

NATURAL ORDER GRAMINEÆ.

Flowers hermaphrodite, or unisexual. Stamens usually 3 in a whorl, rarely by abortion reduced to 2, or 1, or by duplication raised to many. Ovary entire, 1-celled, 1-ovuled; usually with two, rarely one or three styles, free or united at the base. Fruit a small seed-like nut or caryopsis, the thin membranaceous pericarp usually closely adnate to the seed, in a few genera free and loosely surrounding the seed. Embryo small on one side of the base of the albumen. The floral organs in the axils of enveloping chaff-like scales or bracts, the one usually inclosing the flower called a palet, usually 2- rarely 1-nerved; another scale standing opposite this and usually more or less completely inclosing it called the flowering or floral glume, usually 3- to many-nerved.—Usually one to several minute scales called lodicules between the glume or palet and ovary; these, together with the palet, sometimes wanting. The parts above enumerated constitute a spikelet, which may be solitary, and inclosed by another pair of bracts called empty glumes, or there may be two to many spikelets, alternating on a rachis with a pair, or sometimes several empty glumes below, the whole constituting a several- or many-flowered spikelet. The spikelets may be variously grouped in spikes, racemes, or panicles.

Grasses are usually herbaceous, erect, or decumbent, or creeping and rooting at the lower nodes, sometimes suffrutescent, shrubby, or arborescent, the culms usually hollow between the closed nodes. Leaves alternate, parallel veined, usually long and narrow, sheathing the stem at their base, often having at the top of the sheath within a scarious or ciliate appendage called a ligule.

SYNOPSIS OF TRIBES AND GENERA.

1. Tribe MAYDEÆ.

Inflorescence monœcious, spicate, the male and female spikes distinct and on different parts of the plant or connected; when connected the male flowers occupying the upper portion of the spike or spikes, and the female or fertile flowers the lower part.

The genus *Coix* is frequently cultivated under the name of Job's tears.

The genus *Euchlana* is cultivated in the South as a forage plant under the name of Teosinte.

The genus *Zea*, species *mays*, is commonly and extensively cultivated throughout the country, and is known as maize or Indian corn.

As natives of this tribe we have only the genus *Tripsacum*.

2. Tribe ANDROPOGONEÆ.

Spikelets in racemes or spikes, most commonly in twos, occasionally in threes, at each joint of the (usually) articulate rachis, one sessile and one pediceled, or the terminal ones in threes. Spikelets homogamous or heterogamous, generally 1-flowered, with 3 empty glumes; first empty glume more indurated than the inner ones, and than the flowering glume, the latter often hyaline and bearing a bent or twisted awn. Palea usually minute, sometimes absent. Stamens 3, rarely 2 or 1. Style free, stigma plumose.

GROUP 1.

Spikelets in spike-like racemes, awnless, generally in pairs in alternate notches of the generally articulate rachis; one, rarely two, sessile and fertile, more or less imbedded in an excavation of the rachis, the other pediceled and sterile.

A. General rachis not deeply indented at the joints..... ELIONURUS, 6

B. General rachis deeply indented or excavated at the joints.

I. Spikes more than an inch long; sessile spikelets flat or convex.

ROTTBÆLLIA, 7

II. Spikes less than an inch long; sessile spikelets small and globular.

MANISURIS, 7

GROUP 2.

Spikelets in pairs or threes, one sessile and fertile, and one or two pediceled, male, empty or defective, arranged in spikes or loose racemose panicles, the flowering glume of the sterile flower commonly awned.

A. Sessile spikelets male, the pedicellate one perfect..... TRACHYPOGON, 7

B. Sessile spikelets perfect, the pedicellate one male..... HETEROPOGON, 8

GROUP 3.

Inflorescence paniculate, consisting of many spike-like racemes of numerous joints; spikelets in pairs or threes, the sessile one fertile, usually awned, the pedicellate one either fertile, male or imperfect. Axis of the racemes distinctly articulate (usually bearded).

A. Spikelets in pairs along one side of a simple spike, or of the spike-like branches of a simple panicle..... ANDROPOGON, 9

B. Spikelets in single or few pairs on the branches of a more or less compound panicle

I. Panicle loose, the branches not sessile.

* Outer glumes membranaceous or narrow and rigid, with 2 prominent lateral nervesCHRYSOPOGON, 9

** Outer glumes when in fruit hard, smooth, and shiningSORGHUM, 13

II. Panicle strict, the branches sessile.

* Spikelets in pairs, awned, both perfectERIANTHUS, 8

** Spikelets in pairs, awnlessIMPERATA, 8

3. Tribe ZOYSIAE.

Spikelets in groups of two to five, usually 1-flowered, the flowering glume always awnless, membranaceous; the empty glumes of firmer texture and frequently awned.

A. Two outer spikelets male, each 2-flowered, the inner spikelet perfect, 1-floweredHILARIA, 13

B. Lowest spikelet of each group sterile, terminal one fertile, 1-flowered, with delicate glumesÆGOPOGON, 14

C. Uppermost spikelet of each group sterile, second empty glume coriaceous, with hooked spines on the backTRAGUS, 15

4. Tribe PANICEÆ.

Spikelets 1- or occasionally 2- flowered, the second flower male or neutral (very rarely perfect) in the axis of the third glume, arranged in spikes, racemes, or panicles; flowering glume and palea of the perfect flower always firmer in texture than the empty glumes, unawned; empty glumes rarely awned.

A. Spikelets all perfect (hermaphrodite), neither sunken in an excavation in the rachis nor subtended by a large leaf-sheath.

I. Empty glume 1REIMARIA, 15

II. Empty glumes 2; perfect flowers single.

* Spikelets with a swollen, ring-like callus at the baseERIOCHLOA, 21

** Spikelets without a swollen callus at the base.

+ Spikelets sessile, or nearly so, in one-sided spikes, these frequently in pairs or paniclesPASPALUM, 15

± Spikelets not sessile in one-sided spikes, but in panicles, and pedicellate.

(a) All the spikelets alike in terminal paniclesANTHENANTIA, 20

(b) Spikelets of two kinds; first, the sterile, borne on a terminal panicle; second, the fertile, borne on short subterranean branches.

AMPHICARPUM, 20

III. Empty glumes 3, perfect flowers 1, or a flowering glume with male flowers instead of the third empty glume.

* First and second empty glumes without a distinct callus, awnlessPANICUM, 22

** First and second empty glumes awnedOPLISMENUS, 37

IV. Spikelets single or in pairs, subtended by an involucre consisting of from one to many bristles or spines (sterile branches), which are sometimes grown together.

* Spikelets falling at maturity; bristles persistentSETARIA, 37

** Involucral bristles falling off with the spikelets at maturity.

+ Bristles numerous, rigid, thickened at the base, frequently grown together.

