIBUTION.—North America. United States (Texan Region) and Mexico. Native to the New World.

REMARKS.—The only species in the genus was first described by Vasey (1890) as belonging to the genus *Poa*. He later changed his mind and redescribed it in *Seiglingia* Bernhardi, a genus now placed in *Danthonia* DC. (Clayton and Renvoize, 1986). Due to its dioecious habit, characteristic inflorescence, subcoriaceous glumes, exserted styles, and grains enclosed by a coriaceous palea base, Scribner (1899) transferred this species to *Distichlis*.

Allolepis is very similar to *Distichlis*, sharing the dioecious habit, a ciliate membrane for a ligule, disarticulation above the glumes, and many florets per spikelet. The genus seems closely allied with other members of the subtribe Monanthochloinae, which includes *Distichlis, Jouvea, Monanthochloë, Reederochloa,* and *Swallenia* (Clayton and Renvoize, 1986; Peterson et al., 1995). Soderstrom and Decker (1965) found normal, eragrostoid-like, bicellular microhairs in *Allolepis* and bicellular microhairs with enlarged bases that are sunken in the leaf epidermis in all species of *Distichlis, Monanthochloë,* and *Reederochloa*. In addition to these differences, *Allolepis* differs from *Distichlis* by possessing 3-nerved lemmas, long stolons, and a nondistichous leaf arrangement.

2. ***Bealia*** Scribn., True Grasses 104, fig. 45a. 1890. Trans. from Engl. and Prantl, Nat. Pflanzenfam., by Scribner and Southworth.—Type: *Bealia mexicana* Scribn.

Plants annual; lacking stolons; lacking rhizomes. Flowering culms erect (much branched at lower nodes, 9–35 cm tall); caespitose; glabrous or hairy; pubescent. Leaves cauline; with sheath auricles. Sheaths longer than internodes; with smooth or scabrous margins; not ciliate. Ligule a membrane (margins decurrent, usually splitting to form auricles). Leaf blades linear (1–7 cm long, 0.6–1.4 mm wide); flat or involute; not pungent; with thickened whitish margins. Inflorescence a panicle (3–10 cm long, 1.5–3.2 cm wide); exserted (sinuously ascending or flexuous). Main axis minutely glandular; smooth or scabrous. Primary branches spreading from main axis; terminating in a spikelet; with appressed or spreading secondary branches. Pedicels minutely glandular; glabrous; scabrous. Disarticulation above glumes; lemma and palea falling as a unit. Callus hairy. Spikelets 3.2–4.8 mm long; solitary (grayish green); laterally compressed or terete; pedicellate (pedicels 1–5.5 mm long). Glumes about equalling or much exceeding spikelets; more or less equal; smooth or scabrous; hairy. First glume 1-nerved. Second glume about same length or longer than lower lemma; unawned; 1-nerved. Florets 1 per spikelet. Lemma lobed (lobes 1–1.4 mm long); awned (awn crisped-curled to flexuous, 4–6.5 mm long); hairy; villous; scabrous; 3-nerved; membranous; with hairy nerves. Palea hairy (appressed villous on lower $^2/_3$); not extending into awns; membranous; smooth. Lodicules truncate. Stamens 3. Anther reddish purple. Stigmas 2. Caryopsis terete (fusiform, olive brown). Base chromosome number of x = 8.

DISTRIBUTION.—North America. Mexico. Native to the New World.

REMARKS.—Vasey (1899) and Scribner (in Hackel, 1890) were the first to recognize the distinctive morphological features that distinguish *Bealia mexicana* from other members of *Muhlenbergia*. It has deeply bilobed lemmas with rounded to obtuse lobes, pilose or villous glumes that are 1-nerved and subequal to or longer than the lemma, a crisped-curled to flexuous awn borne between the lobes, and minutely glandular pedicels. Besides the morphological differences, *Bealia* has a base chromosome number of x = 8 and has relatively large chromosomes compared to those of *Muhlenbergia* (Peterson, 1988, 1989). Although *Blepharoneuron, Dasyochloa, Erioneuron,* and *Munroa* share a base chromosome number of x = 8, only *Blepharoneuron* appears to be closely related to *Bealia*. Based on restriction fragment analysis of chloroplast DNA (cpDNA), *Bealia* and *Blepharoneuron* always form a clade within the monophyletic subtribe Muhlenbergiinae (Duvall et al., 1994). A recent study also indicated that *Bealia* is allozymically very similar to *Muhlenbergia argentea* Vasey (Peterson et al., 1993).

3. ***Blepharidachne*** Hack., in Engl. and Prantl, Nat. Pflanzenfam. 2(2):68. 1887.—Lectotype: *Blepharidachne kingii* (S. Watson) Hack. (see Hitchc., U.S.D.A. Bull. 772:78. 1920).

Plants hermaphroditic or monoecious; annual (rarely) or perennial; lacking stolons; rhizomatous. Flowering culms decumbent or mat forming (3–8(–20) cm tall); not caespitose (from a knotty base); hairy; pubescent. Leaves cauline or basal;

not distinctly distichous; without auricles. Sheaths shorter than internodes; with smooth margins; ciliate. Ligule a ciliate membrane or absent. Leaf blades linear or triangular (8–20 mm long, clustered, sometimes with dense covering of white indumentum); flat, involute, or plicate; pungent. Inflorescence a panicle (1–3 cm long, narrow, oblong); exserted or partially included in upper sheath. Main axis hairy. Primary branches appressed to main axis; terminating in a spikelet; with appressed secondary branches. Pedicels hairy; pubescent; smooth. Disarticulation above glumes (but not between florets); lemma and palea falling as a unit. Callus hairy. Spikelets 5–7 mm long; solitary; laterally compressed; subsessile or pedicellate. Glumes about equalling spikelets; more or less equal; smooth; glabrous. First glume 1-nerved. Second glume about same length as lower lemma; unawned; 1-nerved. Rachilla pronounced between florets; hairy. Florets 4 per spikelet (but only third floret fertile). Sterile florets present (2, staminate or sterile, below fertile floret and usually 1, reduced to 3-aristate rudiment, above fertile floret). Lemma cleft (3-cleft, 2 basal lemmas with deeper incisions); awned (2 lateral lobes mucronate, third lemma 3-aristate); hairy; villous; smooth; 3-nerved; membranous; with hairy nerves. Palea hairy; not extending into awns; membranous; margins not enfolding fruit; ciliate; smooth. Lodicules absent. Stamens 2 or 3 (rarely 1). Anther yellow. Stigmas 2. Caryopsis laterally compressed. Base chromosome number of x = 7.

DISTRIBUTION.—North America and South America. United States (Central Plains Region and Texan Region) and Mexico. South America (Argentina). Native to the New World.

REMARKS.—Watson (1871) initially published two North American species in *Eremochloë,* which is an illegitimate name because of the previously published genus *Eremochloa* Büse. Hackel (1887) later proposed the new name to replace the illegitimate one. Hitchcock (1920) recognized the disjunct nature of the genus and transferred the South American *Munroa benthamiana* Hack. to *Blepharidachne.* Four species are recognized in this North/South American disjunct genus, two in Argentina and two in western North America. The South American species have flat leaf blades, three stamens, and an annual habit, whereas the North American species have folded or involute leaf blades, two stamens, and a perennial habit (Sanchez, 1983b). Based on similar anatomical characteristics, Sanchez (1983a) placed the genus near *Dasyochloa.* Hunziker and Anton (1979) recognized the morphological similarities of this genus to *Munroa.* The cleft, lobed to emarginate lemma apex also unites these three genera with *Erioneuron. Munroa* appears to be the closest sister to *Blepharidachne* because they share a base chromosome number of x = 7.

4. ***Blepharoneuron*** Nash, Bull. Torrey Bot. Club 25:88. 1898.—Type: *Blepharoneuron tricholepis* (Torr.) Nash.

Plants annual or perennial; lacking stolons; lacking rhizomes. Flowering culms erect or decumbent (10–70 cm tall); caespitose or not; glabrous or hairy; pubescent. Leaves cauline or mostly basal; without auricles. Sheaths longer or shorter than internodes; with smooth or scabrous margins; not ciliate. Ligule a membrane (translucent to whitish, margins decurrent). Leaf blades filiform to linear; flat or involute; not pungent. Inflorescence a panicle (3–25 cm long, 1–10 cm wide); exserted. Main axis smooth or scabrous. Primary branches spreading from main axis; terminating in a spikelet; with spreading secondary branches. Pedicels glandular (minutely granular just below spikelet); glabrous (capillary, wiry, and flexuous, usually nodding to reflexed); smooth. Disarticulation above glumes; lemma and palea falling as a unit. Callus glabrous. Spikelets 2–3.9 mm long; solitary (grayish green); terete; pedicellate (pedicels 2–12 mm long). Glumes shorter or about equalling spikelets; unequal or more or less equal; smooth; glabrous. First glume 1-nerved. Second glume shorter or about same length as lower lemma; unawned; 1-nerved. Florets 1 per spikelet. Lemma entire; unawned (occasionally mucronate); hairy; villous; smooth; 3-nerved; membranous; with hairy nerves (silky hairs up to 1 mm long). Palea hairy; not extending into awns; membranous; smooth. Lodicules truncate. Stamens 3. Anther reddish purple. Stigmas 2. Caryopsis terete (fusiform to ellipsoid, brownish). Base chromosome number of x = 8.

DISTRIBUTION.—North America. United States (Southwestern Region and Texan Region) and Mexico. Native to the New World.

REMARKS.—*Blepharoneuron* historically contained a single, perennial species, *B. tricholepis,* ranging from Colorado to Central Mexico. This species was originally placed in *Vilfa* Beauv. by Torrey (1856) and was transferred to *Sporobolus* by Coulter (1885). Nash (1898) disagreed with Coulter's treatment and proposed the generic name *Blepharoneuron,* which emphasizes the hairy and prominently nerved lemma and palea. The only other species included in the genus, *B. shepherdii* (Vasey) P.M. Peterson & Annable, was first placed in *Sporobolus* by Vasey (1887a) and later was transferred to *Muhlenbergia* by Swallen (1947). Peterson (1988) found *B. shepherdii* to possess a base chromosome number of x = 8 and presented a revision (Peterson and Annable, 1990). The two species of *Blepharoneuron* differ from other eragrostoid genera by having a single floret per spikelet, densely appressed to spreading silky whitish hairs on the midnerve and margins of the lemma, minutely glandular and capillary, wiry, flexuous, usually nodding, and reflexed pedicels, and hairy paleas. Reeder (1971) suggested that *Blepharoneuron* may form an alliance with *Erioneuron* because it shares certain morphological features with that genus, and because it shares a base chromosome number of x = 8. On the basis of cork and silica cell distribution on the surface of the lemma, Valdes-Reyna and Hatch (1991) suggested that *Blepharoneuron* is allied with *Chaboissaea, Crypsis, Lycurus, Muhlenbergia,* and *Sporobolus.* Cladistic analysis of cpDNA restriction fragment variation suggests that *Blepharoneuron* and *Bealia* share a most recent

common ancestor within the monophyletic subtribe Muhlenbergiinae (Duvall et al., 1994).

5. ***Calamovilfa*** (A. Gray) Hack., True Grasses 113. 1890. Trans. from Engl. and Prantl, Nat. Pflanzenfam., by Scribner and Southworth.—Lectotype: *Calamovilfa brevipilis* (Torr.) Scribn. in Hack. (see Hitchcock, U.S.D.A. Bull. 772:126. 1920).

Plants perennial; lacking stolons; rhizomatous (wiry). Flowering culms erect (50–200 cm tall, thick, semisolid); caespitose; glabrous. Leaves cauline; without auricles. Sheaths longer than internodes; with smooth margins; not ciliate (sometimes ciliate near collar). Ligule a line of hairs. Leaf blades filiform to linear (10–80 cm long, 2–8 mm wide, tapering to a long, fine point); involute (flat near base); not pungent. Inflorescence a panicle (10–25(–60) cm long); exserted. Main axis smooth. Primary branches appressed or spreading from main axis; terminating in a spikelet; with appressed or spreading secondary branches. Pedicels glabrous; smooth. Disarticulation above glumes; lemma and palea falling as a unit. Callus hairy (blunt, with soft white hairs). Spikelets 5–10 mm long; solitary; laterally compressed; pedicellate. Glumes about equalling spikelets; unequal (first glume shorter than second glume); smooth; glabrous. First glume 1-nerved. Second glume about same length as lower lemma; unawned; 1-nerved. Florets 1 per spikelet. Lemma entire (3–5 mm long); unawned; glabrous or hairy; smooth; 1-nerved; chartaceous; with glabrous or hairy nerves. Palea hairy; not extending into awns; chartaceous; margins not enfolding fruit; ciliate; smooth. Lodicules truncate. Stamens 3. Anther yellow. Stigmas 2. Fruit with free pericarp. Achene terete. Base chromosome number of x = 10.

DISTRIBUTION.—North America. United States (Southwestern Region, Central Plains Region, and Texan Region). Native to the New World.

REMARKS.—Asa Gray first recognized the distinctive features of the taxon (Thieret, 1966) by erecting section *Calamovilfa* within *Calamagrostis* Adans. Hackel (1890) later raised the section to genus level and suggested it was closely related to *Ammophila* Host. Using information from anatomy, cytology, embryology, and gross morphology, Reeder and Ellington (1960) proposed that *Calamovilfa* was more closely aligned with *Sporobolus* and other chloridoid eragrostoids. The genus is characterized by having single-flowered spikelets, 1-nerved lemmas, fruits with free pericarps, and ligules with a line of hairs. These characteristics also are found in two other genera, *Crypsis* and *Sporobolus*. These three genera seem to share a common ancestor and probably should be the only New World members included in the subtribe Sporobolinae. Clayton and Renvoize (1986) included *Lycurus, Muhlenbergia,* and *Pereilema* in this subtribe; however, these genera belong in the Muhlenbergiinae. The genus consists of four species divided into two sections, each with two species (Thieret, 1966). Section *Calamovilfa* is found in moist to dry pine barrens and on the edge of swamps, whereas section *Interior* is found on sand dunes, sandy prairies, sandy river banks, and sandy flood plains.

6. ***Chaboissaea*** E. Fourn., Mex. Pl. 2:112. 1886.—Type: *Chaboissaea ligulata* E. Fourn.

Plants hermaphroditic or andromonoecious; annual or perennial; lacking stolons; lacking rhizomes. Flowering culms erect or decumbent (3–90 cm tall, often rooting at lower nodes); caespitose or not; glabrous. Leaves cauline; without auricles. Sheaths mostly shorter than internodes; with smooth margins (hyaline, often scarious); not ciliate. Ligule a membrane (margins decurrent). Leaf blades linear (1.2–20 cm long, 0.7–3.0 mm wide); flat, conduplicate, or involute; not pungent. Inflorescence a panicle (1–28 cm long, 0.4–10 cm wide); exserted or partially included in upper sheath. Main axis smooth or scabrous. Primary branches appressed to spreading from main axis; terminating in a spikelet; with appressed secondary branches. Pedicels glabrous; scabrous. Disarticulation above glumes; lemma and palea falling as a unit. Callus hairy or glabrous. Spikelets 1.8–4.7 mm long; solitary; laterally compressed (dark gray or plumbeous to grayish yellow); subsessile or pedicellate (pedicels 0.2–3 mm long). Glumes shorter or about equalling spikelets; more or less equal; scabrous; glabrous. First glume 1-nerved. Second glume shorter than lower lemma; awned or unawned; 1-nerved. Rachilla pronounced or not pronounced between florets; glabrous. Florets 1–3 per spikelet. Sterile florets present or absent; above fertile florets. Lemma entire; awned, mucronate, or unawned (awn 0.2–6 mm long); hairy; pubescent (with minute, appressed hairs); scabrous; 3-nerved (sometimes obscurely so); chartaceous (mottled); with hairy nerves. Palea glabrous; extending or not extending into awns (awns up to 1.2 mm long); chartaceous; scabrous. Lodicules truncate. Stamens 3. Anther reddish purple or olivaceous plumbeous. Stigmas 2. Caryopsis terete. Base chromosome number of x = 8.

DISTRIBUTION.—North America (Mexico) and South America (Argentina, Bolivia). Native to the New World.

REMARKS.—Historically, *Chaboissaea,* sensu stricto, contained a single species, *C. ligulata,* ranging from northern Chihuahua to Distrito Federal, Mexico. *Chaboissaea,* although easily separated from *Muhlenbergia,* has traditionally been included in the latter genus by Hitchcock (1913), Bews (1929), Conzatti (1946), and, more recently, Watson et al. (1985) and Clayton and Renvoize (1986). Sohns (1953) emended the description of *C. ligulata* and suggested the genus belonged in the Festuceae rather than in the Agrostideae, an unnatural assemblage of mostly single-flowered genera. Reeder and Reeder (1988) transferred two Mexican annual species, *C. decumbens* (Swallen) Reeder & C. Reeder and *C. subbiflora* (Hitchc.) Reeder & C. Reeder, from *Muhlenbergia* into *Chaboissaea.* Based on morphological, anatomical, and cyto-

logical similarities, Peterson and Annable (1992) included a South American annual, *C. atacamensis* (Parodi) P.M. Peterson & Annable, in *Chaboissaea.* A revision of the genus and a hypothesized phylogeny based on morphological attributes is given in Peterson and Annable (1992). The four species of *Chaboissaea* differ from other eragrostoid genera in having gray to grayish yellow spikelets with one or two (occasionally three) florets per spikelet, the lower floret perfect and the upper floret staminate or sterile, and a base chromosome number of x = 8. All four species occur in dark, clayish soils in seasonally wet marshes, drainage ditches, and margins of ephemeral pools. Data from restriction site variation of chloroplast genomes suggest that *Chaboissaea* is most closely related to *Muhlenbergia* and is best placed in the subtribe Muhlenbergiinae along with *Bealia, Blepharoneuron, Lycurus,* and *Pereilema* (Duvall et al., 1994). Our evidence from morphology, biogeography, and soluble enzymes suggests that the genus arose in north-central Mexico, where three species still exist, and that the progenitor of *C. atacamensis* migrated to South America recently (Peterson and Annable, 1992; Peterson and Herrera A., 1996).