CENCHRUS, 39

± Bristles usually numerous, apparently whorled, delicate, not thickened at the base, often plumosePENNISSETUM, 39

B. Spikelets without bristles, sunken into cavities of the one-sided broad rachis of the short spikesSTENOTAPHRUM, 40

5. Tribe ORYZEÆ.

Spikelets perfect or unisexual, 1-flowered; flowers apparently terminal and inclosed by a flowering glume and a palet, which is usually 1-nerved. Empty glumes 2 or more, very seldom numerous. Stamens frequently 6, sometimes more. Stigmas more or less elongated; fruit with a small embryo and a long linear hilum.

A. *Spikelets unisexual; plants monœcious; anthers 6 or more.*

- I. Spikelets in short, solitary spikes, terminal and axillary HYDROCHLOA, 40
- II. Spikelets in panicles, not in pairs at the nodes of the panicle, without empty glumes.
 - * Female spikelets ovate or elliptical; embryo many times longer than the fruit.
 - + Male and female spikelets in different panicles, rarely in the same, and then the male spikelets terminal on each branch..... LUZIOLA, 40
 - ± Male and female spikelets in the same panicle, the female terminal, the male at the base of each branch..... ZIZANIOPSIS, 41
- II. Spikelets linear; embryo as long as the fruit; the upper branches female, the lower male..... ZIZANIA, 41

B. *Spikelets all perfect; arranged in paniolas.*

- I. Empty glumes 2, short but distinct, awnless; flowering glume and palet much compressed laterally ORYZA, 41
- II. Empty glumes wanting or only minute rudiments; flowering glumes awnless LEERSIA, 41

6. Tribe PHALARIDÆ.

Spikelets with 1 perfect terminal flower, with the addition of 2 male or imperfect ones, or 1 or 2 sterile glumes or pedicels below the perfect flower and above the lower pair of empty glumes. Rachilla not prolonged beyond the fertile flower. Palet or its substitute, with a central nerve or none, laterally compressed.

- A. A pair of small glumes or bracts, 1 on each side of the perfect flower.
 - PHALARIS, 42
- B. Perfect flower small; on each side an awned empty glume, which is larger than the perfect flower ANTHOXANTHUM, 43
- C. Third and fourth glumes, or at least the third, with a male flower almost equaling the first and second, awnless or short awned..... HIEROCHLOE, 43

7. Tribe AGROSTIDÆ.

Spikelets 1-flowered, sometimes with a rachilla or rudiment of a second flower, very rarely 2-flowered; empty glumes 2, very rarely wanting, usually as long as, or sometimes shorter, or even longer than the floral glumes; palet 2-nerved.

(1) Subtribe STIPEÆ.

Flowering glume indurated at maturity or at least firmer in texture than the empty glumes, very closely inclosing the flowers and fruit, and (except in *Milium*) with a simple or trifid awn from the apex, and (except in *Milium*) with a callus at the base.

- (1) Awn usually trifid, the branches divaricate..... ARISTIDA, 44
 (2) Awn simple, twisted; callus mostly acute..... STIPA, 49
 (3) Awn simple, straight, deciduous; callus short, obtuse..... ORYZOPSIS, 55
 (4) Awn wanting; flowering glume without a callus..... MILIUM, 56

(2) Subtribe EUAGROSTÆ.

Glumes membranaceous, the lower rarely strongly conduplicate, the floral one with or without a dorsal awn; sometimes with a minute or conspicuous rudiment.

- (1) Spikelets strongly conduplicate; palea 1-nerved; stamen 1; sometimes with a rudiment..... CINNA, 57
 (2) Flowering glume 1- (rarely 3-) nerved; grain loosely inclosed or naked; no rudiment..... SPOROBOLUS, 59
 (3) Empty glumes long-awned; no rudiment..... POLYPOGON, 57
 (4) Empty glumes chartaceous and hairy; flowering glume strongly awned under the apex; rudiment present..... THURBERIA, 58
 (5) Flowers large, spicate or closely paniced; not awned..... EPICAMPES, 58
 (6) Flowers large, panicle contracted; Arctic grasses..... ARCTAGROSTIS, 59
 (7) Floral glume mucronate or awned from the apex; no rudiment.
 MUHLENBERGIA, 64
 (8) Empty glumes minute; floral glume large and with a short awn; rachilla much prolonged and terminated by a minute rudiment..... BRACHYELYTRUM, 71
 (9) Empty glumes longer than the floral glume; rarely with a minute rudiment..... AGROSTIS, 72
 (10) Floral glume with a delicate awn below the apex, many times longer than the glume..... APERA, 78
 (11) Empty glumes saccate at the base, many times longer than the floral glume..... GASTRIDIVM, 78
 (12) Flowers generally with many fine hairs from the callus at the base and with a hairy rudiment; the floral glume and palea (except in section Calamovilfa) thin and membranaceous..... CALAMAGROSTIS, 78
 (13) Floral glume and palea chartaceous; floral glume awnless; panicle spike-like..... AMMOPHILA, 85

(3) Subtribe PILEOIDEÆ.

Flowering glume usually hyaline or membranaceous at maturity, at least more delicate than the empty glumes; grain loosely or not at all inclosed.

A. Spikelets in a spikelike panicle.

I. Awns none; spikes short and scarcely exerted..... HELEOCHLOA, 85

II. Glumes somewhat truncate, mucronate, or short-awned, spike cylindric.

PILEUM, 86

III. Empty glumes united at the base, the floral one awned on the back; palea none; spike cylindric..... ALOPECURUS, 86

IV. Lower glumes with 2 awnlike teeth, the upper with 1..... LYCURUS, 88

B. Spikelets minute; empty glumes wanting, the floral usually deciduous.

COLEANTHUS, 88

C. Spikelets in a narrow panicle; empty glume short..... PHIPPSIA, 89

TRIPSACUM Linn.

Flowers monœcious in jointed spikes, the upper part male and the lower female. The upper or male spikelets sessile, in pairs at each joint of the triangular rachis; each spikelet with 2 membranaceous male

flowers, the outer glumes coriaceous or rigid. The pistillate spikelets single and embedded in the joints of the thickened cartilaginous rachis, 2-flowered, the upper flower fertile, the lower neutral; the outer empty glume thickened and cartilaginous, the inner much thinner and pointed; the flowering glumes and paleas thin and scarious.

At maturity the rachis breaks up at the joints with the embedded spikelets.

1. *Tripsacum dactyloides* Linn. (GAMA GRASS). (Gray's Manual, 6th ed., p. 636.) Culms tufted, 4 to 6 feet high, thick and stout; leaves coarse, 1 to 2 feet long, 1 inch wide; spikes 2 to 4 together at the apex, and sometimes 1 or 2 lateral ones, 4 to 8 inches long, rigid, the lower one-fourth pistillate, the upper staminate; spikelets 4 to 5 lines long, as long as or longer than the internodes.—In rich low ground, Connecticut to Missouri and southward to Florida and Texas.

Var. *MONOSTACHYUM* (*T. monostachyum* Willd). Culms 1 to 2½ feet high; cauline leaves short (5 to 8 inches), one-half inch wide, long-attenuated at apex; spike single, terminal, 4 to 6 inches long; spikelets nearly as in *T. dactyloides*, the pistillate part consisting of about 8 joints.—Connecticut to Missouri and southward to Florida and Texas. *G. C. Nealley* in Texas (Ballinger County †).