7. ***Crypsis*** W.T. Aiton, Hortus Kew. 1:48. 1789 (non. cons.).—Type: *Crypsis aculeata* (L.) W.T. Aiton.

Plants annual; lacking stolons; lacking rhizomes. Flowering culms erect, decumbent, or mat forming (3–40(–60) cm tall, much branched near base); not caespitose; glabrous. Leaves cauline; without auricles. Sheaths shorter than internodes; with smooth margins (membranous); not ciliate (few hairs at apex). Ligule a line of hairs. Leaf blades linear (2–5 cm long, 1–6 mm wide, papilose-hirsute); flat or involute; not pungent. Inflorescence a panicle (1–6 cm long, 2.5–8.0 mm wide, hemispherical to ovoid, cylindrical-spiciform); exserted or partially included in upper sheath (terminating main culms and also in axils of upper leaves, often partially enclosed by spathe-like sheaths). Main axis smooth. Primary branches appressed to main axis; terminating in a spikelet. Disarticulation below or above glumes; lemma and palea falling as a unit or falling separately. Callus glabrous. Spikelets 2.5–4 mm long; solitary; strongly laterally compressed; sessile or subsessile. Glumes shorter than or about equalling spikelets; more or less equal; scabrous; glabrous. First glume 1-nerved. Second glume about same length as lower lemma; unawned; 1-nerved. Florets 1 per spikelet. Lemma entire; unawned (acute, sometimes mucronate or short-awned); glabrous; scabrous (on keel); 1-nerved; hyaline or membranous; with glabrous nerves. Palea glabrous; not extending into awns; hyaline; margins not enfolding fruit; smooth (rarely 1-nerved). Lodicules absent. Stamens 2 or 3. Anther reddish purple. Stigmas 2. Fruit with free pericarp. Achene terete. Base chromosome number of x = 8 or 9.

DISTRIBUTION.—North America, Central America, Africa, Europe, and Asia. United States (Northern Pacific Region, Californian Region, Great Lakes Region) and Mexico. Introduced to the New World (represented by 3 naturalized species).

REMARKS.—The type species, *C. aculeata,* was first placed among the Cyperaceae by Linnaeus, who was no doubt mislead by the dilated or spathe-like upper leaf sheaths subtending the inflorescence (Lorch, 1962). Hubbard (1947) recognized the affinity of *Crypsis* with *Sporobolus* by noting the apparent apomorphies of fruits with a free pericarp, single-flowered spikelets, 1-nerved lemmas, and ciliate ligules. These four characters clearly delineate the subtribe, Sporobolinae, of which *Crypsis* is a member. The genus is represented in the western hemisphere by three naturalized species: *C. alopecuroides* (Phill. & Mitterp.) Schrad., *C. schoenoides* (L.) Lam., and *C. vaginiflora* (Forsk.) Opiz. All three species are found in sandy to clayish soils around drying lake margins, rivers, and vernal pools (Hammel and Reeder, 1979).

8. ***Dactyloctenium*** Willd., Enum. Pl. Hort. Berol. 1029. 1809.—Lectotype: *Dactyloctenium aegyptium* (L.) Willd.

Plants annual or perennial (species introduced to New World annual); stoloniferous; lacking rhizomes. Flowering culms erect or mat forming (20–70 cm tall); caespitose; glabrous. Leaves cauline; without auricles. Sheaths shorter than internodes; with scabrous margins; not ciliate (glabrous to pustulate-villous). Ligule a membrane (often ciliolate). Leaf blades linear (3–25(–40) cm long, 2.5–12 mm wide); flat; not pungent; without thickened margins (papillose-hispid on margins). Inflorescence a panicle (2–7 cm long with 3–9 primary branches); exserted. Main axis smooth. Primary branches digitate; spreading to reflexed; terminating in a bare point. Disarticulation above glumes (but not between florets); lemma and palea falling as a unit. Callus glabrous. Spikelets (2–)4–5(–8) mm long; solitary; strongly laterally compressed; sessile (closely imbricate in 2 rows on one side of 3-angled rachis). Glumes present (keeled, broad); shorter than spikelets; unequal; smooth; glabrous. First glume 1-nerved. Second glume shorter than lower lemma; awned from below apex; 1-nerved. Rachilla pronounced between florets; glabrous. Florets (2–)3–6(–9) per spikelet. Sterile florets present; above fertile florets. Lemma entire; awned or mucronate; glabrous; smooth; 3-nerved (lateral nerves indistinct); membranous; with glabrous nerves. Palea glabrous; not extending into awns; membranous; margins not enfolding fruit; smooth. Lodicules truncate. Stamens 3. Anther yellow. Stigmas 2. Fruit with free pericarp. Achene terete (suborbicular, tranversely rugose). Base chromosome number of x = 10 or 12.

DISTRIBUTION.—North America, Central America, South America, Africa, Europe, Asia, and Australia. United States (Northern Pacific Region, Californian Region, Southwestern Region, Northern Plains Region, Central Plains Region, Texan Region, Southeastern Region, Midsouth Region, Great Lakes Region, North Atlantic Region, and Central Atlantic

Region), Mexico, and West Indies. South America (Uruguay, Chile, and Argentina). Introduced to the New World (one species, *D. aegyptium,* widespread in the New World).

REMARKS.—The genus consists of approximately 13 species native to Eurasia, Africa, and Australia. Besides the widespread *D. aegyptium, D. aristatum* Link, *D. geminatum* Hack., and *D. sindicum* Boiss have been reported from Mexico (Beetle, 1987). The grain of *D. aegyptium* is sometimes harvested in India and Africa and has been reported to have an unpleasant taste and to cause gastroenteritis (Bor, 1960). *Dactyloctenium* is an easily recognized genus characterized by digitately arranged primary branches, each of which terminates in a flattened point without a spikelet. Although the leaf anatomy between *Eleusine* and *Dactyloctenium* is quite disparate (Sanchez, 1974), a close relationship may still exist as both genera exhibit similar inflorescences and have fruits with a free pericarp. It is not known whether the derivation of a free pericarp has occurred once or is the result of a parallel event, originating in these two genera and again in *Calamovilfa, Crypsis,* and *Sporobolus* and in *Tetrachne* and *Uniola.* There appears to be very little cpDNA variation between *Sporobolus* and *Eleusine* in a cursory sampling of these two genera (Duvall et al., 1994). This would suggest that the evolution of a free pericarp was a single event.

9. *Dasyochloa* Willd. ex Rydb., Fl. Colo. Agr. Exp. Sta. Bull. 100:18, 37. 1906.—Type: *Dasyochloa pulchella* (Kunth) Willd. ex Rydb.

Plants perennial; stoloniferous (3–7 cm long, ascending, wiry); lacking rhizomes. Flowering culms erect or decumbent (4–10 cm tall, consisting of elongated internodes topped by fascicles of leaves that generally bend down and root, producing other culms); caespitose; glabrous. Leaves mostly basal; without auricles. Sheaths shorter than internodes; with smooth margins; ciliate (hairs up to 2 mm long). Ligule a line of hairs (3–5 mm long). Leaf blades linear (2–6 cm long); involute (often curved); pungent; with thickened margins. Inflorescence a raceme or a panicle (1–2.5 cm long, 1–1.5 cm wide, clustered into a spatheate head, appearing white-wooly); partially included in upper sheath. Main axis smooth. Primary branches appressed to main axis; terminating in a spikelet; reduced to fascicle of spikelets. Pedicels glabrous; smooth. Disarticulation above glumes; lemma and palea falling as a unit. Callus glabrous. Spikelets 5–10 mm long; solitary; laterally compressed; pedicellate. Glumes more or less equal; smooth; glabrous. First glume 1-nerved. Second glume longer than lower lemma; awned; 1-nerved. Rachilla pronounced between florets; glabrous. Florets (4–)6–10 per spikelet. Sterile florets present; above fertile florets. Lemma lobed or cleft (clefts 1–3 mm deep); awned ((1.5–)2.5–4 mm long); hairy; villous (conspicuously long-hairy near base); smooth; 3-nerved; membranous; with hairy nerves. Palea hairy; extending into awns; membranous; margins not enfolding fruit; ciliate; smooth. Stamens 3. Anther yellow. Stigmas 2 (plumose, sessile, or on short style). Caryopsis terete. Base chromosome number of x = 8.

DISTRIBUTION.—North America. United States (Southwestern Region, Northern Plains Region, Central Plains Region, and Texan Region) and Mexico. Native to the New World.

REMARKS.—*Dasyochloa* is a monotypic North American genus (*D. pulchella*) that is distributed from central Mexico to the southwestern United States. It is a very common desert grass in creosote-tarbush scrub. The generic name, *Dasyochloa,* first appeared in the literature as a nomen nudum in Steudel (1840) under *Uralepis* Nutt. Rydberg (1906) validated *Dasyochloa* with an English description as part of a key; it has largely been regarded as a synonym of *Erioneuron.* Based on lemma apices and lateral nerves, Caro (1981) placed all the South American species and assorted varieties of *Erioneuron* in *Dasyochloa.* Using anatomical characters, Sanchez (1983b) later recognized only a single species, *D. pulchella.* The blades of *Dasyochloa* have more abaxial and adaxial sclerenchyma development than those of *Erioneuron.* Valdes-Reyna (1985) also discussed the morphological, anatomical, and cytological differences of this genus with *Erioneuron,* and his results support recognition of *Dasyochloa.* The affinity of *Dasyochloa* with *Erioneuron* has long been known. Recent cpDNA analyses suggest that *Dasyochloa* is basal and shares a most recent common ancestor with *Erioneuron* and *Munroa* (Duvall et al., 1994). Similar silica deposition patterns in the lemma (Valdes-Reyna and Hatch, 1991) and a numerical analysis of morphological features (Phillips, 1982) also suggest that *Dasyochloa, Erioneuron,* and *Munroa* are closely related.

10. *Distichlis* Raf., J. Phys. Chim. Hist. Nat. Arts 89:104. 1819.—Type: *Distichlis maritima* Raf., nom. illeg. (*Uniola spicata* L., *D. spicata* (L.) Greene).

Plants dioecious (rarely monoecious); perennial; lacking stolons (rarely stoloniferous); rhizomatous (well developed, with pronounced scales). Flowering culms erect or mat forming (10–30(–50) cm tall); caespitose; glabrous. Leaves cauline; distinctly distichous; without auricles. Sheaths longer than internodes; with smooth margins; ciliate or not ciliate. Ligule a ciliate membrane (erose-ciliolate and tipped with long, stiff hairs). Leaf blades linear (2–8 cm long, 1–3 mm wide, stiff); flat or involute (occasionally convolute); pungent. Inflorescence normally consisting of more than 3 spikelets; a panicle (3–10 cm long, sometimes a raceme, rarely reduced to a single spikelet); exserted or fully included (staminate exserted, pistillate included among leaves). Main axis scabrous. Primary branches appressed to main axis; terminating in a spikelet; with appressed secondary branches. Pedicels glabrous; scabrous. Disarticulation above glumes (tardily); lemma and palea falling as a unit. Callus glabrous. Spikelets 6–18(–28) mm long;

solitary; laterally compressed; pedicellate. Glumes shorter than spikelets; more or less equal; smooth; glabrous. First glume (1–)3–5(–7)-nerved (lateral nerves often indistinct). Second glume shorter than lower lemma; unawned; 5–7(–9)-nerved (lateral nerves often indistinct). Rachilla pronounced between florets; glabrous. Florets (3–)5–15(–17) per spikelet. Sterile florets present; above fertile florets. Lemma entire; unawned; glabrous; smooth; (5–)7–11(–13)-nerved; coriaceous; with glabrous nerves. Palea glabrous; not extending into awns; membranous or chartaceous (staminate and pistillate, respectively); smooth. Lodicules truncate. Stamens 3. Anther yellow (tinged with purple). Stigmas 2. Caryopsis terete (brown). Base chromosome number of x = 10.

DISTRIBUTION.—North America, Central America, South America (Ecuador, Bolivia, Chile, and Argentina), and Australia. Alaska, Canada, United States (Northern Pacific Region, Californian Region, Southwestern Region, Northern Plains Region, Central Plains Region, Texan Region, Southeastern Region, North Atlantic Region, and Central Atlantic Region) and Mexico. Native to the New World.

REMARKS.—*Distichlis* includes about six species distributed on saline, alkaline, or gypsum flats of deserts or seashores. Most of the species are not very palatable but are often used as forage in some areas because they form the dominant cover. Rafinesque (1819) first proposed *Distichlis* by separating it from *Uniola* and *Festuca* (Beetle, 1943). Because the species is rhizomatous and polymorphic, for nearly a century most botanists recognized only a single species. More recently, Beetle (1955) treated the various forms of *D. spicata* as separate varieties, some restricted to South America. Clayton and Renvoize (1986) placed *Distichlis* in the Monanthochloinae along with *Allolepis, Jouvea, Monanthochloë, Reederochloa,* and *Swallenia.* Perhaps the closest sisters to *Distichlis* are *Monanthochloë* and *Reederochloa. Monanthochloë* and *Distichlis* share distichously arranged leaves and, along with *Reederochloa,* enlarged bicellular microhairs that are sunken in the leaf epidermis (Soderstrom and Decker, 1965).

11. *Eleusine* Gaertn., Fruct. 1:7. 1788.—Lectotype: *Eleusine coracana* (L.) Gaertn. (see Nash in N.L. Britton and A. Brown, Ill. Fl. N. U.S. ed. 2. 1:228. 1913).

Plants annual or perennial; lacking stolons; rhizomatous. Flowering culms erect (10–85 cm tall, rarely decumbent); caespitose; glabrous. Leaves cauline; without auricles. Sheaths longer or shorter than internodes; with smooth margins; not ciliate (a few hairs and glands near margin). Ligule a ciliate membrane. Leaf blades linear (5–25(–40) cm long, 2–6(–11) mm wide); flat; not pungent. Inflorescence a panicle (2–15 cm long, 3–6(–16) cm wide, of 1–10(–17) spike-like primary branches); exserted. Main axis smooth. Primary branches digitate (more commonly subdigitate); spreading from main axis; terminating in a spikelet. Disarticulation above glumes; lemma and palea falling as a unit. Callus glabrous. Spikelets (4–)5–6(–11) mm long; solitary; laterally compressed (strongly); sessile (in 2 rows on one side of a triangular branch). Glumes shorter than spikelets; unequal; scabrous; glabrous. First glume 1-nerved. Second glume shorter than lower lemma; unawned; 3–5-nerved. Rachilla pronounced between florets; glabrous. Florets 5–15 per spikelet. Sterile florets present; above fertile florets. Lemma entire; unawned (sometimes mucronate); glabrous; scabrous (on keel); 3–5-nerved (lateral nerves very close to midnerve); membranous; with glabrous nerves. Palea glabrous; not extending into awns; membranous; margins not enfolding fruit; scabrous. Lodicules acuminate. Stamens 3. Anther yellow. Stigmas 2. Fruit with free pericarp (thin membranous pericarp). Achene terete (transversely rugose). Base chromosome number of x = 9.

DISTRIBUTION.—North America, Central America, South America (Colombia, Venezuela, Guiana, Surinam or French Guiana, Ecuador, Peru, Brazil, Bolivia, Paraguay, Uruguay, Chile, and Argentina), Africa, Europe, Asia, Australia, and Pacific Islands. United States (Northern Pacific Region, Californian Region, Southwestern Region, Northern Plains Region, Central Plains Region, Texan Region, Southeastern Region, Midsouth Region, Great Lakes Region, North Atlantic Region, Central Atlantic Region, and Alaskan Region), Mexico, and West Indies. Native and introduced to the New World (one species described from Uruguay).

REMARKS.—*Eleusine* is a predominantly African genus, with seven of its nine species occurring there (Phillips, 1972). One species, *E. tristachya* (Lam.) Kunth, is native in South America and is naturalized in North America and Africa. Three other species of *Eleusine, E. coracana, E. indica* (L.) Gaertn., and *E. multiflora* Hochst. ex A. Rich., are naturalized in the New World. Finger millet (*E. coracana*) is widely grown in the tropics and subtropics of the Old World for food and for making beer. *Eleusine* is an easily recognized genus characterized by digitate or subdigitately arranged primary branches, each of which terminates in a spikelet. As mentioned previously, *Dactyloctenium* is a possible sister to *Eleusine,* as both genera exhibit similar inflorescences, have fruits with a free pericarp, and are of Old World origin. In a cursory sampling of genera in the Eragrostideae, there appears to be very little cpDNA variation among *Eleusine, Eragrostis, Sporobolus,* and *Tridens* (Duvall et al., 1994).

12. *Eragrostis* Wolf, Gen. Pl. 23. 1776; Gen. Sp. 63, 65. 1781.—Lectotype: *Eragrostis minor* Host (see P. Beauvois., Essai Agrost. 74. 1812; Ross, Acta Bot. Neerl. 15:157. 1966).

Plants hermaphroditic; annual or perennial; stoloniferous or lacking stolons; rhizomatous or lacking rhizomes. Flowering culms erect, decumbent, or mat forming (1–120 cm tall); caespitose or not; glabrous; with viscid or nonviscid internodes. Leaves cauline or basal; without auricles. Sheaths longer

or shorter than internodes; glandular or not; with smooth or scabrous margins; ciliate or not ciliate. Ligule a ciliate membrane or a line of hairs (rarely membranous). Leaf blades filiform to triangular (0.6–60 cm long, 0.1–12 mm wide); flat, conduplicate, or involute; pungent or not pungent. Inflorescence a panicle (0.4–50 cm long, 0.3–40 cm wide); exserted or partially included in upper sheath. Main axis glandular or not; smooth, scabrous, or hairy. Primary branches appressed, spreading, or divaricate from main axis; terminating in a spikelet. Primary branches with appressed or spreading secondary branches or reduced to a fascicle of spikelets. Pedicels glabrous; smooth or scabrous. Cleistogamous spikelets present or absent. Disarticulation above glumes; lemma and palea falling as a unit or usually falling separately. Callus glabrous. Spikelets 1–25 mm long; in clusters or solitary; laterally compressed or terete; sessile, subsessile, or pedicellate. Glumes shorter than spikelets; unequal or more or less equal; smooth or scabrous; glabrous. First glume 1-nerved (rarely 2- or 3-nerved). Second glume shorter than lower lemma; unawned; 1-nerved (rarely 2- or 3-nerved). Rachilla pronounced between florets; glabrous. Florets 3–15(–30) per spikelet (rarely 2(–1)-flowered). Sterile florets present or absent; above fertile florets. Lemma entire; mucronate or unawned; glabrous; smooth or scabrous; 3(–5)-nerved (occasionally lateral nerves indistinct, rarely 5-nerved); hyaline, membranous, chartaceous, coriaceous, or indurate; with glabrous nerves. Palea glabrous or hairy; not extending into awns; hyaline, membranous, or chartaceous; ciliate or not ciliate; smooth or scabrous. Lodicules truncate. Stamens 2 or 3. Anther yellow or reddish purple. Stigmas 2. Caryopsis terete or laterally compressed. Base chromosome number of x = 10.

DISTRIBUTION.—North America, Central America, South America (Colombia, Venezuela, Guiana, Surinam or French Guiana, Ecuador, Peru, Brazil, Bolivia, Paraguay, Uruguay, Chile, and Argentina), Africa, Europe, Asia, Australia, and Pacific Islands. Canada, United States (Northern Pacific Region, Californian Region, Southwestern Region, Northern Plains Region, Central Plains Region, Texan Region, Southeastern Region, Midsouth Region, Great Lakes Region, North Atlantic Region, Central Atlantic Region, and Alaskan Region), Mexico, and West Indies. Native or introduced to the New World.

REMARKS.—*Eragrostis,* the largest genus in the tribe (350 spp.), with about 120 species in the New World, was first published by Wolf (1776). The validity of Wolf's publication is in question, and many workers consider the first generic description to have appeared in Beauvois (1812). This controversy was reviewed by Ross (1966) and Bor (1968). The generic name is based on a Greek translation of a pre-Linnaean taxon referred to as gramen amoris, hence eros, god of love, and agrostis, a grass (Harvey, 1948). Many of the species presently placed in *Eragrostis* were at one time placed in *Poa* L., *Briza* L., and/or *Megastachya* P. Beauv. Like other large genera, many segregates have been erected to emphasize distinctive features. In the New World, Rafinesque (1825) recognized *Erochloe,* based on *E. spectabilis* (Pursh) Steud.; Philippi (1858) described the genus *Macroblepharus* based on *E. ciliaris* (L.) R. Br.; and Nash (1903) described *Acamptoclados* based on *E. sessilispicus* (Buckl.) Nash. Two genera, *Diandrochloa* De Winter (1960) and *Roshevitzia* Tzvelev (1968), have been based on *E. japonica* (Thunb.) Trin. Within *Eragrostis* the species limits are often overlapping, and few agrostologists have attempted to work out any suitable phylogenetic scheme. Based on spikelet disarticulation at maturity, Clayton, Phillips, and Renvoize (1974) and Clayton and Renvoize (1986) have arrived at a "first approximation to natural groups" and have presented a key to sections *Psilantha, Eragrostis, Lappula,* and *Platystachya.* Van den Borre and Watson (1994) investigated 53 species of *Eragrostis* and found that anatomical characters, among others, support the recognition of two distinct groups: subgenus *Eragrostis* and subgenus *Caesiae.* In most native New World taxa the lemmas fall acropetally (from the base toward the apex) from the persistent rachilla, and with the paleas persitent on the rachilla. Due to the wide range in variation, the distinction among many of the species is difficult even for the experienced agrostologist. The best combination of characters used to discriminate this genus from other Eragrostideae is disarticulation of the lemma and palea occurring separtely, longitudinally bowed-out paleas with ciliolate keels, and 3-nerved, unawned lemmas. In a phenetic study of the tribe, Phillips (1982) aligned *Eragrostis* with five small, segregate genera that range from southern Africa to Indo-Malasia: *Desmostachya* (Hook.) Stapf in Dyer, *Eragrostiella* Bor, *Myriostachya* (Benth.) Hook., *Psilolemma* Phillips, and *Richardsiella* Effers & Kenn.-O'Byrne. Biogeography supports the hypothesis that the genus arose in the Old World, particularly in southern Africa, where it is the most speciose. There also seems to be a possible relationship with *Dactyloctenium, Eleusine,* and/or *Sporobolus* because free pericarps have been found in a few Old World species.

13. *Erioneuron* Nash, J.K. Small, Fl. Southeast. U.S. 143, 1327. 1903.—Type: *Erioneuron pilosum* (Buckl.) Nash.

Plants perennial; stoloniferous or lacking stolons; lacking rhizomes. Flowering culms erect (10–65 cm tall); caespitose or not; glabrous. Leaves mostly basal; without auricles. Sheaths shorter than internodes; with smooth margins; ciliate. Ligule a ciliate membrane. Leaf blades linear (2–10 cm long, 1–2.5 mm wide); conduplicate; pungent or not pungent; with thickened margins. Inflorescence a panicle (1.5–6 cm long, 1–3 cm wide, rarely a raceme); exserted. Main axis smooth. Primary branches appressed or spreading from main axis; terminating in a spikelet; with appressed secondary branches. Pedicels glabrous; smooth. Disarticulation above glumes; lemma and palea falling as a unit. Callus hairy. Spikelets (6–)8–12(–15) mm long; solitary; laterally compressed; pedicellate. Glumes shorter or about equalling spikelets; unequal or more or less

equal; smooth; glabrous. First glume 1-nerved. Second glume shorter or longer than lower lemma; unawned; 1-nerved. Rachilla pronounced between florets; glabrous. Florets (4–)6–12(–20) per spikelet. Sterile florets present; above fertile florets. Lemma emarginate or lobed (0.3–2.5 mm deep); awned (1–4 mm long); hairy; pilose (densely pilose near base); smooth; 3-nerved; membranous; with hairy nerves. Palea hairy; not extending into awns; membranous; margins not enfolding fruit; ciliate; smooth. Lodicules adnate to palea; cuneate. Stamens 1 or 3 (monandrous condition common). Anther yellow. Stigmas 2. Caryopsis terete (glossy and translucent). Base chromosome number of x = 8.

DISTRIBUTION.—North America and South America (Peru, Bolivia, and Argentina). United States (Southwestern Region, Northern Plains Region, Central Plains Region, and Texan Region) and Mexico. Native to the New World.

REMARKS.—The genus consists of three species, *E. avenaceum* (Kunth) Tateoka (with four varieties), *E. nealleyi* (Vasey) Tateoka, and *E. pilosum* (with three varieties). *Erioneuron* was submerged within *Tridens* for many years (Hitchcock, 1913; Hitchcock and Chase, 1951; Pilger, 1954), and only after morphological, anatomical, and cytological investigations did Tateoka (1961) revive *Erioneuron.* He also made the necessary new combinations and suggested affinities with *Munroa,* rather than with *Tridens.* Anton (1977) described the two species (*E. avenaceum* and *E. pilosa*) that occur in Argentina, and Valdes-Reyna (1985) discussed all the species in North America. As pointed out previously in this paper, the affinity of *Dasyochloa* with *Erioneuron* has long been known. Recent molecular studies suggest that *Dasyochloa* is a basal member of a clade containing *Erioneuron* and *Munroa* (Duvall et al., 1994). Cytologically, *Dasyochloa* and *Erioneuron* share a base chromosome number of x = 8. Based on morphological features (Phillips, 1982) and similar silica deposition patterns in the lemma (Valdes-Reyna and Hatch, 1991), *Dasyochloa, Erioneuron,* and *Munroa* appear to be closely related.

14. *Gouinia* E. Fourn. ex Benth., Gen. Pl. 3:1178. 1883.—Lectotype: *Gouinia polygama* E. Fourn. (see Swallen, Amer. J. Bot. 22:32. 1935).

Plants perennial; lacking stolons; rhizomatous or lacking rhizomes (short and knotty). Flowering culms erect (0.3–2(–3) m tall); caespitose; glabrous. Leaves cauline; without auricles. Sheaths longer or shorter than internodes; with scabrous margins (to scaberulous, rarely smooth); ciliate or not ciliate (pilose and papillose-pilose toward collar). Ligule a membrane or a ciliate membrane. Leaf blades linear (10–45 cm long, 5–20(–26) mm wide); flat or loosely involute; not pungent. Inflorescence a panicle (5–40(–50) cm long); exserted. Main axis scabrous. Primary branches spreading or divaricate from main axis (8–25 cm long, branches mostly simple, naked near base); terminating in a spikelet. Pedicels glabrous; scabrous. Disarticulation above glumes; lemma and palea falling as a unit. Callus hairy. Spikelets 8–15(–25) mm long; solitary; laterally compressed; subsessile or pedicellate. Glumes shorter than spikelets; unequal; scabrous (on keel); glabrous. First glume 1–3(–5)-nerved. Second glume shorter than lower lemma; unawned; 3–5(–7)-nerved. Rachilla pronounced between florets; glabrous. Florets 2–6 per spikelet. Sterile florets present; above fertile florets (uppermost floret rudimentary and awned). Lemma entire; awned; hairy; pilose or villous (densely silky ciliate below); scabrous; 3- or 5-nerved; membranous; with glabrous nerves. Palea glabrous; extending into awns; membranous; margins not enfolding fruit; ciliate or not (silky); scabrous. Lodicules truncate. Stamens 3. Anther reddish purple. Stigmas 2. Caryopsis terete. Chromosome number of n = 20.

DISTRIBUTION.—Central America and South America (Brazil, Bolivia, Paraguay, and Argentina). Mexico and West Indies. Native to the New World.

REMARKS.—The genus consists of about 12 species ranging from Mexico in the north to Argentina in the south. In the past the taxonomic position of the species in *Gouinia* has lead to their placement in other genera in different subfamilies, such as *Arundinaria* Michx. (Bambusoideae), *Bromus* L. (Pooideae), *Diplachne* (Chloridoideae), *Festuca* L. (Pooideae), *Leptochloa* (Chloridoideae), and *Triodia* R. Br. (Chloridoideae). In addition to revising *Gouinia,* Swallen (1935) suggested that it may be most closely related to *Leptochloa,* an opinion held also by Clayton and Renvoize (1986). Turpe (1975) gave a historical account of the systematic position of *Gouinia* and a revision of the Argentinian species. *Leptochloa* and *Gouinia* are morphologically very similar, with two or more (up to 10) florets per spikelet, a pronounced rachilla between each floret, very unequal glumes, and a 3- or 5-nerved lemma. The lemmas are usually long awned, the callus hairy, and the sheath margins, glumes, and paleas scabrous in *Gouinia.* In *Leptochloa* the lemmas are unawned or short-awned, the callus glabrous, and the sheath margins, glumes, and paleas smooth. More recently, Ortiz (1991) recognized a new, monotypic genus, *Schenckochloa,* based primarily on the triangular shape of the rachilla (apex) and caryopsis in cross section. The rachilla in *S. barbata* (Hack.) J. Ortiz. is hardly triangular, in fact, it appears circular to elliptic as in other species of *Gouinia.* These two characters seem hardly sufficient to warrant generic status, because many of the other characters cited in the paper, i.e., number of glume nerves and number of lemmatal nerves, as characteristic for *Schenckochloa,* also are seen in other species of *Gouinia.* Ortiz (1993) recently completed a revision of *Gouinia* in which he recognized 12 taxa, including nine species. Based on morphological differences in the spikelets, rachilla, lemma, callus, and caryopsis, Ortiz (1993) suggested that *G. barbata* be excluded from *Gouinia.* He indicated that *G. barbata* has affinities with *Leptochloa* and *Trichoneura* but did not specify if this species warrants generic recognition.

15. *Jouvea* E. Fourn., Bull. Soc. Roy. Bot. Belgique 15:475. 1876.—Type: *Jouvea straminea* E. Fourn.

Plants dioecious; perennial; stoloniferous; rhizomatous (often with scaly buds). Flowering culms decumbent or mat forming (20–60 cm tall); caespitose; glabrous. Leaves cauline; without auricles. Sheaths shorter or longer than internodes; with smooth margins; not ciliate. Ligule a line of hairs. Leaf blades linear (1–15 cm long, 1–4 mm wide when flat); involute; pungent. Inflorescence consisting of 1-many spikelets (single or in fascicles of 2–5 in pistillate inflorescences); a panicle (pistillate 2–3 cm long, staminate 2–6 cm long); exserted or fully included (cluster consisting of 2–5 pistillate spikelets embedded in sponge-like tissue of rachilla, only summit of florets free). Main axis smooth. Primary branches appressed to main axis; terminating in a spikelet. Primary branches with appressed secondary branches. Disarticulation above glumes; lemma and palea falling as a unit. Callus glabrous. Spikelets 8–30 mm long (15–40 mm long in staminate spikelets); in clusters (pistillate spikelets only); laterally compressed; sessile. Glumes present or absent (sometimes first glume absent in staminate spikelets, absent in pistillate); shorter than spikelets (in staminate spikelets); very unequal; smooth; glabrous. First glume nerveless. Second glume shorter than lower lemma; unawned; 1-nerved. Rachilla pronounced between florets (surface hard); glabrous. Florets (3–)5–25 per spikelet. Sterile florets present; above fertile florets; homomorphic. Lemma entire; unawned; glabrous; smooth; 3-nerved; chartaceous; with glabrous nerves. Palea glabrous; not extending into awns; chartaceous; margins not enfolding fruit; smooth. Lodicules truncate. Stamens 3. Anther yellow or reddish purple. Stigmas 2 (embedded in hard spongy tissue of rachilla). Caryopsis terete. Base chromosome number of x = 10.

DISTRIBUTION.—Central America and Mexico. Native to the New World.

REMARKS.—*Jouvea* is an endemic New World genus with two species, *J. pilosa* (Presl) Scribn. and *J. straminea* Fourn., distributed from Central America to the Pacific coast of Mexico on coastal sand dunes and mud flats. The genus is characterized by an inflorescence that consists of two to five pistils embedded in a sponge-like tissue of the rachilla, with only the summit of the florets free. Clayton and Renvoize (1986) place *Jouvea* in the Monanthochloinae along with *Allolepis, Distichlis, Monanthochloë, Reederochloa,* and *Swallenia.* Perhaps the closest sister to *Jouvea* is *Monanthochloë. Monanthochloë* and *Jouvea* share distichously arranged leaves and the dioecious habit.

16. *Leptochloa* P. Beauv., Essai Agrost. 71. 1812.—Lectotype: *Leptochloa virgata* (L.) Beauv. (see Nash in N.L. Britton and A. Brown, Ill. Fl. N. U.S. ed. 2. 1:229. 1913).

Plants annual or perennial; lacking stolons; lacking rhizomes. Flowering culms erect (30–150 cm tall); caespitose; glabrous. Leaves cauline; with sheath auricles or without auricles (sheath auricles in *L. viscida* (Scribn.) Beal). Sheaths longer or shorter than internodes; with smooth margins; not ciliate. Ligule a membrane or a ciliate membrane. Leaf blades linear (5–45 cm long, 2–14 mm wide); flat (often inrolled on drying); not pungent. Inflorescence a panicle (10–50 cm long, with racemose primary branches along elongated, central, triquetrous main axis); exserted. Main axis scabrous. Primary branches not digitate (sometimes subdigitate); appressed or spreading from main axis (2–10 cm long); terminating in a spikelet; with appressed secondary branches. Pedicels glabrous; scabrous. Cleistogamous spikelets present or absent (present in axils of lower sheaths in *L. dubia* (Kunth) Nees). Disarticulation above glumes; lemma and palea falling as a unit. Callus glabrous. Spikelets 1.2–7(–12) mm long; solitary; laterally compressed or terete; subsessile or pedicellate. Glumes shorter than spikelets; unequal; smooth; glabrous. First glume 1-nerved. Second glume shorter than lower lemma; unawned; 1–3-nerved. Rachilla pronounced between florets; glabrous. Florets 2–10 per spikelet (rarely 1). Sterile florets present; above fertile florets (upper floret reduced to small, awnless rudiment). Lemma entire, emarginate, lobed; awned, mucronate, or unawned; glabrous or hairy; pubescent; smooth; 3-nerved; membranous; with glabrous or hairy nerves (puberulent). Palea glabrous; not extending into awns; membranous; margins not enfolding fruit; smooth. Lodicules truncate. Stamens 2 or 3. Anther yellow or reddish purple. Stigmas 2. Fruit with adnate pericarp. Caryopsis dorsiventrally compressed or laterally compressed. Base chromosome number of x = 10.

DISTRIBUTION.—North America, Central America, South America (Venezuela, Brazil, Bolivia, Paraguay, Uruguay, and Argentina), Africa, Europe, Asia, Australia, and Pacific Islands. United States (Northern Pacific Region, Californian Region, Southwestern Region, Northern Plains Region, Central Plains Region, Texan Region, Southeastern Region, Midsouth Region, Great Lakes Region, North Atlantic Region, and Central Atlantic Region), Mexico, and West Indies. Native or introduced to the New World.