2. *T. Floridanum* Porter in Herb. Culms 2 to 4 feet high, slender, leaves 2 feet long, narrow and rigid; spike single, terminal, 6 to 10 inches long, stiffly erect, more slender than the preceding; spikelets smaller and more numerous, two-ranked, the pistillate part short.—Florida (*A. P. Garber*) and Texas (*G. C. Nealley*).

3. *Lemmoni* Vasey. Culms 4 to 5 feet high, less robust than in *T. dactyloides*, the leaves longer, narrower, and more rigid, becoming somewhat involute, scabrous on the margins, otherwise smooth; spikelets terminal and lateral, the upper in clusters of 5, the lateral in pairs or single, the male part 3 to 3½ inches long, the female part 2½ to 3 inches; the male part slender, the spikelets 3 lines long; the female part about 2 lines wide, somewhat flattened or angular, of 12 to 15 joints, each about 2 lines long.—Huachuca Mountains, Arizona (*J. G. Lemmon*).

This species is near *T. fasciculatum* Trin., of Mexico, but is less robust, with much narrower leaves. That also has much laxer and longer male spikes, its spikelets 2 lines long; the female spikelets shorter.

COIX Linn.

Culm repeatedly branched, the branches ending in an inflorescence, which consists of (at the base) one or two globose ivory-like capsules with an orifice at the top from which projects a number of male spikelets in pairs. The globose capsule with one or two sterile spikelets. The capsule is formed by a condensation of the sheath of the leaf at the base of the female inflorescence.

The species *C. lachryma* is occasionally cultivated in this country, and is occasionally found escaped from cultivation. It is called Job's tears, and is originally from China and India.

ELIONURUS H. B. K.

Spike cylindrical, rachis grooved, white-hairy, the sessile spikelet with one perfect flower, the pediceled one sterile. Glumes 4, all awnless, the lower one usually the largest and thickest, keeled near the margin on each side, and with a row of balsam cells under each keel, second rather smaller and thinner, the third and fourth hyaline. Stamens 3. Styles distant, stigmas plumose.

1. *E. tripsacoides* H. B. K. (*Andropogon Nuttalli* Chapm.; *Rottbœllia ciliata* Nutt.) (Chapm., Flora S. U. States, p. 580.) Culms 3 to 4 feet high, stout, erect, smooth; leaves linear, smooth; spikes terminal and lateral, 3 to 5 inches long, on long peduncles; rachis and pedicel of sterile flower white-ciliate; outer glumes hispid-ciliate near the margin.—Florida to Texas and Mexico.

2. *E. barbiculmis* Hack. (*Andropogon candidus* Torr. in Herb.) (Vasey, Grasses of the Southwest, Pl. 15.) Culms 2 to 3 feet high, white-ciliate at the nodes, pubescent below, more slender than the preceding; radical leaves numerous, almost capillary, about half as long as the culm, ciliate-margined; spikes mostly terminal, 3 to 4 inches long; rachis, pedicels, and first and second glumes white villous.—Texas, Arizona and Mexico.

ROTTBŒLLIA Linn. f.

Culms erect, spikes terminal, or terminal and lateral, cylindrical or slightly compressed, joints of the rachis and pedicels thickened, first or outer empty glume coriaceous, covering the excavation in the rachis, joints of rachis and spikelet usually naked.

(a) Joints of rachis readily disarticulating.

1. *R. cylindrica* Chapm. (*Tripsacum cylindricum* Michx.) (Chapm. Fl. S. States, p. 579.) Culms slender, terete, 1 to 2 feet high; leaves narrowly linear; spikes mostly terminal and curved, 2 to 6 inches long, 1 line in diameter, purplish; spikelets as long as the internode; lower glume obtuse, obscurely pitted, sterile spikelet rudimentary.—Florida to Texas.

2. *R. rugosa* Nutt. (Chapm. Fl. S. States, p. 579.) Culms compressed, 2 to 4 feet high, smooth; leaves long, linear spikes numerous (5 to 15), mostly on long pedicels 2 to 6 inches long; spikelets sessile, about equaling the joints; lower empty glume transversely rugose and sometimes reticulated.—Delaware, Florida to Texas.

3. *R. corrugata* Baldw. (Chapm. Fl. S. States, p. 579.) Peduncles mostly single, elongated; spikes slightly compressed, erect; spikelets longer than the joint.—Southern States, near the coast.

Var. *AREOLATA* Hack.—Alabama (*Dr. Charles Mohr*).

(b) Joints of rachis persistent or tardily disjoining.

4. *R. fasciculata* Lam. Ill. 1. 204. (*Hemarthria fasciculata* Kth.) Culms angular or compressed, 2 to 3 feet high; leaves short; spikes mostly fasciated, 2 to 4 inches long, compressed, not rigid, from numerous lateral branches; pedicel of the staminate spikelet adnate to the rachis.—Southwestern Texas (*Havard, Nealley*).

MANISURIS Swartz.

Spikelets small, in pairs; the sessile or perfect spikelet 1-flowered, globose, inflated, pitted externally; the pedicellate spikelets flat, male or empty, their pedicels grown to the rachis.

1. *M. granularis* Swartz. (Chapm. Fl. S. States, p. 580.) Culms 1 to 2½ feet high; much branched below; leaves 1 to 4 inches long, the sheaths pubescent or scabrous, inflated, blade ciliate on the margins; spikes numerous, lateral and terminal, about 1 inch long, closely flowered; spikelets less than 1 line long.—Florida to Texas and Mexico, near the coast.

TRACHYPOGON Nees.

Spikes or spikelike raceme solitary and terminal. Axis of the spikes indistinctly articulate, not brittle, the male spikelet very short-pedicel, awnless; fertile spikelet longer-pedicel, and with a long twisted and bent awn.

1. **T. polymorphus** Hack. (Vasey, Grasses of the Southwest, Pl. 17.) Perennial; culms 2 to 4 feet high; leaves flat, 3 to 6 inches long; spikes 3 to 6 inches long, rather loosely flowered, sometimes one-sided; spikelets 3 lines long, pubescent; outer glume lance-oblong, obtuse, 7-nerved; awn $1\frac{1}{2}$ to 2 inches long.—Texas to Arizona and New Mexico.

HETEROPOGON Pers.

Spike densely flowered, appearing one-sided. The sessile spikelets awned fertile, cylindrical; the pediceled spikelets male, imbricated and obliquely bent to one side of the spike, awnless. Glumes in the perfect flower 4, the outer one hard and convolute, the second softer, keeled, the third thin and hyaline, the fourth, hyaline at the base, above terminating in a hard, twisted, and bent awn.