REMARKS.—*Leptochloa* sensu lato consists of about 45 species worldwide, with 15 species occurring in the New World. Although Phillips (1982), McNeill (1979), and Nicora and Rugolo de Agrasar (1987) recognized *Diplachne* Beauv. as a separate genus, we agree with McVaugh (1983) that the number of florets, the size of the spikelets, and the position of the panicle-branches (i.e., secund or not secund), vary from plant to plant and that these hardly seem sufficient to indicate a generic difference. Based on a numerical analysis of morphological characters, Phillips (1982) found that species placed in *Diplachne* and *Leptochloa* overlaped one another in a principal coordinates analysis. At this time it seems more appropriate to recognize a highly variable but possibly monophyletic assemblage as a single genus. The relationship of

Leptochloa with other genera in this tribe is problematical. In a restriction fragment analysis of cpDNA using a smattering of New World genera (Duvall et al., 1994), *Leptochloa* (*dubia*) is a basal clade member, sharing a common ancestor with *Scleropogon, Dasyochloa, Munroa,* and *Erioneuron.* In a strict consensus tree produced by a bootstrap analysis, it does not form a particularly strong clade with the other genera and instead shares a common ancestor in a clade including the Muhlenbergiinae, the Munroinae, *Scleropogon, Sporobolus, Eleusine, Tridens, Tripogon,* and *Eustachys* Desv. It does share a parallel restriction site loss with the latter genus, which is not included in the Eragrostideae.

17. ***Lycurus*** Kunth, Nov. Gen. Sp. 1:141. 1816.—Lectotype: *Lycurus phleoides* Kunth (Hitchcock, U.S.D.A. Bull. 772:139. 1920).

Plants perennial; lacking stolons; lacking rhizomes. Flowering culms erect (30–60 cm tall); caespitose; hairy; finely pubescent. Leaves cauline; without auricles. Sheaths shorter than internodes; with scabrous margins; ciliate. Ligule a membrane (truncate or broadly deltoid, acuminate, or 3-toothed). Leaf blades linear (4–10 cm long, 1–3 mm wide); flat or conduplicate; not pungent (apex mucronate or acuminate); with thickened margins. Inflorescence a panicle (3–10 cm long, 0.4–1.3 cm wide); exserted (usually some axillary inflorescences present). Main axis scabrous. Primary branches appressed to main axis; terminating in a spikelet. Pedicels glabrous; scabrous. Disarticulation above glumes (with secondary point of disarticulating at base of spikelet pair); lemma and palea falling as a unit. Callus glabrous. Spikelets 3–4 mm long; paired (lower spikelet short pedicellate, staminate, occasionally sterile, or rarely perfect, upper spikelet long pedicellate and perfect); terete; pedicellate (lower spikelet 0.6–0.8 mm long, upper spikelet 1.2–1.6 mm long). Glumes shorter than spikelets; more or less equal; scabrous; hairy. First glume 2–3-nerved (with 2 awns, 3–7 mm long). Second glume shorter than lower lemma; awned (with single awn, 1.5–4 mm long); 1–2-nerved. Florets 1 per spikelet. Sterile florets present. Lemma entire; awned (2–8 mm long); hairy; pubescent; scabrous; 3-nerved; membranous to chartaceous; with glabrous nerves. Palea hairy (pubescent); not extending into awns; membranous; scabrous. Lodicules truncate. Stamens 3. Anther yellow or reddish purple. Stigmas 2. Caryopsis terete. Base chromosome number of x = 10.

DISTRIBUTION.—North America, Central America, and South America (Colombia, Ecuador, Bolivia, and Argentina). United States (Southwestern Region and Southeastern Region), and Mexico. Native to the New World.

REMARKS.—The genus was first described by Kunth (1816) as containing two species, *L. phalaroides* Kunth and *L. phleoides.* Based on the presence of perfect, paired spikelets, Nuttall (1848) described a monotypic genus, *Pleopogon setosum* Nutt. Recent studies by Reeder (1985) and Sanchez and Rugolo de Agrasar (1986) recognized three species, including *L. setosus* (Nutt.) C. Reeder. *Lycurus* can be separated from other members of the Eragrostideae by possessing paired spikelets, with the lower one usually staminate and the upper one perfect, a narrow, spiciform panicle, and 2- or 3-nerved and 2-awned first glume. Based on anatomical and morphological similarities, particularly the paired spikelets, *Lycurus* was suggested to be closely related to *Aegopogon* and *Tragus* in the Zoysieae (Sanchez and Rugolo de Agrasar, 1986). Sanchez and Rugolo de Agrasar (1986) also pointed out the anatomical similarity between *Erioneuron* and *Lycurus.* Pilger (1956) erected the subtribe Lycurinae, which included *Pereilema* as well. Hilu and Wright (1982), in a phenetic study of the Poaceae, placed *Lycurus* near *Hilaria.* Clayton and Renvoize (1986) took the traditional view and placed *Lycurus* in the subtribe Sporoboliinae along with *Calamovilfa, Crypsis, Hubbardochloa* Auquier, *Muhlenbergia, Pereilema, Sporobolus,* and *Urochondra* Hubbard. Based on restriction site variation of the chloroplast genome, *Lycurus* appears to be most closely allied with *Muhlenbergia* and the following members of the Muhlenbergiinae: *Bealia, Blepharoneuron, Chaboissaea,* and *Pereilema* (Duvall et al., 1994).

18. ***Monanthochloë*** Engelm., Trans. Acad. Sci. St. Louis. 1:436. 1859.—Type: *Monanthochloë littoralis* Engelm.

Plants dioecious; perennial; stoloniferous; (wiry, up to 10 cm long); rhizomatous (scaly). Flowering culms mat forming (erect, floriferous branches usually 8–15 cm tall); not caespitose; glabrous. Leaves cauline; distinctly distichous; without auricles. Sheaths longer than internodes; with smooth margins; not ciliate. Ligule a ciliate membrane. Leaf blades linear (0.5–1.5 cm long, 1–3 mm wide at main branch tips); conduplicate (and subulate); pungent. Inflorescence consisting of a single spikelet (singly in axils of fascicled leaves); partially included in upper sheath (appearing terminal and concealed by upper leaves). Disarticulation above glumes (pistillate spikelets disarticulating tardily at lower rachilla node); lemma and palea falling as a unit. Callus glabrous. Spikelets 5–10 mm long; solitary; laterally compressed; sessile. Glumes absent (rarely, 1 rudiment present). Rachilla pronounced between florets; glabrous. Florets 2–5(–7) per spikelet. Sterile florets present; above fertile florets. Lemma entire; unawned; glabrous; smooth; 7–9-nerved (indistinct); coriaceous or indurate (staminate and pistillate, respectively); with glabrous nerves. Palea glabrous; not extending into awns; coriaceous or indurate; smooth. Lodicules absent. Stamens 3. Anther yellow. Stigmas 2. Caryopsis terete (usually with rudimentary styles at base). Chromosome number unknown.

DISTRIBUTION.—North America, Central America, and South America (Argentina). United States (Californian Region, Texan Region, and Southeastern Region), Mexico, and West Indies (Cuba). Native to the New World.

REMARKS.—*Monanthochloë* consists of two species with amphitropical, disjunct distributions that occur on seashores and inland salt, gypsum, or alkaline plains. *Monanthochloë littoralis* is found in North America and Cuba and *M. acerosa* (Griseb.) Speg. is restricted to south central Argentina (Parodi, 1954; Villamil, 1969). The genus is characterized by having short, distinctly distichous leaf blades and a partially included inflorescence that consists of a single spikelet. Stebbins and Crampton (1961) were the first to recognize the affinity of *Monanthochloë, Distichlis,* and *Jouvea,* near the Old World maritime genus *Aeluropus. Monanthochloë* seems well placed in the Monathochloinae along with the other New World genera *Allolepis, Distichlis, Jouvea, Reederochloa,* and *Swallenia.* Perhaps the closest sister to *Monanthochloë* is *Distichlis. Monanthochloë* and *Distichlis* share distichously arranged leaves and, along with *Reederochloa,* enlarged bicellular microhairs that are sunken in the leaf epidermis (Soderstrom and Decker, 1965).

19. *Muhlenbergia* Schreb., Gen. Pl. 44. 1789.—Lectotype: *Muhlenbergia schreberi* J.F. Gmel., Syst. Nat. 2:171. 1791 (see Nash in N.L. Britton and A. Brown, Ill. Fl. N. U.S. ed. 2. 1:184. 1913).

Plants annual or perennial; lacking stolons (*M. asperifolia* (Nees & Meyen ex Trin.) Parodi occasionally stoloniferous); rhizomatous or lacking rhizomes. Flowering culms erect, decumbent, or mat forming (2–300 cm tall, compressed-keeled to rounded near base); caespitose or not; glabrous or hairy; pubescent, pilose, or villous; with glaucous internodes or with neither viscid nor glaucous internodes. Leaves cauline or mostly basal; with or without sheath auricles. Sheaths longer or shorter than internodes; with smooth or scabrous margins (hyaline, scarious, occasionally striate); ciliate or not ciliate. Ligule a membrane or ciliate membrane (often decurrent). Leaf blades filiform or linear (1–100 cm long, 0.1–12 mm wide); flat, conduplicate, or involute; pungent or not pungent; with or without thickened margins. Inflorescence a panicle (0.5–110 cm long, 0.2–35 cm wide); exserted or partially included in upper sheath. Main axis smooth, scabrous, or hairy. Primary branches appressed, spreading, divaricate, or reflexed from main axis; terminating in a spikelet; with appressed or spreading secondary branches. Pedicels glabrous or hairy; pubescent, pilose, or villous; smooth or scabrous. Cleistogamous spikelets present or absent. Disarticulation below or above glumes (most commonly above); lemma and palea falling as a unit. Callus hairy or glabrous. Spikelets 0.5–8 mm long; solitary (paired in *M. brevis* C.O. Goodding, *M. depauperata* Scribn., and *M. diversiglumis* Trin.); not subtended by sterile bristles; laterally compressed, terete, or dorsiventrally compressed; subsessile or pedicellate. Glumes present (first glume often rudimentary or lacking in *M. schreberi* and occasionally lacking in some spikelets of *M. diversiglumis*); shorter, about equalling, or much exceeding spikelets; unequal or more or less equal; smooth or scabrous; glabrous or hairy. First glume 1–2-nerved. Second glume shorter, about same length, or longer than lower lemma; awned or unawned; 1–4-nerved. Florets 1 per spikelet (occasionally 2- or 3-flowered in *M. asperifolia* and *M. uniflora* (Muhl.) Fern.). Lemma entire or emarginate (lobed in *M. argentea* Vasey and *M. lucida* Swallen); awned, mucronate, or unawned (awns up to 40 mm long); glabrous or hairy; pubescent, pilose, or villous; smooth or scabrous; 3-nerved (sometimes obscurely so; 1-nerved in *M. palmirensis* Grignon & Laegaard); hyaline, membranous, or chartaceous; with glabrous or hairy nerves. Palea glabrous or hairy; extending or not extending into awns; hyaline, membranous, or chartaceous; smooth or scabrous. Lodicules truncate. Stamens 3. Anther yellow, reddish purple, or olivaceous plumbeous. Stigmas 2. Caryopsis terete or laterally compressed. Base chromosome number of $x = 10$ ($x = 9$ in *M. filiformis* (Thurb. ex Wats.) Rydb. and *M. vaginata* Swallen).

DISTRIBUTION.—North America, Central America, South America (Colombia, Venezuela, Ecuador, Peru, Brazil, Bolivia, Chile, and Argentina), Asia, and Pacific Islands. Canada, United States (Alaskan Region, Northern Pacific Region, Californian Region, Southwestern Region, Northern Plains Region, Central Plains Region, Texan Region, Southeastern Region, Midsouth Region, Great Lakes Region, North Atlantic Region, Central Atlantic Region, and Alaskan Region), Mexico, and West Indies. Native to the New and Old Worlds.

REMARKS.—*Muhlenbergia* is the second largest genus and contains over 150 species in the New World. The genus was proposed by Schreber (1789) in honor of G.H.E. Muhlenberg, a Lutheran minister and pioneer botanist of Pennsylvania. Many agrostologists have erected segregate genera to emphasize critical features of this large and diverse genus. Desvaux (1810) recognized the genus *Podosemum* based on the caespitose, open-panicled, and long-awned *M. capillaris* (Lam.) Trin. Beauvois (1812) described the genus *Clomena* based on the annual *M. peruviana* (Beauv.) Steud., and Presl (1830) described *Epicampes* based on *M. robusta* (Fourn.) Hitchc. Two relatives of *M. schreberi* (*M. glomerata* (Willd.) Trin. and *M. andina* (Nutt.) Hitchc.) were given generic status by Link (1833), as *Dactylogramma,* and by Thurber (1863), as *Vaseya,* respectively. Nuttall (1848) described the genus *Calycodon* based on the widespread and often important range grass *M. montana* (Nutt.) Hitchc. The only other generic name given to a species presently placed in *Muhlenbergia* is *Crypsinna,* described by Fournier (1886) and based on *M. macroura* (Kunth) Hitchc. Hitchcock's (1935a) transfer of many of these segregate genera to *Muhlenbergia* has been followed by most American and European botanists. The morphological characters that delimit the genus are spikelets with single perfect florets and hyaline, chartaceous, or membranous lemmas with three usually prominent nerves. These characters are, however, not at all unique in the

Eragrostideae and seem to be portrayed by about one-half of the genera in the tribe.

The distribution of this genus is almost entirely New World, and only approximately eight of the 160 species of *Muhlenbergia* are known to occur in southern Asia. These southern Asian species of *Muhlenbergia* appear to be closely related to those species of the genus that inhabit the eastern portion of the United States and were referred to by Pohl (1969) as belonging to the subgenus *Muhlenbergia.*

On the basis of anatomy, morphology, and cytology, Soderstrom (1967) distinguished two subgenera (*Muhlenbergia, Podosemum*) and divided subgenus *Podosemum* into two sections, sect. *Podosemum* and sect. *Epicampes.* Soderstrom placed 42 species of *Muhlenbergia* that have partially sclerosed phloem of the primary vascular bundles into subgenus *Podosemum.* Two years later Pohl (1969) completed a revision of 12 closely related species that he believed represented the entire subgenus *Muhlenbergia* in North America. Using characteristics of the rhizome (possession of very short internodes with imbricated scales) and leaf blade (thin, flat blades with low length/width ratios), Pohl distinguished these species from others in the genus. These same characteristics, however, are seen in *M. californica* Vasey, a species of the mountains and valleys of southern California. Morden (1985) and Morden and Hatch (1986, 1987, 1996) have investigated the *M. repens* (Presl) Hitchc. complex, which consists of six species in North and South America. Based on morphology, anatomy, cytology, and, in part, flavonoid chemistry, a revision of 29 species of *Muhlenbergia* has been completed (Peterson and Rieseberg, 1987; Peterson, 1988, 1989; Peterson, Annable, and Franceschi, 1989; Peterson and Annable, 1991). More recently a biosystematic study investigating the morphology and flavonoid chemistry of the *M. montana* complex (consisting of 14 species) has been completed (Herrera-Arrieta and Bain, 1991; Herrera-Arrieta and Grant, 1993).

Pilger (1956) divided *Muhlenbergia* into eight sections within his monogeneric subtribe Muhlenbergiinae. Subsequent authors have agreed that Pilger's treatment was phylogenetically uninformative and not particularly useful (Soderstrom, 1967; Pohl, 1969; Morden, 1985; Peterson and Annable, 1991). The placement of this large genus within the Eragrostideae has long been problematical. Because *Muhlenbergia* posesses many of the characteristics of the entire tribe, alliances with many other genera have been suggested. It has most recently been placed in the Sporobolinae by Clayton and Renvoize (1986), along with *Calamovilfa, Crypsis, Hubbardochloa* Auquier, *Lycurus, Pereilema, Sporobolus,* and *Urochondra* C.E. Hubb. *Hubbardochloa* and *Urochondra* are restricted to Africa and will not be discussed herein, whereas *Calamovilfa, Crypsis,* and *Sporobolus* seem to represent a closely allied group based on the possesion of a free pericarp and 1-nerved lemmas. That leaves us with two, smaller segregate genera, *Lycurus* and *Pereilema.* Based on similar leaf anatomical characters and preliminary analysis of restriction site variation of the chloroplast genome, *M. diversiglumis* has been suggested to be more closely related to species of *Pereilema* than to other species of *Muhlenbergia* (Peterson, Annable, and Franceschi, 1989). Likewise, *M. brevis* C.O. Goodding and *M. depauperata* Scribn. exhibit morphological features that suggest a close relationship with *Lycurus.* Mez (1921) indicated a relationship with *Lycurus* when he transferred *M. shaffneri* E. Fourn. in Hemsl., considered to be a synonym of *M. depauperata,* to *Lycurus. Muhlenbergia brevis* and *M. depauperata* share many morphological features with *Lycurus,* most importantly spikelets borne in pairs; first glumes that are 2-nerved and 2-awned; second glumes that are 1-nerved and awned; 3-nerved, acuminate, awned lemmas with short pubescence along the margins; and pubescent paleas. Perhaps these two species are intermediate between *Muhlenbergia* and *Pereilema.* Based on the lack of cork cells on the lemmatal surface, *Blepharoneuron, Chaboissaea, Crypsis, Lycurus, Muhlenbergia,* and *Sporobolus* have been suggested to form an allied group (Valdes-Reyna and Hatch, 1991). Our recent data from restriction fragment variation of cpDNA supports inclusion of *Blepharoneuron, Chaboissaea,* and *Muhlenbergia* along with *Bealia, Lycurus,* and *Pereilema* in an expanded Muhlenbergiinae (Duvall et al., 1994).