1. **H. contortus** R. & S. (*Andropogon contortus* Linn.) (Vasey, Grasses of the Southwest, Pl. 16.) Perennial, strongly rooted; culm tufted, smooth, branching above, erect, about 3 feet high; leaves 6 to 12 inches long, smooth, sheaths flattened; spike cylindrical, about 2 inches long without the awns; rachis with a tuft of brown hairs at the base of the spikelets; sessile spikelet about 3 lines long, the male one 5 inches, flattish, oblique.—Texas, New Mexico Arizona and in tropical countries.

2. **H. acuminatus** Trin. (*Andropogon melanocarpus* Ell.) (Chapm. Fl. S. States, p. 582.) Culms 4 to 8 feet high; leaves elongated; spikes numerous, approximate, 1-sided, 1 to 2 inches long, shorter than the sheathing bract; spikelets large, the sterile one 6 to 8 lines long, of 3 flattish, nerved, twisted, glumes, the fertile spikelet 2 lines long, rusty bearded; the glumes coriaceous, obtuse; awn 4 inches long.—Florida and westward to Texas and Mexico.

IMPERATA Cyrill.

Inflorescence in a narrow, or spike-like panicle; spikelets in pairs, one sessile, the other pediceled, both perfect, awnless; the 2 outer glumes densely clothed with long silky hairs. Stamens 1 to 2. Stigmas 2.

1. **I. Brasiliensis** Trin. Mem. Acad., Petersb. Ser. 6, II. p. 331. Culms 2 to 3 feet high, simple, rather slender, from long creeping rootstocks; radical leaves broadly linear, 2 feet long, cauline ones few, the lower 6 inches long, blade much reduced or wanting; panicle linear-oblong, 4 to 6 inches long, spikelets 2 lines long.—Florida.

2. **I. Hookeri** Rupr. in Anderson. (*I. brevifolia* Vasey in Bull. Torr. Club XIII. p. 26.) Culms 3 to 4 feet high, from creeping rootstocks, rather stout, simple, smooth; radical leaves 6 to 12 inches long, cauline ones shorter, gradually decreasing upward, ligule short, ciliate; panicle nearly cylindrical, erect, 6 to 12 inches long, sometimes interrupted below, lower branches 1 to 2 inches long, appressed; spikelets little more than 1 line long.—Texas, New Mexico to Southern California and Mexico.

ERIANTHUS Michx.

Inflorescence an ample or narrow panicle; spikelets in pairs, one sessile and one pediceled, both alike fertile and awned. Tall and stout reed-like perennials.

1. **E. saccharoides** Michx. (*E. alopecuroides* Ell.; *Andropogon alopecuroides* Linn.) (Gray's Manual, 6th ed., p. 637.) Culms 4 to 6 feet high, woolly-bearded at the nodes; panicle dense, contracted, 4 to 10 inches long; general rachis woolly; partial rachis woolly-tufted below the spikelets, the hairs longer than the spikelets; awn $\frac{1}{2}$ to 1 inch long, straight; spikelet 2 lines long; outer glumes sparsely hairy; stamens 2.—New Jersey south to Florida and Texas.

2. *E. brevibarbis* Michx. (Gray's Manual, 6th ed., p. 637.) Culms 3 to 5 feet high; main rachis of panicle pubescent or nearly smooth; panicle more open and the silky hairs usually shorter than the spikelets.—Maryland south to Florida and west to Texas.

E. contortus Ell. seems to differ from the preceding only in a twisted awn, and the difference is hardly sufficient to entitle it to be called a variety.—Same range as preceding.

3. *E. strictus* Baldw. (Chapm. Fl. S. States, p. 583.) Culms 4 to 8 feet high, smooth; leaves 1 to 2 feet long, smooth, or scabrous beneath; panicle narrow and strict, 10 to 15 inches long, no silky hairs; spikelets 4 lines long; the outer glumes scabrous; awns straight, 8 lines long.—Georgia, Florida, Tennessee to Texas.

CHRYSOPOGON Trin.

Panicle open, the branches usually short; spikelets in pairs, sometimes in threes, the outer sessile one fertile, the pediceled ones sterile or reduced to a rudiment; fertile spikelet with 4 glumes, the lower one larger and coriaceous, second narrow, keeled, pointed, the third hyaline, empty, the fourth or flowering glume hyaline, and awned, rarely awnless; palet very small or wanting.

The genus *Sorghum* Pers. differs from *Chrysopogon* principally in the glumes of the fertile spikelets becoming more hardened after flowering. Prof. Hackel includes the genus under *Andropogon*.

1. *C. nutans* Benth. (INDIAN GRASS, WOOD GRASS.) (Gray's Manual, 6th ed., p. 638.) Root perennial; culms simple, 3 to 6 feet high, smooth; leaves linear-lanceolate, sheaths smooth; panicle narrowly oblong, crowded or loose, erect or nodding, 6 to 12 inches long; fertile spikelets about 3 lines long, lanceolate, yellowish or brownish, sparsely hairy; awn twisted, 6 to 10 lines long; pedicel of the sterile or imperfect spikelet plumose hairy.—Very widely spread, Atlantic to Rocky Mountains and Mexico.

I find no permanent characters to distinguish this from *Andropogon avenaceus* Michx.

2. *C. secundum* Benth. (*Andropogon unilaterale* Hack.; *Sorghum secundum* Chapm. in Fl. S. States.) Culms 2 to 3 feet high; panicle narrow, erect, one-sided, 6 to 12 inches long; glume light brown, very hairy all over, otherwise like *C. nutans*.—Very dry ridges in the pine barrens Georgia and Florida.

3. *C. Wrightii* Munro. (*Sorghum pauciflorum* Chapm. in Fl. S. States, Suppl. p. 668; (*Andropogon pauciflorus* Hack.) Annual; culms branched near the base, 2 to 3 feet high; leaves long, broadly linear, flat, ciliate; spikelets few (6 to 12), racemose; pedicels 2 to 3 inches long, setaceous in whorls of 2 to 6; perfect spikelets 4 lines long, the pediceled ones as long but slender and reduced to 2 glumes; first and second glumes of fertile spikelets equal, linear, 5 to 6 inches long, geniculate, twisted below the middle.—Sandy pine barrens East Florida (*Chapman*).

ANDROPOGON Linn.

Inflorescence in simple or paniculate spikes or spike-like racemes, either solitary, in pairs, digitate, or paniced. Spikelets in pairs in the alternate notches of the rachis, one sessile and fertile, the other pediceled and sterile, (this either male or empty, or reduced to a mere pedicel); fertile spikelet with two, more or less coriaceous outer glumes, a third hyaline empty glume, and the fourth or flowering glume also hyaline and awned; the sterile spikelet similar, but empty or male only, and unawned. Palet small and hyaline or wanting.

Our species of this genus belong to several sub-genera or sections.

§ 1. SCHIZACHYRIUM.

Racemes slender, solitary, terminal, on long peduncles; the thickened joints of the rachis with a cup or tooth-like appendage at the apex; flowering glume often cleft nearly to the base, awned from between the divisions.

1. *A. hirtiflorus* Kth. var. *FEENSIS* Hack. in DC. Monogr. Phau. VI. 372. Culms 2 to 3 feet high, the upper half giving out lateral branches, smooth; radical leaves narrow, flat or conduplicate, 4 to 6 inches long, acuminate, scabrous, sparsely hairy below; culm leaves similar, the upper sheaths inclosing lateral branches; racemes 4 to 5, about 3 inches long, of 10 to 13 joints; rachis villose; sessile spikelet 5 lines long; first glume linear lanceolate, acuminate, scabrous on the back and sparsely hairy; second glume glabrous; third glume hyaline, one-third shorter than the second, parted nearly to the base, twisted awn between the lobes; fourth glume as long and very narrow.—Arizona and Mexico.

Var. *OLIGOSTACHYUS* Hack. in DC. Monogr. Phan. VI. p. 372. (*Andropogon oligostachyus* Chapm. Fl. S. States, p. 581.) Racemes 2 to 2½ inches long, with 10 to 15 joints, more slender; joints at apex loosely pilose; first glume entire or minutely 2-toothed, with scattered pubescence.—Middle Florida and Arizona.

2. *A. cirrhatus* Hack. in Flora, 1835, p. 119. (Vasey, Grasses of the Southwest, Pl. XVIII.) Culms 2 to 2½ feet high, slender, branching from the upper joints; peduncles 1½ to 3 inches long; leaves 3 to 5 inches long, erect; sheaths smooth; racemes 3 to 5, 1 to 2½ inches long, with about 10 joints, peduncles and rachis smooth or nearly so; sessile spikelet 3 to 3½ lines long, smooth; first glume 7- to 9-nerved; second glume rather shorter, membranaceous, 1-nerved, scabrous on the keel; third and fourth glumes hyaline, the fourth cleft three-fourths to base.

3. *A. tener* Kth. (Chapm. Fl. S. States, p. 581.) Culms 2 to 3 feet long, filiform, like the smooth soon involute leaves; spikes slender, terete, 1 to 2 inches long, with the joints bearded at base, otherwise smooth; spikelets appressed, half as long as the bent awn; glumes rough above; pedicel of the awnless neutral flower beaded at the apex.—Georgia, Florida and westward to Texas.

4. *A. scoparius* Michx. (Gray's Manual, 6th ed., p. 637.) Culms 2 to 4 feet high, somewhat compressed, with numerous branches either single or fascicled, sometimes again fasciculately branched, long exerted from the sheaths; spikes slender, 1 to 2 inches long, loosely flowered, often purplish, with 5 to 10 joints; rachis generally zigzag when ripe, and with the sterile pedicels long ciliate above; sessile spikelets 3 to 5 lines long; first glume acute, minutely scabrous, bidentate at apex, obscurely 5-nerved; second glume membranaceous, acute, keeled, scarious and ciliate on margin; third and fourth glumes scarious, fourth with awn 5 to 8 lines long.

Var. *MARITIMUS* Hack. (*A. maritimus* Chapm.). "Panicle simple, racemose, 4 to 8 inches long; spikes single, 8 to 10 flowered, very silky; spikelets larger in the species, outer glumes twice as long as the stout joints, and half as long as the twisted awn" Chapman. Remarkable for its large glumes.

5. *A. semiberbis* Kth. Enum. I. p. 489. (*Andropogon oligostachyus* Chapm.) Culms rigid, erect, 2 to 3 feet high; leaves linear, smooth, glaucous; spikes 2 to 4 inches long, erect, lower glume pubescent, one-half to one-third as long as the contorted awn; sterile flower neutral, short-awned.—Dry sandy ridges, middle Florida.

This is Dr. Chapman's description of his *A. oligostachys*, which Prof. Hackel refers to *A. semiberbis* var. *pruinosa*.

6. *A. gracilis* Spreng. Sys. I. p. 284. Culms caespitose, 1 foot to 18 inches high, slender; leaves filiform-setaceous, 2 to 4 inches long; spikes few, terminal and lateral, solitary, 1 to 1½ inches long, the lateral distant on slender peduncles; rachis and pedicels silky-hairy; pedicellate spikelets reduced to a simple awned glume, outer glumes of fertile spikelet acuminate, 2 lines long, the fourth glume shortly bifid, with an awn three to four times its own length.—Florida (No. 236, Dr. Garber).

§2. ARTHROLOPHIS.

Racemes mostly in pairs, rarely digitate or panicle, the lateral ones sessile; joints of the rachis not translucent; flowering glume unusually bifid or 2-toothed, the rachis with a leaf-like bract at the first joint below; pediceled spikelet empty, reduced to 1 or 2 glumes.

(a) *Sheathing bracts at the base of the spikes and equaling or longer than them.*

7. **A. macrourus** Mich. (Gray's Manual, 6th ed., p. 638, Chapm. Fl. S. States, p. 582.) Culms stout, 2 to 4 feet high, much branched, especially at the summit; panicle 4 to 20 inches long, dense, cymose clustered; racemes in pairs, slender, about 1 inch long, 5 to 8 joints; rachis and sterile pedicels clothed with long white hairs; sessile spikelets about 2 lines long, linear; first glume linear, smooth except on the margins, 2-nerved, bidentate; second glume keeled, acute; third and fourth glume scarious; fourth awned; sterile pedicel longer than the perfect flower; stamen 1.

There are in the Southern States several varieties of this species, the principal of which are:

Var. **GLAUCOPSIS** Ell., with a more slender, fewer-flowered panicle, the leaves and culm smooth and glaucous.

Var. **VIRIDIS** Chapm., also a more slender, open-panicled form, with leaves narrowly linear, the radical ones equaling or nearly equaling the culm, light green.

Var. **CORYMBOSUS** Chapm., in which the spikes are heavily clustered in a corymbose form near the top of the culm.

Var. **PUMILUS**, n. var. Perennial dwarf, tufted; culms 6 to 10 inches high, branching at the base and terminating in a cymose panicle; leaves 3 to 6 inches long, longer than the internodes, smooth, the sheaths inclosing the lateral flowering branches, sparingly hairy at the throat, branches numerous at the upper sheaths, each subdivided, the sheathing bract rather longer than the terminal spikes, which are 1 to 1½ inches long, and with 10 to 12 spikelets; pedicel slightly hairy below the bract. A remarkable variety, collected in western Texas (*G. C. Nealley*).

8. **A. Virginicus** Linn. (Gray's Manual, 6th ed., p. 638.) (*A. dissitiflorus* Mich.) Culms appressed below, 2 to 4 feet high, slender, much branched, the branches short and erect; leaves long and narrow and with the sheaths mostly smooth; sheathing leaves longer than the lateral branches, which are 2 to 3 inches long and twice or thrice subdivided, each pair of racemes sheathed with a bract longer than themselves; pedicels short, slender; racemes about 1 inch long; rachis flexuous, 8 to 12 jointed, the sterile pedicel and upper part of the joints long hairy; sessile spikelet 1½ lines long, lanceolate, acute, smooth except on the margins; awn 6 to 8 lines long; stamen 1.—Massachusetts to Florida and coastwise to Texas. Var. **GLAUCUS** Hack., glabrous throughout.—Florida. Var. **DEALBATUS** Mohr., sheaths and leaves becoming whitish.—Mobile. Var. **TETRASTACHYUS** Hack., spikes often in fours, lower sheaths, and leaves pubescent or villous.—Alabama to Florida. Var. **STENOPHYLLUS** Hack., culms shorter, leaves very short.—South Carolina.