20. *Munroa* Torr., Pacif. Railr. Rep. vol. 4, pt. 5(4):158. 1857.—Type: *Munroa squarrosa* (Nutt.) Torr.

Plants hermaphroditic or gynomonoecious (1 species in northern Argentina); annual; stoloniferous (2–8 cm long, bearing fascicles of leaves); lacking rhizomes. Flowering culms decumbent or mat forming (erect floriferous culms not over 15 cm tall, internodes elongate, slender, reclining or arching, sometimes rooting at nodes); not caespitose; hairy; pubescent. Leaves mostly basal; without auricles. Sheaths shorter than internodes; with scabrous margins; ciliate (on upper margins and with tuft of long hairs on either side of collar). Ligule a line of hairs. Leaf blades linear (1–5 cm long, 1–2.5 mm wide, short and fascicled); flat or conduplicate; pungent; with thickened margins. Inflorescence a panicle (0.5–1 cm long, 0.5–1 cm wide, spatheate head, panicle reduced to small cluster of 2–4 subsessile spikelets); fully included (almost hidden in fascicles of leaves at branch tips). Main axis scabrous. Primary branches appressed to main axis; terminating in a spikelet. Pedicels glabrous; scabrous. Disarticulation above glumes; lemma and palea falling as a unit. Callus glabrous. Spikelets 7–10 mm long; in clusters; laterally compressed; subsessile or pedicellate. Glumes present or absent (first glume absent or reduced to a scale in terminal spikelet); shorter than spikelets; unequal or more or less equal (those of lower spikelet subequal, those of upper spikelet unequal); smooth; glabrous. First glume 1-nerved. Second glume shorter than lower lemma; unawned; 1-nerved. Rachilla pronounced between florets; glabrous. Florets 2–10 per spikelet. Sterile florets present; above fertile florets; heteromorphic (lower spikelet sessile and upper

spikelets pedicellate and in a fascicle). Lemma emarginate or lobed; awned (0.5–3 mm long, lateral nerves occasionally excurrent as mucros); hairy (tuft of hairs halfway up margin); villous; scabrous; 3-nerved; membranous or coriaceous; with hairy nerves. Palea glabrous; not extending into awns; membranous; margins not enfolding fruit; smooth. Lodicules present or absent; truncate. Stamens 2 or 3. Anther yellow. Stigmas 2 or 3 (barbellate on long styles). Caryopsis dorsiventrally compressed. Base chromosome number of x = 7 or 8.

DISTRIBUTION.—North America, Central America, and South America (Peru, Bolivia, Chile, and Argentina). Canada, United States (Californian Region, Southwestern Region, Northern Plains Region, and Texan Region), and Mexico. Native to the New World.

REMARKS.—*Munroa* consists of five species, *M. squarrosa,* the sole member of section *Munroa* in North America; *M. andina* Phil. and *M. decumbens* Phil., section *Hemimunroa,* in South America; and *M. argentina* Griseb. and *M. mendocina* Phil, section *Apelytron,* in Argentina (Anton and Hunziker, 1978). Anton and Hunziker (1978) suggested that *M. squarrosa* is the most primitive member of the genus with a trimerous androecium and combined reproductive features seen in the other four South American species. Species diversity is highest in the Atacama Puna and adjacent mountains where the four annual, South American taxa occur (Parodi, 1934). Parodi (1934) indicated a close relationship among *Blepharidachne, Dasyochloa pulchella, Munroa,* and *Triodia* (= *Erioneuron*) *avenaceum.* Tateoka (1961) suggested that *Dasyochloa, Erioneuron,* and *Munroa* were more closely related among themselves than they were to *Tridens.* Recent cpDNA analyses place *Erioneuron* and *Munroa* as sharing a common ancestor, whereas *Dasyochloa* is the next closest sister (Duvall et al., 1994). Similar silica deposition patterns in the lemma (Valdes-Reyna and Hatch, 1991) and a numerical analysis of morphological features (Phillips, 1982) also suggests *Dasyochloa, Erioneuron,* and *Munroa* are closely related. The genus is named after William Munro (1818–1889), an English agrostologist.

21. *Neeragrostis* Bush, Trans. Acad. Sci. St. Louis. 13:178. 1903.—Type: *Poa reptans* Michx.

Plants dioecious; annual; lacking stolons; lacking rhizomes. Flowering culms decumbent or mat forming (creeping and rooting at nodes, floriferous tips 5–20 cm tall); not caespitose; glabrous or hairy; pubescent, pilose, or villous. Leaves cauline; without auricles. Sheaths shorter than internodes (mostly 0.5–1.6 cm long); glandular; with scabrous margins; ciliate or not ciliate. Ligule a line of hairs (0.1–0.6 mm long). Leaf blades triangular (1–4 cm long, 1–4.5 mm wide); flat or conduplicate (arcuate, glabrous, or frequently pubescent on both surfaces); not pungent (apices somewhat stiffened). Inflorescence a panicle (1–3 cm long, 0.6–2.5 cm wide, dense and spatheate); exserted or partially included in upper sheath. Main axis glandular; smooth or hairy. Primary branches appressed to main axis; terminating in a spikelet; with appressed secondary branches. Pedicels glandular or not; glabrous or hairy; pubescent, pilose, or villous; smooth. Disarticulation above glumes; lemma and palea falling separately. Callus glabrous. Spikelets 5–26 mm long; in clusters; laterally compressed; sessile, subsessile, or pedicellate. Glumes shorter than spikelets; unequal; smooth; glabrous or hairy. First glume 1-nerved. Second glume shorter than lower lemma; unawned; 1–3 nerved. Rachilla pronounced between florets; glabrous. Florets 16–60 per spikelet. Sterile florets present; above fertile florets. Lemma entire (2–3.5 mm long); awned or mucronate; glabrous or hairy; pubescent, pilose, or villous; smooth; 3-nerved (nerves greenish); hyaline, in male spikelets membranous to chartaceous; with glabrous nerves. Palea glabrous or hairy; not extending into awns; hyaline (vestigial in female spikelets, less than 1/2 length of lemma); margins not enfolding fruit; ciliate; smooth. Lodicules truncate. Stamens 3 (1.4–2 mm long). Anther yellow. Stigmas 2. Caryopsis terete. Base chromosome number of x = 10.

DISTRIBUTION.—North America and Central America. United States (Northern Plains Region, Central Plains Region, Texan Region, Southeastern Region, Midsouth Region, and Great Lakes Region) and Mexico. Native to the New World.

REMARKS.—Hitchcock (1926) clarified the confusion between *Eragrostis reptans* (Michx.) Nees and *E. hypnoides* (Lam.) Britton, Sterns, & Pogg. Bush (1903) incorrectly based *Neeragrostis* on the latter and not the former and correct basyonym. Nicora (1962) revalidated the genus and listed specific morphological characters to differentiate between *Eragrostis* and *Neeragrostis.* The genus as presently interpreted includes two species: *Neeragrostis reptans* (Michx.) Nicora and *N. contrerasii* (Pohl) P.M. Peterson, comb. nov. (*Eragrostis contrerasii* R. Pohl, Iowa State J. Res. 51(3):323. 1977). *Neeragrostis* can be separated from *Eragrostis* by its dioecious nature; style bases that are attached to the ovary at a single point, these somewhat persistent; dimorphic spikelets, with male plants having more hardened lemmas; a creeping habit (also present in *E. hypnoides*); bicellular microhairs with long basal cells; and dumbell-shaped silica bodies (also seen in *E. tenella* (L.) Beauv. and *E. capillaris* (L.) Nees). Koch (1978) and Pohl (1977) presented evidence for retaining these species in *Eragrostis.* Because *Eragrostis* appears to be a large polyphyletic assemblage, we believe that recognition of this small segregate genus is warranted. Based on similarities in leaf anatomy, Nicora (1962) suggested that *Distichlis* and *Monanthochloë* may be the closest relatives.

22. *Neesiochloa* Pilg., Repert. Spec. Nov. Regni Veg. 48:119. 1940.—Type: *Neesiochloa barbata* (Nees) Pilg.

Plants annual; lacking stolons; lacking rhizomes. Flowering culms erect (15–30 cm tall); caespitose; glabrous. Leaves

cauline; without auricles. Sheaths shorter than internodes; with smooth margins; not ciliate. Ligule a ciliate membrane. Leaf blades linear (3–7 cm long, 2–3 mm wide, sometimes linear-lanceolate); flat; not pungent; with thickened margins (margins hispid, with tuberculate hairs). Inflorescence a raceme or panicle (4–10 cm long); exserted. Main axis glandular; smooth. Primary branches spreading from main axis; terminating in a spikelet; with spreading secondary branches. Pedicels glandular; glabrous; smooth. Disarticulation above glumes; lemma and palea falling as a unit. Callus hairy. Spikelets 6–9 mm long; solitary; laterally compressed (broadly oblong or orbicular); pedicellate (0.5–2 cm long, capillary). Glumes shorter than spikelets; more or less equal; smooth; glabrous. First glume 1-nerved. Second glume about same length as lower lemma; awned; 1-nerved. Rachilla pronounced between florets; hairy. Florets 6–12 per spikelet. Sterile florets present; above fertile florets. Lemma emarginate (broadly truncate); awned; glabrous; smooth; 3-nerved; membranous; with hairy nerves (long ciliate). Palea hairy; not extending into awns; membranous; margins not enfolding fruit; ciliate (with medial tuft of hairs); smooth. Lodicules acuminate. Stamens 3. Anther olivaceous plumbeous. Stigmas 2. Caryopsis dorsiventrally compressed. Chromosome number unknown.

DISTRIBUTION.—South America (Brazil). Native to the New World.

REMARKS.—A monotypic South American genus known only from Brazil, where it inhabits damp, disturbed sites. Nees (1829) first described the type species in *Calotheca* Desv. Trinius (1831) placed this species in *Briza* L., and Kunth (1833) aligned it with *Chascolytrum* Desv. *Neesiochloa barbata* is morphologically unique by having a distinctive emarginate, or broadly truncate, awned lemma with long ciliate nerves. Clayton and Renvoize (1986) mentioned that the caryopsis is similar to *Erioneuron* and placed this genus near *Tridens* and below a clade containing *Blepharidachne, Erioneuron,* and *Munroa.* Anatomically, the leaf blade has whitish margins and the lemma nerves are long ciliate, a characteristic of the Munroinae. More cytological and morphological data are needed to place this enigmatic genus in any other tribe than the unnatural Eragrostidinae.

23. *Neyraudia* Hook., Fl. Brit. India 7:305. 1896.—Type: *Neyraudia madagascariensis* (Kunth) Hook. (= *N. arundinacea* (L.) Henrard).

Plants perennial (reed-like); lacking stolons; rhizomatous. Flowering culms erect (1–3 m tall); caespitose; glabrous. Leaves cauline; without auricles. Sheaths shorter than internodes; with smooth margins; not ciliate. Ligule a line of hairs. Leaf blades linear (1–2 cm wide); flat (sometimes narrow and subinvolute, tapering to a filiform apex); not pungent. Inflorescence a panicle (typically more than 30 cm long, plumose, nodding, densely flowered); exserted. Main axis smooth. Primary branches spreading from main axis; terminating in a spikelet; with appressed secondary branches. Pedicels glabrous; scabrous. Disarticulation above glumes; lemma and palea falling separately. Callus glabrous. Spikelets 6–10 mm long; solitary; laterally compressed; pedicellate. Glumes shorter than spikelets; unequal; smooth; glabrous. First glume 1-nerved. Second glume shorter than lower lemma; unawned; 1-nerved. Rachilla pronounced between florets; hairy. Florets 2–5 per spikelet. Sterile florets present; below fertile florets (lower 1 or 2 sterile). Lemma cleft; awned (central awn recurved, lateral awn setaceously bidentate); hairy; long villous; smooth; 3-nerved; membranous; with hairy nerves (long ciliate on lateral nerves). Palea glabrous; not extending into awns; membranous; margins not enfolding fruit; smooth. Lodicules acuminate. Stamens 3. Anther yellow. Stigmas 2. Caryopsis terete. Chromosome number unknown.

DISTRIBUTION.—North America and Central America. United States (Southeastern Region) and Mexico. Introduced to the New World.

REMARKS.—An Old World genus with only two species, superficially very similar to *Phragmites* Adans. (Clayton and Revoize, 1986). *Neyraudia* exhibits typical Kranz or C4 leaf anatomy and embryo features that are common in the Chloridoideae; however, the occurrence of very slender arundinoid-like microhairs is unusual. Its affinity to other Eragrostideae is not known. Clayton and Renvoize (1986) only allude to a small clade with two other African genera, *Triraphis* R. Br. and *Habrochloa* C.E. Hubb., as derived members.

24. *Pereilema* J. Presl, Rel. Haenk. 1:233. 1830.—Type: *Pereilema crinitum* J. Presl.

Plants annual; lacking stolons; lacking rhizomes. Flowering culms erect or decumbent (10–80 cm tall, often rooting at lower nodes, somewhat scaberulous roughened, often reddish purple); not caespitose; glabrous. Leaves cauline; with blade auricles (prominent and often ciliate). Sheaths longer or shorter than internodes; with smooth or scabrous margins; ciliate. Ligule a membrane (somewhat thickened, often brownish or purplish, less than 1 mm long). Leaf blades linear (3–22 cm long, 1–8 mm wide); flat; not pungent. Inflorescence a panicle (usually interrupted below, 3–20 cm long, 0.3–3 cm wide); exserted or partially included in upper sheath. Main axis hairy. Primary branches appressed or spreading from main axis; terminating in a spikelet; reduced to fascicle of spikelets. Pedicels glabrous or hairy; pilose or villous; smooth or scabrous. Disarticulation above or below glumes (occasionally between clusters of spikelets); lemma and palea falling as a unit. Callus hairy. Spikelets 1–3 mm long; in clusters; subtended by sterile bristles (bristles usually scabrous but plumose in *P. ciliatum* E. Fourn.); terete (greenish to yellowish); sessile, subsessile, or pedicellate (0–2 mm long). Glumes shorter than spikelets; unequal or more or less equal; smooth; glabrous. First glume 1-nerved. Second glume shorter than lower lemma; awned; 1-nerved. Florets 1 per spikelet.

Sterile florets present (reduced to bristles); heteromorphic. Lemma entire; awned (0.7–3.5 cm long); hairy; pubescent or pilose; scabrous; 3-nerved; membranous (with visible papillae); with hairy nerves. Palea hairy; not extending into awns; membranous; scabrous. Lodicules truncate. Stamens 2 or 3. Anther yellow. Stigmas 2. Caryopsis laterally compressed. Base chromosome number of x = 10.

DISTRIBUTION.—North America, Central America, and South America (Colombia, Venezuela, Guiana, Surinam, French Guiana, Ecuador, Peru, and Brazil). Mexico. Native to the New World.

REMARKS.—Presl (1830) recognized *Pereilema* as a distinct genus and his concept has been narrowly interpreted by later authors. Kunth (1833) described a species of *Muhlenbergia* from Brazil that Hitchcock (1927) later transferred to *P. beyrichianum* (Kunth) Hitchc. *Pereilema ciliatum* Fourn. ex Hemsl. is native to Mexico, and *P. crinitum* occurs throughout the range of the genus. A new species, *P. diandrum* R.W. Pohl, apparently restricted to Costa Rica (Davidse and Pohl, 1992), brings the total to four in the genus.

The genus can be separated from other members of the Eragrostideae by the sterile, bristle-like spikelets that subtend the fertile spikelets and by the prominent blade auricles that are usually ciliate. The species occupy seasonally moist sites along disturbed slopes and in partial openings in adjacent forest between 500–2100 m. *Pereilema* has been included in the Lycurinae by Pilger (1956), suggesting a relationship with *Lycurus,* and was included more recently by Clayton and Renvoize (1986) in the Sporobolinae along with *Calamovilfa, Crypsis, Hubbardochloa, Lycurus, Muhlenbergia, Sporobolus,* and *Urochondra* C.E. Hubb. Based on restriction site variation of the chloroplast genome, *Pereilema* seems allied with *Bealia, Blepharoneuron, Chaboissaea, Lycurus,* and *Muhlenbergia,* all members of the Muhlenbergiinae (Duvall et al., 1994).

25. *Redfieldia* Vasey, Bull. Torrey Bot. Club 14:133. 1887.—Type: *Redfieldia flexuosa* (Thurb. ex A. Gray) Vasey.

Plants perennial; lacking stolons; rhizomatous (long creeping or vertical). Flowering culms erect (50–130 cm tall); caespitose; glabrous. Leaves cauline; without auricles. Sheaths longer than internodes; with smooth margins; not ciliate. Ligule a line of hairs. Leaf blades filiform (16–75 cm long, 1.5–5 mm wide and flexuous); involute; not pungent. Inflorescence a panicle (20–75 cm long, 4–25 cm wide, with flexuous, capillary branches and pedicels); exserted. Main axis smooth. Primary branches divaricate; terminating in a spikelet; with spreading secondary branches. Pedicels glabrous (sometimes with a few scattered hairs); smooth. Disarticulation above glumes; lemma and palea falling as a unit. Callus hairy (with long silky hairs). Spikelets (3–)5–7(–8) mm long; solitary; laterally compressed (dark gray or plumbeous); pedicellate (1–14 mm long). Glumes shorter than spikelets; very unequal; smooth; glabrous. First glume 1-nerved. Second glume shorter than lower lemma; unawned; 1-nerved (rarely 2–3-nerved). Rachilla pronounced between florets; glabrous. Florets 1–6 per spikelet. Sterile florets present; above fertile florets. Lemma entire; mucronate (slightly excurrent, forming 3 minute teeth, with lateral nerves); hairy; pubescent; smooth; 3-nerved; chartaceous; with glabrous nerves. Palea glabrous; not extending into awns; chartaceous; margins not enfolding fruit; not ciliate (tuft of hairs at base); smooth. Lodicules rounded. Stamens 3. Anther yellow or reddish purple. Stigmas 2. Caryopsis terete. Base chromosome number of x = 10 (cytologically atypical, 2n = 25 with a loosely synapsed bivalent and 3 univalents).