9. **A. longiberbis** Hack. in *Flora*, 1885, p. 131. Culms 2 to 3 feet high, sheaths more or less hairy; leaves linear, 4 to 8 inches long, narrow; spikes in pairs, 1 to 1½ inches long, mostly rather shorter than the bract at the base, rather densely flowered; the rachis and pedicels covered with long white hairs; spikelets 2 lines long, awn 6 to 8 lines long.—Florida (*Dr. Garber*, 1887).

10. **A. Mohrii** Hack., in litt. (*A. Liebmanni*, var. *Mohrii* Hack.) Culms 3 to 4 feet high, robust, leafy; leaves and sheaths villous-pubescent, the lower distichous, blade narrow, 6 to 10 inches long; panicle 1 to 1½ feet long; peduncles mostly in pairs or threes; bract about as long as the spikes or shorter; spikes in clusters of 3 to 7, 1 to 2 inches long; rachis and internodes villose, brownish; awn of perfect flower ½ to 1 inch long.—Florida (No. 3636, *A. H. Curtiss' distribution*), Mobile, Ala. (*Dr Charles Mohr*), and Ocean Springs, Mississippi (*S. M. Tracy*).

(b) *Sheathing bracts at some distance below the spikes and exceeded by them.*

11. *A. Elliottii* Chapm. Fl. S. States, p. 581. (*A. olandestinum* Hale.†) Culms 1 to 2 feet high, bearded at the upper joints; leaves and sheaths purplish, hairy; sheaths, particularly the upper ones, inflated, often crowded and imbricated, 3 to 4 inches long; spikes becoming long exserted, in pairs (rarely 3 to 4); the bract distant below the spikes; rachis very slender, hairs long and silvery; awn 3 to 4 times as long as the glumes.—Delaware to Florida and west to Texas.

12. *A. brachystachyus* Chapm. Fl. S. States, Suppl. p. 668. Culms 2 to 4 feet high, compressed, branching from the upper joints, narrowly paniculate; leaves linear, long, not hairy, rough on the margins; spikes very numerous, by pairs, 6 to 8 lines long, 6 to 9 flowered; spikes very small; awn 4 to 6 lines long.—Florida (*Dr. Chapman*).

13. *A. arctatus* Chapm. (Chapm. Fl. S. States, p. 668.) (*A. tetrastachyus* var. *distachyus* Chapm.) Culms single, 2 to 3 feet high, the appressed branches narrowly paniculate; leaves and sheaths shaggy, with long white, mostly deciduous hairs; spikes in pairs, 1 to 1½ inches long, rather stout, closely 15- to 29-flowered; glumes rough, twice as long as the joints of the rachis; hairs of the rachis few and short; stamen 1.—Florida (*Dr. Chapman*).

14. *A. argyræus* Schultes. (*A. argenteus* Ell.: Gray's Manual, 6th ed., p. 637.) Culms, 2 to 3 feet high, smooth, branching; leaves long, linear, 6 to 10 inches long; culm and leaves smooth; branches 1 to 2 from each upper joint, long exserted; spikes in pairs, 3 to 8 inches long; peduncle stout, with dense white silky hairs; joints of the rachis rigid, as long as the hispid, serrate spikelet; stamens, 3; awns, 3 to 4 times longer than the glumes.—Old fields and woods, Maryland to Florida and west to Texas. Var. *TENUIS* much more slender, leaves narrowly linear, spikes few.—Texas.

15. *A. Cabanisii* Hack., in Flora, 1885, p. 133. Culms, 2 to 3 feet high, slender, branching from the lower one-third to one-half; lower branches solitary or in pairs, primary ones elongated arcuate-spreading, of 1 to 2 glabrous nodes, secondary ones single or none, short; common peduncle densely barbed at the apex, spikes about 2 inches long, spikelets much as in *A. argyræus*.—Pennsylvania to Florida (fide *Hackel*).

§ 3. AMPHILOPHIS.

Racemes digitate or paniced, all pediceled; joints of the rachis and pedicels with a translucent longitudinal median line; flowering glume pedicel like, tapering into an awn.

16. *A. provincialis* Lam. Ency. I. p. 376. (*A. furcatus* Muhl.) Culms 3 to 6 feet high, rigid; the summit and usually some lateral branches terminated by the 2 to 5 approximate, rigid spikes 3 to 4 inches long, 20 to 25 jointed; joints of the rachis and pedicels sparsely ciliate; spikelets 3 to 4 lines long; lower glume lanceolate, rigid, bidentate, firmly scabrous; second glume membranaceous, keeled in the middle; third and fourth scarious; the fourth awned; fifth 1 line long, fimbriate at apex; pediceled spikelet as long as the sessile one; first glume 13- to 15-nerved; the other glumes as in the sessile spikelet except the awn of the fourth glume; stamens 3.—Common east of the Rocky Mountains.

17. *A. Hallii* Hack. (Gray's Manual, 6th ed., p. 638.) (*A. glauous* Torr.) Culms 3 to 6 feet high, stout, smooth, glaucous; lateral branches exserted and sometimes nearly as long as the main culm; spikes 2 to 5, usually 3, digitate, 2 to 4 inches long, 10 to 15 joints; the rachis and pedicels more or less villose, with white or straw-colored hairs; spikelets 4 to 5 lines long, the pediceled ones usually a little longer than the sessile ones; first glume linear-lanceolate, smooth or glaucous, except near the apex, 9- to 11-nerved, one-fifth longer than the second glume.—Great Plains, from Montana to Mexico.

A. Hallii is generally distinguished from *A. provincialis* by its thicker and more succulent stem and leaves, its glaucous appearance, its usually larger spikes, and flowers which are conspicuously silky-hairy.

Var. FLAVEOLUS Hack. Hairs of the rachis and pedicel straw-colored, a few long hairs also near the apex of the first and second glumes; awn of the fertile flower short, little exerted.

Var. INCANESCENS Hack. Joints of the spikes white, canescent spikelets 5 to 6 lines long; awn of the fertile flower short or wanting.

18. **A. Wrightii** Hack. in Flora 1885, p. 139. Culms 2 to 3 feet high, unbranched, the nodes glaucous and sometimes ciliate; leaves narrow, smooth, 6 to 10 inches long, shorter than the internodes, ligule short, ciliate; common rachis smooth; racemes 3 to 7, somewhat digitate or subfastigate, $1\frac{1}{2}$ to 2 inches long, conspicuously pedicellate (the lower pedicels sometimes 6 to 8 lines long), 12 to 15 jointed, joints of rachis and sterile pedicels ciliate; spikelets $2\frac{1}{2}$ to 3 lines long, equal; lower glume of fertile spikelet smooth, ciliate near the apex, 7-nerved, the nerves disappearing below the apex; second glume, chartaceous, 3-nerved; third glume hyaline, smooth, obtuse; fourth glume with an awn 6 to 8 lines long; pediceled spikelet male, as long as the sessile one; first glume obtusish, 9-nerved, the upper part ciliate-margined; second glume obtuse, 3-nerved; third glume hyaline, nerveless, smooth, one-third shorter than the first; fourth glume and palea wanting; stamens 3.—Texas to Mexico.