DISTRIBUTION.—North America. United States (Southwestern Region, Northern Plains Region, Central Plains Region, and Texan Region). Native to the New World.

REMARKS.—Thurber (1863) described the only species recognized in the genus under *Graphephorum* Desv., an American segregate genus lying somewhere between *Trisetum* and *Koeleria* Pers. of the Pooideae, tribe Aveneae (Clayton and Renvoize, 1986). Vasey (1887b) considered the species to be distinct and created a genus in honor of J.H. Redfield, a curator of the Herbarium of the Philadelphia Academy of Natural Sciences. Vasey (1887b) mentioned that it resembled *Triodia* R. Br. (an endemic Australian genus), now treated as *Tridens* in the New World, but differed in many morphological features. The structure of the spikelets led Vasey to believe that *R. flexuosa* seemed nearest to *Festuca* L. Other workers included *Redfieldia* in the Festucoideae, tribe Festuceae (Hitchcock, 1935b, 1951; Sutton, 1973), and others have correctly aligned it with the Chloridoideae, tribe Eragrostideae (Pilger 1954; Reeder, 1957, 1976; Stebbins and Crampton, 1961; Decker, 1964; Gould, 1968, 1975; Clayton and Renvoize, 1986). A second species, *Redfieldia hitchcockii* A. Camus, was described from Madagascar (Camus, 1926). Pilger (1956) first noticed that the placement of this species in *Redfieldia* was not appropriate. We agree with Camus that the spikelets between the two species are very similar; however, de Winter (1966) found this species to have danthonioid leaf anatomy and that it may prove to belong to the genus *Styppeiochloa* de Winter. Therefore, the generic and probably subfamilial placement of this enigmatic species needs reevaluation.

The primary characters that can be used to differentiate *Redfieldia* from other members of the Eragrostideae are ligules with a dense line of hairs, a hairy, bearded callus, unequal glumes, 2–6-flowered spikelets, and 3-nerved, mucronate, chartaceous lemmas. Phillips (1982), in a phenetic analysis of the Eragrostideae, found *Redfieldia* to lie between *Eragrostis* and *Tridens* on a minimum spanning tree and principal coordinates plot, and Clayton and Renvoize (1986) reiterated her conclusion. Cytologically, *R. flexuosa* has been reported to have irregular meiosis at diakinesis and metaphase I, with 12 bivalents and one univalent or 11 bivalents and three univalents (Reeder, 1971; 1976). It was suggested by Reeder (1976) that aneuploidy is occurring and that the base number for the genus

is x = 10. Information from restriction site variation of the chloroplast genome (Duvall et al., 1994) aligns *Redfieldia* with members of the subtribe Muhlenbergiinae (*Bealia, Blepharoneuron, Chaboissaea, Lycurus, Muhlenbergia,* and *Pereilema*). Perhaps this species has arisen from hybridization between a member or an extinct ancestor of *Eragrostis* or *Tridens* (genera that have ligules with a dense line of hairs and 2-many-flowered spikelets) and *Muhlenbergia* (membranous ligules and 1-flowered spikelets), the maternal chloroplast donor. The inclusion of *Redfieldia* in the Muhlenbergiinae without further data seems premature.

26. *Reederochloa* Soderstr. & H.F. Decker, Brittonia 16:334. 1964.—Type: *Reederochloa eludens* Soderstr. and H.F. Decker.

Plants dioecious; perennial; stoloniferous; lacking rhizomes. Flowering culms erect (dimorphic; staminate culms 3–11 cm tall, pistillate culms 2–3.5 cm tall); caespitose; glabrous. Leaves mostly basal; without auricles. Sheaths longer than internodes; with smooth margins; ciliate (sparsely to densely pilose). Ligule a membrane. Leaf blades linear (1.5–4 cm long, 0.2–1 mm wide); involute; pungent. Inflorescence consisting of 2–3(–4) spikelets; a raceme (pistillate inflorescence 1–1.5 cm long, 6–8.5 mm wide, staminate inflorescence 0.5–1.5 cm long, 5–8 mm wide); exserted or partially included in upper sheath (pistillate inflorescence hidden among leaves). Main axis smooth. Primary branches spreading from main axis; terminating in a spikelet. Pedicels glabrous; smooth. Disarticulation above glumes (tardily); lemma and palea falling as a unit. Callus glabrous. Spikelets 5–13 mm long; solitary; laterally compressed; pedicellate. Glumes shorter than spikelets; unequal; smooth; glabrous. First glume 2–8-nerved (indistinct). Second glume shorter than lower lemma; unawned; 3–8-nerved (indistinct). Rachilla pronounced between florets; glabrous. Florets 3–8 per spikelet. Sterile florets present; above fertile florets. Lemma entire; unawned; glabrous; smooth; 6–13-nerved (indistinct); coriaceous; with glabrous nerves. Palea glabrous; not extending into awns; chartaceous; smooth. Stamens 3. Anther olivaceous plumbeous. Caryopsis laterally compressed. Base chromosome number of x = 9 or 10.

DISTRIBUTION.—North America. Mexico. Native to the New World.

REMARKS.—*Reederochloa* is a monotypic, endemic Mexican genus restricted to a few alkaline flats in Durango and San Luis Potosi (Soderstrom and Decker, 1964). Morphologically, the genus is most similar to *Distichlis* and can be separated from the latter by possessing membranous ligules and a stoloniferous growth form. Clayton and Renvoize (1986) place *Reederochloa* in the Monanthochloinae along with *Allolepis, Distichlis, Jouvea, Monanthochloë,* and *Swallenia. Distichlis, Monanthochloë,* and *Reederochloa* share enlarged bicellular microhairs that are sunken in the leaf epidermis (Soderstrom and Decker, 1964). Perhaps the closest sisters to *Reederochloa* are *Distichlis* and *Monanthochloë.*

27. *Scleropogon* Phil., Anales Univ. Chile 36:205. 1870.—Type: *Scleropogon brevifolius* Phil.

Plants dioecious or monoecious (rarely hermaphroditic); perennial; stoloniferous (creeping, 5–15 cm long); lacking rhizomes. Flowering culms erect or mat forming (10–25 cm tall); caespitose; glabrous. Leaves mostly basal; without auricles. Sheaths shorter than internodes; with smooth margins; not ciliate. Ligule a line of hairs. Leaf blades linear (2–6(–8) cm long, 1.5–2.5 mm wide); flat or conduplicate (sharply bent away from culm at base); pungent. Inflorescence a raceme or a panicle (pistillate inflorescence 10–15(–18) cm long, including awns; staminate inflorescence 3–7 cm long); exserted. Main axis scabrous. Primary branches appressed to main axis; terminating in a spikelet; with appressed secondary branches. Pedicels glabrous; scabrous. Disarticulation above glumes (but not between florets in pistillate spikelets); lemma and palea falling as a unit. Callus hairy (pistillate spikelets) or glabrous. Spikelets 20–40 mm long (staminate spikelets 10–24 mm long); solitary; laterally compressed or terete (rounded on back in pistillate spikelets); pedicellate. Glumes about equalling spikelets; more or less equal (glumes of pistillate spikelets subtended by glume-like bract, about as long as first glume); smooth; glabrous. First glume 1–5-nerved. Second glume about same length as lower lemma; awned or unawned (awned on pistillate spikelets); 3–5-nerved (3-nerved in pistillate spikelets). Rachilla pronounced between florets; glabrous. Florets 2–5 per spikelet (occasionally 1-flowered in male spikelets). Sterile florets present; above fertile florets (upper florets reduced to awns in pistillate spikelets). Lemma entire; awned or unawned (3 long, spreading terminal awns in pistillate spikelets, awns 4–10 cm long); glabrous; smooth; 3-nerved; coriaceous; with glabrous nerves. Palea glabrous; not extending into awns; membranous or chartaceous; margins not enfolding fruit; smooth. Lodicules present or absent (absent in pistillate spikelets); truncate. Stamens 3. Anther yellow. Stigmas 2. Caryopsis terete. Base chromosome number of x = 10 (2n = 40).

DISTRIBUTION.—North America and South America (Chile and Argentina). United States (Californian Region, Southwestern Region, and Texan Region) and Mexico. Native to the New World.

REMARKS.—This amphitropical, disjunct, monotypic genus is highly variable in its morphology and has been segregated into two species by Beetle (1981). More recently, Reeder and Toolin (1987) reevaluated Beetle's work and found no consistent morphological characteristics to differentiate two taxa. Clayton and Renvoize (1986) suggested that the genus is related to *Tridens,* perhaps through *Sohnsia.*

In a cpDNA restriction site survey among a sample of New World Eragrostideae, the placement of *Scleropogon* is not well resolved (Duvall et al., 1994). *Scleropogon* does, however, appear to share a common ancestor with the Munroinae clade that includes *Dasyochloa, Erioneuron,* and *Munroa.* This is a very tentative result because not all genera of Eragrostideae

were incorporated in this analysis. Peterson and Columbus (1997) investigated the soluble enzymes from populations occurring in North and South America, and it appears there is more genetic variation in North America. This would suggest a north to south migration pattern, where a few disseminules may have given rise to the South American populations that are fixed for certain alleles.

28. *Sohnsia* Airy Shaw, Kew Bull. 18:272. 1965.—Type: *Sohnsia filifolia* (E. Fourn.) Airy Shaw.

Plants dioecious; perennial; lacking stolons; rhizomatous. Flowering culms erect (30–100 cm tall); caespitose; hairy; pubescent. Leaves mostly basal; without auricles (rarely present as prolongation of sheath margin). Sheaths longer or shorter than internodes; with scabrous margins; not ciliate. Ligule a line of hairs (long ciliate near junction of leaf and sheath). Leaf blades linear (10–40 cm long, antrorsely scabrous on both surfaces); flat or involute (flexuous); not pungent. Inflorescence a panicle (7–20 cm long, spreading in anthesis, contracted with age); exserted. Main axis hairy (pubescent). Primary branches appressed or spreading from main axis; terminating in a spikelet; with appressed secondary branches. Pedicels hairy; pubescent; scabrous. Disarticulation above glumes; lemma and palea falling as a unit (tardily disarticulating between florets). Callus hairy. Spikelets 10–12 mm long (staminate spikelets 5–9 mm long); solitary; laterally compressed; pedicellate. Glumes shorter or about equalling spikelets; more or less equal; smooth; glabrous (slightly scaberulous on keel). First glume 1-nerved. Second glume shorter or about same length as lower lemma; unawned (median nerve projecting beyond tip as small mucro); 1-nerved. Rachilla pronounced between florets; hairy. Florets 3–5 per spikelet (3 in pistillate spikelets). Sterile florets present; above fertile florets. Lemma cleft; awned (3-awned from below apex); glabrous or hairy; pilose (pistillate plants); smooth; 3-nerved; membranous; with glabrous or hairy nerves. Palea glabrous; not extending into awns; membranous; margins not enfolding fruit; smooth. Lodicules truncate. Stamens 3. Anther reddish purple. Stigmas 2. Base chromosome number of x = 10? or 12 (see Reeder, 1967).

DISTRIBUTION.—North America. Mexico (endemic to San Luis Potosi). Native to the New World.

REMARKS.—Fournier (1877) originally described the genus *Calamochloa* as containing a single species, *C. filifolia.* Later, Airy Shaw (1965) transferred the species to a new genus, *Sohnsia,* because *Calamochloa* had previously been applied by Reichenbach (1828) to a different grass. *Sohnsia* is a monotypic, Mexican endemic known only from calcareous slopes at margins of dense thorn-scrub community in San Luis Potosi. The three-awned nature of the lemma in *Sohnsia* is a unique feature in the Eragrostideae. It lead Hubbard (1934), Sohns (1956), and Roshevits (1980) to align it with the Pappophoreae, a related tribe in the Chloridoideae that has lemmas generally with 7–19 awns. Anatomically, *Sohnsia* exhibits eragrostoid features (Decker, 1964). Reeder (1967) found meiotic irregularities, such as formation of 10 bivalents and 4 univalents at diakinesis, that suggest a basic chromosome number of 10, a common number for the tribe. Clayton and Renvoize (1986) suggested that *Sohnsia* arose out of *Tridens* and then gave rise to *Scleropogon,* another dioecious member of the Eragrostideae.

29. *Sporobolus* R. Br., Prodr. 169. 1810.—Lectotype: *Sporobolus indicus* (L.) R. Br. (see Nash in N.L. Britton and A. Brown, Ill. Fl. N. U.S. ed. 2. 1:194. 1913).

Plants annual or perennial; stoloniferous or lacking stolons; rhizomatous or lacking rhizomes (creeping). Flowering culms erect or mat forming (10–250 cm tall); caespitose (often forming large clumps); glabrous. Leaves cauline; without auricles. Sheaths longer or shorter than internodes; with smooth margins; ciliate or not ciliate. Ligule a line of hairs. Leaf blades filiform or linear (3–70 cm long, 1–15 mm wide at base); flat, involute, or terete; not pungent. Inflorescence a panicle (0.5–80 cm long, 0.3–30 cm wide); exserted or partially included in upper sheath. Main axis smooth. Primary branches appressed, spreading, divaricate, or reflexed from main axis (with or without capillary branches); terminating in a spikelet; with appressed or spreading secondary branches. Pedicels glabrous; smooth. Cleistogamous spikelets present or absent (axillary when present). Disarticulation below or above glumes (commonly above first glume); lemma and palea falling as a unit. Callus glabrous. Spikelets 1–4(–7) mm long; solitary; terete; subsessile or pedicellate. Glumes shorter than spikelets; very unequal; smooth; glabrous. First glume 0–1-nerved. Second glume about same length as lower lemma; unawned; 1-nerved. Florets 1 per spikelet. Lemma entire; unawned; glabrous and hairy; pubescent or pilose; smooth; 1-nerved (3-nerved in *S. palmeri* Scribn.); membranous; with glabrous nerves. Palea glabrous; not extending into awns; membranous; margins not enfolding fruit; smooth. Lodicules present or absent; truncate. Stamens 2 or 3. Anther yellow, reddish purple, or olivaceous plumbeous. Stigmas 2. Fruit with free pericarp. Achene terete. Base chromosome number of x = 9.

DISTRIBUTION.—North America, Central America, South America (Colombia, Venezuela, Guiana, Surinam or French Guiana, Ecuador, Peru, Brazil, Bolivia, Paraguay, Uruguay, Chile, and Argentina), Africa, Europe, Asia, Australia, and Pacific Islands. Canada, United States (Northern Pacific Region, Californian Region, Southwestern Region, Northern Plains Region, Central Plains Region, Texan Region, Southeastern Region, Midsouth Region, Great Lakes Region, North Atlantic Region, and Central Atlantic Region), Mexico, and West Indies. Native or introduced to the New World.

REMARKS.—Brown (1810) first erected *Sporobolus* to differentiate among the large number of species placed in *Agrostis* L. He thought *Sporobolus* differed from the latter genus by having a hairy throat, reduced ligules, and loose seeds. A very good review of the concepts and use of other

generic names now placed in synonymy under *Sporobolus* are given in Baaijens and Veldkamp (1991). Hubbard (1947) recognized the affinity of *Crypsis* with *Sporobolus* by noting the apparent apomorphies of fruits with a free pericarp, 1-nerved lemmas, and ciliate ligules. On the basis of anatomical differences, Duval-Jouve (1866) differentiated *Crypsis* and *Sporobolus* from other members of the old Agrostideae (1-flowered grasses). Based on a shared base chromosome number (x = 9) and size, Avdulov (1931) placed *Crypsis* near *Sporobolus.* The possession of free pericarps, 1-nerved lemmas, and ciliate ligules clearly delineates the subtribe Sporobolinae, of which *Crypsis* is a member (Peterson et al., 1995).

The genus is characterized by having single-flowered spikelets, 1-nerved lemmas, fruits with free pericarps, and ligules with a line of hairs. These characteristics also are found in two other genera, *Calamovilfa* and *Crypsis.* These three genera seem to share a common ancestor and probably should be the only New World members included in the subtribe Sporobolinae. Bentham (1881) first began to sort out the disparate array of genera placed in Agrostideae, sensu lato, by erecting the subtribe Sporobolinae (as "Sporoboleae") with other genera, such as *Coleanthus* Seidl., *Mibora* Adans., and *Phippsia* R. Br. More recently, Clayton and Renvoize (1986) have included *Muhlenbergia, Lycurus,* and *Pereilema* in the Sporobolinae. Based on morphological similarity and shared cpDNA restriction site variation, these three genera belong in the Muhlenbergiinae (Duvall et al., 1994). The genus as presently circumscribed is very diverse, and a complete revision on a world-wide basis would be helpful in sorting out possible misplaced species. Within *Sporobolus,* Stapf (1898) first divided the genus into two sections: *Chaetorhacia* and *Eusporobolus.* Pilger (1956) then divided the latter section, which he elevated to subgenus *Sporobolus,* into six groups based on life form and characteristics of the glumes and panicles. Based on caryopsis morphology, Bor (1960) divided *Sporobolus* into five rather unnatural groups (Baaijens and Veldkamp, 1991). Working on the Malesian species, Baaijens and Veldkamp (1991) divided subgenus *Sporobolus* into five sections based on overall morphology, with special attention given to inflorescence branching. In the New World *Sporobolus* is represented by approximately 45 species that generally occur on marginal habitats, i.e., roadside to open prairies and savannahs.

30. *Steirachne* Ekman, Ark. Bot. 10(17):35. 1911.—Type: *Steirachne diandra* Ekman.