19. **A. saccharoides** Swartz. (*A. laguroides* DC. in part: Gray's Manual, 6th ed., p. 638.) Culms erect or ascending, simple, smooth; nodes smooth or ciliate; leaves numerous, sheaths terete, striate, shorter than the internodes, smooth or hairy at the throat; ligule short, obtuse, blade linear, narrowed to a long setaceous point, rigid, glaucous or glaucescent; panicle 2 to 5 inches long, often 1 to $1\frac{1}{2}$ inches wide, loosely contracted or dense, the upper branches single and nearly sessile, the lower branches generally subdivided; spikes or racemes usually very numerous (30 to 50), sometimes reduced to 10 or 12, 1 to 2 inches long; the joints of rachis and pedicels copiously clothed with long white hairs obscuring the flowers; sessile spikelets $2\frac{1}{2}$ to 3 lines long, the pediceled ones one-third shorter and imperfect; first glume 5- to 7-nerved, obtuse or bidentate at apex, smooth, except sparsely hairy below; third glume hyaline, one-third shorter than the first; fourth glume reduced to a narrow margin of the awn, which is usually 9 to 12 lines long.

Var. BARBINODIS Hack. Culms robust, nodes densely barbate, panicle large and showy.

Var. TORREYANUS Hack. Sheaths and nodes generally smooth.

Var. SUBMUTICUS Vasey. Culms more slender, panicle narrower, spikelets smaller, $1\frac{1}{2}$ lines long; first glume oblong lanceolate, bidentate, 5-nerved, awn about 4 lines long, or almost wanting.—Southern Kansas, Colorado, Texas, New Mexico and Arizona.

NOTE—The genus *SORGHUM* Pers. (included by Prof. Hackel in *Audropogon*) is represented in this country only by cultivated species, first, *S. halapense*, which is commonly called Johnson grass, and is extensively cultivated as a forage plant; and second, *S. vulgare*, including the many varieties cultivated for sugar, fodder, and broom-making.

HILARIA H. B. K.

Inflorescence in terminal spikes; the spikelets in small clusters of three, closely sessile at the joints of the rachis, the central spikelet containing a single fertile flower, either female or perfect, the two lateral spikelets each with two or three male flowers. The outer glumes of the spikelets unlike, mostly thin, rigid, and strongly nerved, some lobed or bifid, dentate or lacerate at the apex, some awnless, and some awned between the lobes. The spikes are sometimes so closely sessile as to require much care to separate them properly.

(a) *Cluster not hairy at the base.*

1. *H. cenchroides* H. B. K. var. *TEXANA* Vasey Contr. Nat. Herb. I. 53. Perennial, low, tufted, multiplying by shoots or runners from the base, forming new tufts at intervals of 3 to 6 inches. Flowering culms 6 to 12 inches high, slender, nodes ciliate; leaves small, rigid, 1 to 3 inches long, becoming involute, ciliate on the margins; spike of 5 to 8 joints, slender, clusters loosely, imbricated; spikelets about 3 lines long, connate at base, the male ones each 2-flowered, the fertile one pistillate only; glumes of the fertile flower awned on the back above the middle, the male ones unawned.—Texas to Arizona.

Differs from the type in the taller and more slender culm, longer leaves, longer and more slender spike, with more numerous, looser clusters.

(b) *Clusters densely hairy at the base.*

2. *H. mutica* Benth. (Buckl. Proc. Acad. Phil. 1862, p. 95.) Rhizoma creeping, strongly rooted; culms tufted, ascending at the base, 1 to 2 feet high, leafy; leaves rigid, erect, 2 to 3 inches long, acuminate, scabrous, lower sheaths longer than the internodes, ciliate at the throat; spike cylindrical, 2 to 3 inches long; clusters 3 to 4 lines long; two lateral spikelets, each 2- to 3-flowered, the empty glumes cuneate, ciliate on margins and fimbriate at apex, unawned; empty glumes of central spikelet shorter than its flower, narrowly cuneate, lacinate at apex, with a short spreading awn near the apex; the thin glumes of the male spikelets spreading or often reflexed at maturity.—Texas and Arizona.

3. *H. Jameai* Benth. (Coul. Rocky Mt. Fl. p. 405.) Rhizome creeping, strongly rooted; culms tufted, 6 to 18 inches high, leafy below; leaves rigid, 2 to 4 inches long, the lowest with loose, large sheaths; spike about 2 inches long, wider than the preceding; clusters 4 to 5 lines long; male spikelets 2-flowered, the empty glumes linear-lanceolate, 5-nerved, ciliate on the margins, the outer with an awn from the back about the middle, longer than the spikelet, the inner one unawned; the female spikelet with the empty glumes ciliate on the margin, cuneate below, above 2-lobed and lacinate into 5 to 7 slender teeth, and awned between the lobes.—Texas, New Mexico and Colorado.

4. *H. rigida* Scribn. (*Pleuraphis rigida* Thurber Bot. Cal. II. p. 293.) Perennial; culms 2 to 3 feet high, solid, and almost woody below, much branched, clothed within the sheaths with a dense matted tomentum; the lower leaves pubescent, particularly on the lower surface, 4 to 5 inches long, the uppermost about 1 inch, very rigid, becoming involute, setaceously pointed; sheaths crowded below, loose, pubescent; panicle 3 to 4 inches long, dense, pale or purplish; outer glumes cuneate at base, bifid above, woolly-fringed, 3- to 5-nerved, the central nerves excurrent just below the middle as a stout divergent awn a little exceeding the glume, the two or three lateral nerves produced as setæ between the lobes and about equalling them; the floret stipitate; the flowering glume broad, oblong, 3-nerved, irregularly toothed and fringed above, with a short central awn, pale equalling or slightly exceeding its glume; outer glumes of the lateral spikelets similar to those of the central one; one or more of the nerves excurrent as awns, the flowering glume and palets of the two male flowers similar to those of the fertile one.—The most valuable grass of the desert regions in Arizona and Southern California.

This description is, with little alteration, from Prof. Thurber, in Bot. California.

ÆGOPOGON H. & B.

Inflorescence in loose, one-sided terminal and lateral spikes or racemes; the spikelets 1-flowered, in clusters of two or three, one usually sterile or male only. The outer glumes are cuneate, emarginate

or 3-toothed, shorter than the flowering glumes, the latter 3-toothed, with the middle tooth awned; the palet 2-nerved and 2-awned. Stamens 3. Styles 3.