Plants perennial; lacking stolons; rhizomatous (short, knotty base). Flowering culms erect (15–50 cm tall); caespitose; glabrous. Leaves cauline; without auricles. Sheaths shorter than internodes; with smooth margins; not ciliate. Ligule a line of hairs. Leaf blades linear (2–9 cm long, 1.5–2.5 mm wide); flat; not pungent. Inflorescence a panicle (2–7 cm long, ovate, short pedunculate); exserted. Main axis scabrous. Primary branches spreading from main axis; terminating in a spikelet; with appressed secondary branches. Pedicels glabrous; scabrous. Cleistogamous spikelets present (at base or in upper leaf axils). Disarticulation above glumes; lemma and palea falling as a unit. Callus glabrous. Spikelets 7–12 mm long; solitary; laterally compressed; pedicellate. Glumes shorter than spikelets (subulate); more or less equal; smooth; glabrous. First glume 1-nerved. Second glume shorter than lower lemma; unawned; 1-nerved. Rachilla pronounced between florets; hairy (with apical tuft of hairs). Florets 6–13 per spikelet. Sterile florets present; above fertile florets. Lemma entire; mucronate; glabrous; scabrous (midnerve setulose); 3-nerved (lateral nerves parallel to midnerve); membranous; with glabrous nerves. Palea glabrous; not extending into awns; membranous; margins not enfolding fruit; scabrous. Lodicules truncate. Stamens 2. Anther reddish purple. Stigmas 2. Caryopsis terete (narrowly elliptical, somewhat beaked near apex). Chromosome number unknown.

DISTRIBUTION.—South America (Venezuela, Guyana, Surinam, French Guiana, and Brazil). Native to the New World.

REMARKS.—*Steirachne* is a small genus with only two species: *S. diandra* and *S. barbata* (Trin.) Renvoize. They are primarily found growing in wet depressions in open savannah and cerrado habitats. Clayton and Renvoize (1986) suggested that *Steirachne* may be most closely related to a group of seven small, Old World/Australian genera centered near *Ectrosiopsis* (Ohwi) Jansen. Anatomically, all have linear, elongated microhairs and triangular vascular bundles (Decker, 1964) rather than the bulbous microhairs that are more common in *Eragrostis* and other eragrostoid genera (Clayton and Renvoize, 1986; Judziewicz, 1991). Superficially, *Steirachne* can be differentiated from *Eragrostis* by the following combination of characters: florets disarticulating as a unit with segments of the rachilla, the later often with an apical tuft of hairs; florets with a setulose surface; florets loosely imbricate; cleistogamous spikelets present, often in the lower leaf sheaths; glumes persistent; and caryopses that are narrowly elliptical and somewhat beaked at the apex.

31. *Swallenia* Soderstr. & H.F. Decker, Madroño 17:88. 1963.—Type: *Swallenia alexandrae* (Swallen) Soderstr. and H.F. Decker.

Plants perennial; lacking stolons; rhizomatous. Flowering culms erect (25–60 cm tall, forming extensive masses, 1 m or more across, on sand dunes); caespitose; hairy; pilose (nodes lanate). Leaves cauline; not distinctly distichous (short and crowded); without auricles. Sheaths longer than internodes; with smooth margins; ciliate (villous at throat and collar). Ligule a line of hairs. Leaf blades linear (5–10 cm long, 3–5 mm wide, strongly nerved); flat; pungent. Inflorescence a panicle (4–10 cm long, narrow, branches short-appressed); exserted or partially included in upper sheath. Main axis

scabrous. Primary branches appressed to main axis; terminating in a spikelet; with appressed secondary branches. Pedicels hairy; pilose; scabrous. Disarticulation above glumes; lemma and palea falling as a unit. Callus hairy. Spikelets 10–15 mm long (nearly as wide); solitary; laterally compressed; pedicellate. Glumes about equalling spikelets; more or less equal; smooth; glabrous. First glume 7-nerved (some nerves faint). Second glume about same length as lower lemma; unawned; 7–11-nerved (some nerves faint). Rachilla pronounced between florets; hairy. Florets 3–7 per spikelet. Sterile florets present; above fertile florets. Lemma entire; unawned; hairy; villous; smooth; 5–7-nerved; chartaceous; with hairy nerves. Palea hairy; not extending into awns; chartaceous; margins not enfolding fruit; ciliate; smooth. Lodicules truncate. Stamens 3. Anther reddish purple. Stigmas 2. Caryopsis terete; with persistent style bases. Caryopsis with relatively short and blunt style bases. Base chromosome number of x = 10.

DISTRIBUTION.—North America. United States (Californian Region) (endemic to California sand dunes). Native to the New World.

REMARKS.—The single species in this genus, *Swallenia alexandrae,* is known only from the Eureka Dunes in southeastern California, where it occurs in extensive masses, one meter or more in diameter, deeply embedded in siliceous sand (Henry, 1979). The species is listed as federally endangered in the United States and rare in California (Smith and York, 1984). Swallen (1950) recognized the unique features of this species and described it as a monotypic genus, *Ectosperma* Swallen. The generic name was invalid because it had been used in 1903 for an algal genus; therefore, Soderstrom and Decker (1963) named it after Jason R. Swallen (1903–1991), a Smithsonian Institution (Washington, D.C.) agrostologist. Swallen (1950) suggested that *Swallenia* belonged in the Festuceae, possibly linked to the Aveneae. Anatomical work on *Swallenia* performed by Metcalf (1960) led Stebbins and Crampton (1961) to place it in the subtribe Monanthochloinae (= Aeluropodinae), which includes *Allolepis, Distichlis, Jouvea, Monanthochloë,* and *Reederochloa* (Clayton and Renvoize, 1986). *Swallenia* shares the following characteristics with other members of the subtribe: 5–7-nerved, chartaceaous lemmas, and ligule a line of hairs. *Swallenia* can be separated from other members of the Monanthochloinae by possessing caryopses with short and blunt style bases and hermaphroditic flowers.

32. *Tetrachne* Nees, Fl. Africae Austr. 375. 1841.—Type: *Tetrachne dregei* Nees.

Plants perennial; lacking stolons; rhizomatous. Flowering culms erect (30–90 cm tall); caespitose; glabrous. Leaves cauline or mostly basal; without auricles. Sheaths shorter than internodes; with smooth margins; not ciliate (with few hairs at corners). Ligule a line of hairs. Leaf blades linear (5–20 cm long, 1–4 mm wide); flat or involute; not pungent. Inflorescence a panicle (8–20 cm long with 6–16 secund, racemose primary branches); exserted. Main axis smooth. Primary branches appressed to main axis; terminating in a spikelet. Pedicels glabrous (up to 0.5 mm long); smooth. Disarticulation above glumes; lemma and palea falling as a unit. Callus glabrous. Spikelets 3–6 mm long; solitary; strongly laterally compressed; subsessile (closely imbricate in 2 rows on racemose primary branches). Glumes present (keeled); shorter than spikelets; more or less equal; smooth; glabrous. First glume 1-nerved. Second glume shorter than lower lemma; unawned; 1-nerved. Rachilla pronounced between florets; glabrous. Florets 5–6 per spikelet. Sterile florets present; below fertile florets (2 lowest florets sterile and without paleas). Lemma entire (strongly keeled); unawned; glabrous; smooth; 3–5-nerved (lateral nerves indistinct); membranous; with glabrous nerves. Palea glabrous; not extending into awns; membranous; margins not enfolding fruit; smooth. Lodicules truncate. Stamens 3. Anther yellow or reddish purple. Stigmas 2. Fruit with free pericarp (somewhat tardily). Achene terete. Base chromosome number of x = 10.

DISTRIBUTION.—North America, South America (Argentina) and Africa. United States (Central Atlantic Region). Introduced to the New World (a monotypic genus from Africa, introduced as a forage grass in the United States and Argentina).

REMARKS.—*Tetrachne* can be differentiated from all other eragrostoid genera by possessing inflorescences with one-sided, racemose primary branches along a central axis, each with two rows of spikelets, and the presence of sterile florets below the fertile ones. The laterally compressed spikelets with strongly keeled lemmas of *Tetrachne* suggested a close relationship with *Uniola.* Clayton and Renvoize (1986) suggested that *Uniola* is a basal member of a clade that gave rise to *Tetrachne, Entoplocamia* Stapf, and *Fingerhuthia* Nees, all members of the Uniolinae. Morphologically, *Tetrachne* is very similar to *Eleusine* and *Dactyloctenium,* members of the Eleusininae. All three genera share laterally compressed spikelets with strongly keeled lemmas, fruits with free pericarps, and spikelets that are two ranked along the primary inflorescence branches. These branches are arranged digitately or subdigitately in the Eleusininae and racemosely in *Tetrachne.* Whatever the case may be, *Tetrachne* seems somewhat centrally located between the Eleusininae and the Uniolinae. *Tetrachne dregei* is native only in southern Africa and Pakistan, where it can form dense stands when grazed (Gibbs-Russell et al., 1990).

33. *Trichoneura* Andersson, Kongl. Svenska Vetenskapsakad. Handl. 1853:148. 1855.—Type: *Trichoneura hookeri* Andersson, nom. illeg. (*Calamagrostis pumilia* Hook.f.).

Plants annual or perennial; lacking stolons; lacking rhizomes. Flowering culms erect (30–100 cm tall); caespitose; glabrous. Leaves cauline; without auricles. Sheaths shorter than

internodes; with smooth margins (minutely scabrous); not ciliate. Ligule a membrane. Leaf blades linear (3–30 cm long, 2.5–8 mm wide); flat (loosely involute on drying, acuminate); not pungent. Inflorescence a panicle (5–40 cm long, with unbranched racemose primary branches); exserted. Main axis scabrous (often puberulent). Primary branches spreading from main axis (occasionally appressed to main axis); terminating in a spikelet. Pedicels glabrous; scabrous. Disarticulation above glumes; lemma and palea falling as a unit. Callus glabrous. Spikelets 7–10(–14) mm long; solitary; terete; subsessile or pedicellate (short pedicellate). Glumes about equalling spikelets; more or less equal; scabrous; glabrous. First glume 1-nerved. Second glume about same length as lower lemma; mucronate or awned; 1-nerved. Rachilla pronounced between florets; glabrous (a few hairs at top). Florets (4–)5–8(–9) per spikelet. Sterile florets present; above fertile florets. Lemma emarginate; awned; glabrous; scabrous; 3-nerved; membranous; with hairy nerves. Palea glabrous (pilose between keels); not extending into awns; membranous; margins not enfolding fruit; smooth. Lodicules rounded. Stamens 3. Anther reddish purple. Stigmas 2. Caryopsis dorsiventrally compressed. Base chromosome number of x = 10.

DISTRIBUTION.—North America, South America (Ecuador and Peru), Africa, Asia, and Pacific Islands. United States (Texan Region) and Mexico. Native to the New and Old worlds (8 species).

REMARKS.—The following three species (four taxa) are autochthonous in the New World: *Trichoneura elegans* Swallen, *T. lindleyana* (Kunth) Ekman, *T. lindleyana* var. *albemarlensis* (Rob. & Greenm.) J. Reeder, and *T. weberbaueri* Pilg. (Matthei, 1973; Nicora and Rugolo de Agrasar, 1987). These species occur in open, usually sandy or stony habitats. *Trichoneura* is characterized by possessing emarginate lemmas with three prominent hairy nerves and spikelets with 5–8 florets. The genus is reminiscent of *Erioneuron;* however, we believe *Trichoneura* may be closely allied to, or derived from ancestors similar to *Leptochloa* and *Gouinia,* as suggested by Clayton and Renvoize (1986).

34. *Tridens* Roem. & Schult., Syst. Veg. 2:34, 599. 1817.—Type: *Tridens quinquefida* (Pursh) Roem. & Schult., nom. illeg. (*Poa seslerioides* Michx.) (= *T. flavus* (L.) Hitchc. (*Poa flava* L.)).

Plants perennial; lacking stolons; rhizomatous or lacking rhizomes. Flowering culms erect (20–170 cm tall); caespitose; glabrous. Leaves cauline; without auricles. Sheaths shorter than internodes; with smooth margins; not ciliate. Ligule a ciliate membrane or a line of hairs. Leaf blades linear (6–25 cm long, 1–8 mm wide); flat or involute; not pungent. Inflorescence a panicle (5–35 cm long, occasionally a raceme); exserted. Main axis smooth or scabrous. Primary branches appressed, spreading, or divaricate from main axis; terminating in a spikelet; with spreading secondary branches. Pedicels glabrous; smooth or scabrous. Disarticulation above glumes; lemma and palea falling as a unit. Callus glabrous. Spikelets (3–)4–10(–13) mm long; solitary; laterally compressed; pedicellate. Glumes shorter or about equalling spikelets; very unequal or subequal; smooth; glabrous. First glume 1-nerved (rarely 3-nerved). Second glume shorter or about same length as lower lemma; unawned; 1–3(–9)-nerved. Rachilla pronounced between florets; glabrous. Florets (3–)4–11(–16) per spikelet. Sterile florets present; above fertile florets. Lemma emarginate; mucronate (lateral nerves sometimes excurrent to a mucro); hairy; pubescent; smooth; 3-nerved; hyaline or membranous; with hairy nerves (hairy on nerves below, glabrous above, except *T. albescens* (Vasey) Woot. and Standl. occasionally glabrous below). Palea glabrous or hairy; not extending into awns; hyaline or membranous; margins not enfolding fruit; not ciliate (sometimes ciliate on keels); smooth. Lodicules adnate or not adnate to palea; rounded. Stamens 3. Anther reddish purple. Stigmas 2. Caryopsis dorsiventrally compressed. Base chromosome number of x = 10.

DISTRIBUTION.—North America, Central America, South America (Bolivia and Argentina), and Africa. United States (Southwestern Region, Central Plains Region, Texan Region, and Southeastern Region) and Mexico. Native to the New and Old Worlds.

REMARKS.—*Tridens* consists of about 17 species endemic to the New World and one species from Angola (Tateoka, 1961; Clayton and Renvoize, 1986). The genus for many years was composed of a loose assemblage of species with a diverse geography. It was not until Burbidge (1946a, 1946b, 1953) found sufficient anatomical evidence to separate *Triodia* R. Br., an Australian endemic, from *Tridens* that the genus began to approach a phylogenetic unit or clade. Based on anatomical evidence, Burbidge (1946a, 1946b) thought *Triodia* would be better placed in the Danthonieae. For many years *Erioneuron* was included within *Tridens* (Hitchcock, 1913; Hitchcock and Chase, 1951; Pilger, 1954), and only after careful morphological, anatomical, and cytological investigations did Tateoka (1961) decide to use Nash's (1903) *Erioneuron* for five taxa. The distinctive features of an emarginate lemma with a mucronate apex and hairy lateral nerves, 4–11 florets per spikelet, and ligules being either a ciliate membrane or a line of hairs, led Clayton and Renvoize (1986) to suggest that *Tridens* lies at the junction of several divergent lines. Our data on overall morphology suggests phenetic relationships with *Erioneuron, Leptochloa, Munroa, Neesiochloa, Trichoneura,* and *Tripogon. Erioneuron* and *Munroa* have already been suggested to lie in the Munroinae, where the base chromosome number is either 7 or 8. In a cpDNA analysis involving 17 genera of the Eragrostideae, *T. flavus* and *T. muticus* (Torr.) Nash shared a common ancestor with and were basal to an extremely weakly supported clade containing *Tripogon, Leptochloa,* and *Scleropogon* (Duvall et al., 1994).

35. *Triplasis* P. Beauv., Essai Agrost. 81. 1812.—Type: *Triplasis americana* P. Beauv.

Plants annual or perennial; lacking stolons; rhizomatous. Flowering culms erect (45–80 cm tall); caespitose; glabrous or hairy; pubescent (appressed-pubescent at nodes). Leaves cauline; without auricles. Sheaths shorter than internodes; with scabrous margins; not ciliate. Ligule a line of hairs. Leaf blades linear (4–15 cm long, 1–4 mm wide); flat or involute; not pungent. Inflorescence a panicle (3–11 cm long); exserted or partially included in upper sheath. Main axis scabrous. Primary branches spreading from main axis; terminating in a spikelet; with appressed secondary branches. Pedicels glabrous; scabrous. Cleistogamous spikelets present (in upper sheaths and at base of lower sheaths). Disarticulation above glumes; lemma and palea falling as a unit. Callus hairy. Spikelets 6–10 mm long; solitary; laterally compressed; pedicellate. Glumes shorter than spikelets; unequal; scabrous (scabrous at midnerve with margins lacerate); glabrous. First glume 1-nerved. Second glume about same length as lower lemma; unawned; 1-nerved. Rachilla pronounced between florets; glabrous. Florets 2–4 per spikelet (widely spaced on slender, long, rachilla internodes). Sterile florets present; above fertile florets. Lemma lobed (with notch 0.5–1 mm deep); awned (generally 1–2.5 mm long); hairy; villous; smooth; 3-nerved; membranous; with hairy nerves (lateral nerves conspicuously silky hairy). Palea hairy (silky villous on upper 1/2); not extending into awns; membranous; margins not enfolding fruit; smooth. Lodicules truncate. Stamens 3 (none in cleistogenes). Anther reddish purple. Stigmas 2. Caryopsis dorsiventrally compressed (with reddish, striate pericarp). Chromosome number of n = 20.

DISTRIBUTION.—North America and Central America. Canada, United States (Southwestern Region, Northern Plains Region, Central Plains Region, Texan Region, and Southeastern Region), Mexico, and Central America. Native to the New World.

REMARKS.—*Triplasis* consists of three taxa in two species, *T. americana,* an annual with a short-awned lemma, *T. purpurea* (Walt.) Chapm., and *T. purpurea* var. *caribensis* Pohl (1972), a perennial with an awn longer than the lemma. Both species occur in sandy soils along streambanks and along the borders of forests. In a numerical analysis of morphological features, Phillips (1982) found that *Triplasis* consistently formed a group within *Tridens,* sometimes in association with *Trichoneura.* Clayton and Renvoize (1986) suggested that *Triplasis* was derived from ancestors similar to *Tridens.* By possessing lobed lemma apices, a pronounced rachilla, and a chromosome number based on 10/20, *Triplasis* seems well placed near *Leptochloa, Trichoneura, Tridens,* and *Tripogon.* The occurrence of cleistagamous spikelets and disarticulating culms in *Triplasis* also is seen in *Leptochloa, Gouinia,* and *Tridens* (Pohl, 1980).

36. *Tripogon* Roem. & Schult., Syst. Veg. 2:34, 600. 1817.—Type: *Tripogon bromoides* Roem. and Schult.

Plants perennial; lacking stolons; rhizomatous. Flowering culms erect (5–55 cm tall); caespitose; glabrous. Leaves mostly basal (old sheaths persistent, shredded); without auricles. Sheaths shorter than internodes; with smooth margins; not ciliate (summit with minute tuft of white hairs). Ligule a ciliate membrane. Leaf blades filiform or linear (3–10 cm long, 0.5–2.0 mm wide); involute; not pungent. Inflorescence a raceme (3–10 cm long); exserted. Main axis scabrous (slender triangular). Rachis terminating in a spikelet. Disarticulation above glumes; lemma and palea falling as a unit. Callus glabrous. Spikelets 3–15(–25) mm long; solitary (spreading from main axis); laterally compressed; subsessile (pedicels 0.1–0.4 mm long). Glumes shorter than spikelets; unequal; scabrous (on keel); glabrous; about same length as lower lemma. First glume 1-nerved. Second glume unawned; 1(–3)-nerved. Rachilla pronounced between florets; glabrous. Florets (3–)5–12(–19) per spikelet. Sterile florets present; above fertile florets. Lemma emarginate; awned (lateral nerves often excurrent as mucros); glabrous (except for tuft of hairs at base); scabrous (on central nerve and awn); 3-nerved; membranous; with glabrous nerves. Palea not extending into awns; membranous; margins not enfolding fruit; minutely ciliate; smooth. Lodicules truncate. Stamens 1–3. Anther yellow. Stigmas 2. Caryopsis terete. Base chromosome number of x = 10.

DISTRIBUTION.—North America, Central America, South America, Africa, and Asia. United States (Texan Region), Mexico, and West Indies (Cuba). Native to the New World.

REMARKS.—In the New World, *Tripogon* consists of the widespread *T. spicatus* (Nees) Ekman and the more local *T. ekmanii* Nicora & Rugolo, from Paraguay and northeastern Argentina (30 species world-wide). The latter species differs from the former by having lanate vascular traces near the base of the culms and longer lemmas, paleas, rachillas, and anthers (Nicora and Rugolo de Agrasar, 1991). The genus seems to be most diverse in India, Burma, and Ceylon, where 13 species occur (Bor, 1960); however, there are at least eight species centered in Africa (Phillips and Launert, 1971). Although each species of *Tripogon* has a particular set of environmental requirements, *T. spicatus* and quite a few others in the genus seem to prefer granitic substrates, often in the crevice of rocks. The genus is unique in the Eragrostideae in having an inflorescence that is a true raceme. *Tripogon* also differs from many other Eragrostideae by having lemmas with glabrous lateral nerves. By possessing emarginate lemma apices, a pronounced rachilla, and a chromosome number based on 10,

Tripogon seems well placed near *Leptochloa, Trichoneura,* and *Tridens.* Clayton and Renvoize (1986) suggested that *Tripogon* evolved from ancestors very similar to *Leptochloa.*

37. *Uniola* L., Sp. Pl. 71. 1753.—Lectotype: *Uniola paniculata* L. (see Nash in N.L. Britton and A. Brown, Ill. Fl. N. U.S. ed. 2. 1:248. 1913).

Plants perennial; stoloniferous; rhizomatous (long, thick). Flowering culms erect (0.5–2.5 m tall); caespitose; glabrous. Leaves cauline; not distinctly distichous (distichous at base in *U. pitteri* Hack.); without auricles. Sheaths longer than internodes; with smooth margins; not ciliate (except villous in throat and on margins, becoming glabrate in age). Ligule a line of hairs. Leaf blades linear (20–70 cm long, 8–15 mm wide, tough in texture); flat or conduplicate (coriaceous, tapering to a point); not pungent; without thickened margins (strongly ridged on adaxial surface). Inflorescence a panicle (10–60 cm long, narrow and dense); exserted. Main axis smooth. Primary branches appressed or spreading from main axis (branches drooping or nodding with age); terminating in a spikelet; with appressed or spreading secondary branches. Pedicels glabrous; smooth. Disarticulation below glumes. Callus glabrous. Spikelets 8–30(–50) mm long; solitary; strongly laterally compressed; pedicellate. Glumes shorter than spikelets; more or less equal; smooth; glabrous. First glume 3–5-nerved. Second glume shorter than lower lemma; unawned; 2–5-nerved. Rachilla pronounced between florets; glabrous. Florets (3–)6–20(–30) per spikelet. Sterile florets present; above or below fertile florets (lower 2–6 empty and without paleas then sterile above fertile florets). Lemma entire; unawned (sometimes slightly mucronate); glabrous; smooth (keel serrulate); 3–9-nerved; coriaceous; with glabrous nerves. Palea glabrous; not extending into awns; chartaceous; margins not enfolding fruit; ciliate (to ciliolate); smooth. Lodicules truncate. Stamens 3. Anther yellow. Stigmas 2. Fruit with free pericarp. Achene terete. Base chromosome number of x = 10.

DISTRIBUTION.—North America, Central America, West Indies, and South America (Colombia and Ecuador). United States (Texan Region, Southeastern Region, Midsouth Region, and Central Atlantic Region) and Mexico. Native to the New World.

REMARKS.—Yates (1966a, 1966b, 1967) investigated *Uniola* sensu lato and concluded that the genus was divisible into two distinct groups, one belonging to *Chasmanthium,* placed in the tribe Centotheceae, and the other in *Uniola.* Yates (1966b) further recognized *Leptochloöpsis* Yates, a weakly supported segregate that was erected to show the affinity of *U. virgata* (Poir.) Griseb. and *U. condensata* Hitchc. to various species of *Leptochloa. Uniola virgata* and *U. condensata* are perhaps sister taxa but their placement in a separate genus at this time seems unwarranted. *Uniola,* as currently circumscribed, contains four species that are primarily centered along the Caribbean and Pacific coasts. The genus is characterized by strongly keeled, coriaceous lemmas, disarticulation of entire spikelets as a unit, and between 6–20 florets per spikelet. The laterally compressed spikelets with strongly keeled lemmas of *Uniola* suggested a close relationship with *Tetrachne.* Clayton and Renvoize (1986) suggested that perhaps *Uniola* is a basal member of a clade that gave rise to *Tetrachne* and two other members of the Uniolinae.

38. *Vaseyochloa* Hitchc., J. Wash. Acad. Sci. 23:452. 1933.—Type: *Vaseyochloa multinervosa* (Vasey) Hitchc.

Plants perennial; lacking stolons; rhizomatous (slender, creeping or knotty). Flowering culms erect (50–100 cm tall); caespitose; glabrous. Leaves cauline; without auricles. Sheaths longer than internodes; with smooth margins; not ciliate. Ligule a ciliate membrane. Leaf blades linear (15–35 cm long, 2–5 mm wide); flat or involute; not pungent. Inflorescence a panicle (5–20 cm long); exserted. Main axis scabrous. Primary branches spreading from main axis (loosely contracted, at maturity branches drooping); terminating in a spikelet; with appressed or spreading secondary branches. Pedicels glabrous; scabrous. Disarticulation above glumes; lemma and palea falling as a unit. Callus hairy. Spikelets 10–18 mm long; solitary; laterally compressed (sometimes subterete); pedicellate. Glumes shorter than spikelets; very unequal; smooth; glabrous. First glume 3–5-nerved. Second glume shorter than lower lemma; unawned; 7–9-nerved. Rachilla pronounced between florets; hairy. Florets 6–11 per spikelet. Sterile florets present; above fertile florets. Lemma entire; unawned; hairy; pubescent or pilose (especially below); smooth; 7–9-nerved; chartaceous; with glabrous nerves. Palea glabrous; not extending into awns; chartaceous; margins not enfolding fruit (splitting down to center at maturity); smooth. Lodicules truncate. Stamens 3. Anther reddish purple. Stigmas 2. Caryopsis terete (deeply concave on ventral side); with persistent style bases. Caryopsis with pronounced, sharp-pointed style bases. Chromosome number of n = 30, 34.

DISTRIBUTION.—North America. United States (Texan Region). Native to the New World.

REMARKS.—A monotypic, North American genus, *V. multinervosa* is recorded from Texas and is probably present in Tamaulipas, Mexico (Gould, 1975). This species occurs on sands of river banks and coastal dunes and in sandy, open grasslands. Vasey (1891:235–236) originally described this enigmatic grass in another genus and stated, "I place this species doubtfully in *Melica* L., although it differs in several particulars from any species of that genus with which I am acquainted." Hitchcock (1928) later transferred it to *Triodia,* at the time a genus containing most of the North American species of *Tridens.* Without any explanation, Hitchcock (1933) decided to place this species in its own genus, hence *Vaseyochloa,* after the original author. The relationship of *Vaseyochloa* to other members of the Eragrostideae is somewhat problematic. Clayton and Renvoize (1986) sug-

gested *Vaseyochloa* is related to *Coelachyrum* Hochst. & Nees, an African genus of about eight species that has a caryopsis with a deeply concave ventral surface similar to *Vaseyochloa*. Based on phenetic characteristics, *Neesiochloa, Neyraudia, Steirachne,* and *Swallenia* are similar to *Vaseyochloa* by having pronounced rachillas that are hairy and having at least 6 florets per spikelet. In addition, *Swallenia* has persistent style bases at the summit of the caryopsis, a character that also is found in *Vaseyochloa*. Besides *Swallenia,* which seems to clearly have affinities with other members of the Monanthochloinae, relationships among the other three species (*Neesiochloa, Neyraudia,* and *Steirachne*) are not well understood.

Classification

Based primarily on morphological characteristics, we have attempted to place the genera of Eragrostideae into natural groups. We have included the naturalized genera along with the autochthonous genera, even though many of the remaining genera in each of the subtribes may be centered in other continents. By using results from our phenetic analysis and review of the literature (Peterson et al., 1995), especially on data from cpDNA restriction site comparisons (Duvall et al., 1994), the New World Eragrostideae is appropriately divided into seven subtribes: Eleusininae, Eragrostidinae, Monanthochloinae, Muhlenbergiinae, Munroinae, Sporobolinae, and Uniolinae (see Table 1). Diagnostic, fully comparative descriptions for each subtribe are given in Peterson et al. (1995).

Dactyloctenium and *Eleusine* are the New World representatives of the Eleusininae. An inflorescence with digitate primary branches is the diagnostic characteristic for this subtribe. Additional significant characters that define the Eleusininae include the presence of a free pericarp and a membranous ligule. The Eleusininae obviously arose in the Old World tropics, quite possibly in East Africa, where species diversity of *Dactyloctenium* and *Eleusine* is greatest. The few species represented in the New World of these two genera suggest migration from the Old World has occurred recently.

The Eragrostidinae is, at best, an unnatural grouping of convenience, because the relationships among these 15 genera are poorly understood (Table 1). However, based on the full range of characters used herein, these genera are presently excluded from other subtribes. More than one floret per spikelet, fruit with an adnate pericarp, and base chromosome number of 10, 20, or 30 distinguishes the Eragrostidinae from the Eleusininae, Munroinae, Sporobolinae, and the Uniolinae. Important characters that can be used to separate the Eragrostidinae from most of the Monanthochloinae and Muhlenbergiinae include leaf arrangement (distichous in Monanthochloinae), sexuality (dioecious in Monanthochloinae, except *Swallenia*), lemma texture (relatively thick in Monanthochloinae), and number of lemmatal nerves (3-nerved in Muhlenbergiinae). No characters exclusively distinguish the Eragrostidinae from the Muhlenbergiinae.

TABLE 1.—Subtribal classification of the New World Eragrostideae.

ELUSININAE Dumort., Anal. Fam. 63. 1829. Type: *Eleusine*
- *Dactyloctenium*
- *Eleusine*

ERAGROSTIDINAE Presl, Rel. Haenk., 1:273. 1830. Type: *Eragrostis*
- *Eragrostis*
- *Gouinia*
- *Leptochloa*
- *Neeragrostis*
- *Neesiochloa*
- *Neyraudia*
- *Redfieldia*
- *Scleropogon*
- *Sohnsia*
- *Steirachne*
- *Trichoneura*
- *Tridens*
- *Triplasis*
- *Tripogon*
- *Vaseyochloa*

MONANTHOCHLOINAE Potztal, Willdenowia 5:472. 1969. Type: *Monanthochloë*
- *Allolepis*
- *Distichlis*
- *Jouvea*
- *Monanthochloë*
- *Reederochloa*
- *Swallenia*

MUHLENBERGIINAE Pilger, Nat. Pfl.-Fam. ed. 2, 14d:168. 1956. Type: *Muhlenbergia*
- *Bealia*
- *Blepharoneuron*
- *Chaboissaea*
- *Lycurus*
- *Muhlenbergia*
- *Pereilema*

MUNROINAE Parodi ex P.M. Peterson, Gram. bonaer., ed. 4:28. 1946, nom. nud.; Sida 16:541. 1995. Type: *Munroa*
- *Blepharidachne*
- *Dasyochloa*
- *Erioneuron*
- *Munroa*

SPOROBOLINAE Benth., J. Linn. Soc. Bot. 19:30. 1881. Type: *Sporobolus*
- *Calamovilfa*
- *Crypsis*
- *Sporobolus*

UNIOLINAE Clayton, Kew Bull. 37:417. 1982. Type: *Uniola*
- *Tetrachne*
- *Uniola*

Eventually, as new data become available we suspect that many of these 15 taxa will be aligned within other current subtribes or placed within new, smaller monophyletic assemblages.

The Uniolinae is a curious, small subtribe that includes only four genera worldwide (Clayton and Renvoize 1986), three distributed in Africa and *Uniola* centered along the subtropical and tropical coastal regions of North and Central America. The presence of 5–20 florets per spikelet, fruit with a free pericarp,

and ligule a line of hairs are characters, when used in combination, that serve to distinguish the Uniolinae from the other subtribes. Characters of secondary significance include a 3–9-nerved lemma, primary inflorescence branches racemose or paniculate, and lemma entire at the apex. The Uniolinae shows some affinities with the Eleusininae because both subtribes contain species with free pericarps, laterally flattened spikelets, and spikelets that are two-ranked along primary inflorescence branches.

Calamovilfa, Crypsis, and *Sporobolus* are the New World members of the Sporobolinae, which is exclusively defined by the presence of a 1-nerved lemma. Secondary diagnostic characters include one floret per spikelet and a line of hairs for a ligule. The Sporobolinae are closely linked to the Eleusininae and Uniolinae, as all three subtribes possess fruits with free pericarps. Our analysis does not indicate a close affinity between the Muhlenbergiinae and the Sporobolinae even though both have a one-flowered spikelet. Origin of the Sporobolinae probably lies in Africa or the Eastern Mediterranean, where species diversity is greatest. There are at least 39 indigenous species of *Sporobolus* from southern Africa (Gibbs-Russell et al., 1991).

Allolepis, Distichlis, Jouvea, Monanthochloë, Reederochloa, and *Swallenia* are the New World members of the Monathochloinae (Table 1). For most taxa, the presence of distichous leaf arrangement, thick textured lemmas, and the dioecious habit distinguishes this tribe. Secondary diagnostic characters include florets 2–25 per spikelet, fruit with an adnate pericarp, and lemmas entire at the apex. Numerous morphological and anatomical adoptions, i.e., distinctly distichous leaf arrangement and bicellular microhairs with enlarged bases, are found in some members of this subtribe. These adaptations are in direct response to the environment because most of the species occur in saline habitats. Based on our phenetic analyses and those by Soderstrom and Decker (1963, 1964, 1965), the Monanthochloinae seems to be a good monophyletic unit. The Monanthochloinae is primarily New World in distribution; only *Aeluropus* Trin. is restricted to the Mediterranean, northern China, Ethiopia, and Sri Lanka.

The distribution of the Muhlenbergiinae is almost entirely New World; only approximately eight of the 160 species of *Muhlenbergia* are known to occur in southern Asia. The six genera of the Muhlenbergiinae (*Bealia, Blepharoneuron, Chaboissaea, Lycurus, Muhlenbergia, Pereilema*) are characterized by 1–3 florets per spikelet, 3-nerved lemmas, true caryopses, and a base chromosome number of 8 or 10. These characters do not adequately distinguish the Muhlenbergiinae from the Munroinae. The Munroinae, however, always has 2–12 florets per spikelet and the lemma apex is usually emarginate to cleft, whereas the Muhlenbergiinae usually has a single floret per spikelet and the lemma apex is mostly entire. Evidence from molecular data supports this subtribe as being monophyletic (Duvall et al., 1994).

The Munroinae consists exclusively of the following New World genera: *Blepharidachne, Dasyochloa, Erioneuron,* and *Munroa* (Peterson et al., 1995). Diagnostic characteristics of the subtribe include lemmas with emarginate to cleft apices and a base chromosome number of $x = 7$ or 8. Molecular studies support the conclusion that the Munroinae evolved from a common ancestor (Duvall et al., 1994).

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