1. *Æ. geminiflorus* H. B. K. Culms much branched, 6 to 8 inches high, weak and decumbent below; leaves linear, plane, 1 to 2 inches long; racemes 2 inches long, somewhat secund, lax; spikelets in twos or threes, 1 to 1½ lines long without the awns; empty glumes less than 1 line long, cuneate, the midrib excurrent in a straight awn about 1 line long; floral glumes half longer than the empty ones, lanceolate-oblong, 3-nerved, 3-toothed, the middle tooth extended into an awn two or three times as long as its glume; palet 2-nerved, 2-toothed.—Huachuca Mountains Arizona (*Lemmon*) and also in Mexico.

TRAGUS Hall.

Flowers in rather loose terminal spikes, the spikelets in clusters of 2 to 5, mostly 3, imperfect. The perfect spikelets 1-flowered, with dissimilar glumes, the lower one minute and membranaceous, the upper ones concave, subcartilaginous, and beset with stout, short hooks; the flowering glume firmly membranaceous and acute; the palet shorter and thinner, 2-nerved. Stamens 3. Styles distinct.

1. *T. racemosus* Hall. (*Vasey, Grasses of the Southwest, Pl. 14.*) Culms much branched at base, slender, 6 to 18 inches high, leafy, decumbent below; leaves 1 to 2 inches long, ciliate, serrate on the margins; sheaths loose and striate, shorter than the internodes; spike 2 to 4 inches long, narrow, densely flowered, the spikelets about 1 line long.—Introduced and abundantly naturalized near the Gulf of Mexico.

REIMARIA Flügge.

Spikelets acuminate, in unilateral subsessile spikes, with one perfect terminal flower and one exterior empty glume, membranaceous, 3- to 5-nerved, acute, about equaling the fertile glume; fertile glume and palet indurated or membranaceous, finely punctulate. Stamens 2. Styles 2, distinct to the base. Stigmas long and plumose. Culms ascending, diffusely branched at base.

1. *R. oligostachya* Munro. (*Chapm. Fl. S. States, Suppl. p. 665.*) Culms 1 to 2 feet high, procumbent and rooting at the lower joints, smooth, leafy; sheaths about equaling the internodes; leaves plane or becoming convolute, narrowly linear, acuminate; upper sheaths usually inclosing the base of the 2 to 3 approximate, erect or divergent spikes about 2 inches long and 10- to 20-flowered.—Florida, in ditches and shallow water; probably also to be found on the Gulf coast westward.

This species varies from the character of the genus in usually having a second outer glume either fully or imperfectly developed in a portion of the spikelets of each spike.

R. acuta occurs in Cuba, and will probably also be found in southern Florida.

PASPALUM Linn.

Spikelets obtuse or rarely short-acuminate, each with one terminal perfect flower, in one or two rows along one side of the slender solitary or paniculate flattened spikes. Glumes 3, the outer ones membranaceous, equal, or in a few species the outer one smaller or disappearing; the flowering glume more or less concave, becoming indurated, embracing

the shorter palet of the same texture. Stamens 3. Styles 2, distinct to the base. Stigmas plumose. Spikes simple, terminal, or subdigitate or approximate or scattered along the general peduncle, spreading or reflexed.

§ 1. ANASTROPHUS Benth.

Spikelets rather distichous than secund, with the back of the flowering glume turned outwards or away from the rachis.

1. *P. platycaule* Poir. (Vasey in Bull. Torr. Club, XII. 162.) Culms very slender, 6 to 18 inches high, from a creeping rhizome; peduncle long, exerted, terminated by a pair of spikes (1 to 2 inches long), or 3 or 4 approximate slender spikes, and frequently with several long peduncled lateral ones; spikelets single, elliptical-oblong, acutish or obtuse, outer glumes little longer than the flower, generally only 2-nerved; leaves narrowly linear, smooth, obtuse, the sheaths much compressed.—Damp ground; Florida to Texas.

2. *P. furcatum* Flugge. (*P. Digitaria* Chapm. non Poir.; *P. Elliottii* Wats. (Gray's Manual, 6th ed., p. 629); *P. Michauxianum* Kth.) Culms ascending from a creeping and branching base, 1 to 2 feet high; leaves lanceolate, obtuse, or rather acute, 3 to 6 inches long, 3 to 6 lines wide, smooth or hairy; spikes mostly in pairs from slender, elongated peduncles (often 2 to 3 together from the upper sheath), slender, 3 to 4 inches long; spikelets about 2 lines long, lanceolate, acute; empty glumes, 5- to 7-nerved, one-third longer than the obtuse flower.—Wet ground, North Carolina to Florida and Texas.

Var. *VILLOSUM*; leaves and sheaths very villous.

3. *P. compressum* Nees. Mart. Bras. II. p. 23. Culms decumbent and creeping, stout, about 1 foot high, nodes 2 or 3, ciliate-woolly; lower leaves 6 inches long, 4 to 6 lines wide, obtusish, 13-nerved, finely ciliate on the margins, upper ones 1 to 2 inches long; sheaths compressed, loose; spikes 3, approximate, 3 to 4 inches long; spikelets ovate, about 1 line long, acute, the empty glumes sparsely pubescent, a little longer than the obtuse flowering glume.—Manatee, Fla. (*J. H. Simpson*). This species is intermediate between *P. platycaule* and *P. furcatum*. It has none of the subradical spikes of the first.

§ 2. EUPASPALUM Benth.

Spikelets more or less secund along the rachis, with the back of the flowering glume turned inward or toward the rachis.

(1) Subsection *Pseudoceresia* Benth.

Rachis of the spikes membranaceous, dilated, and applied close to and nearly inclosing the flowers when mature.

4. *P. fluitans* Kunth. (Gray's Manual, 6th ed., p. 628.) Culms decumbent and creeping, 1 to 3 feet long, smooth; leaves from 2 to 6 inches long, 4 to 8 lines wide, scabrous; panicle 3 to 6 inches long, formed of numerous (20 to 50) linear spikes, becoming spreading or sometimes reflexed, the lower ones often fascicled, the others scattered; rachis wider than the spikelets, acute, the point extending beyond the spikelets; spikelets small (one-half to two-thirds of a line long), oblong, acute, whitish; empty glumes pointed, thin, without a midrib, sparsely hairy; fertile flower a little shorter than the empty glumes.—On muddy shores, and floating in water, Maryland to Louisiana and Texas.

5. *P. Walterianum* Schultes. (Chapm. Fl. S. States, p. 570.) Culms decumbent and creeping, smooth, much branched, 1 to 2 feet long; leaves linear, short (1 to 2 inches); sheaths mostly longer than the internodes; spikes 3 to 7, usually 3 or 4, approximate or becoming somewhat distant, the lowest included in the uppermost sheath, 1 to 1½ inches long, smooth, ovate, rather obtuse; glumes, 5-nerved.—Maryland; southward and westward to Louisiana.

(2) Subsection *Opisthion* Benth.

Rachis of spikes flat, not dilated.

(a) *Spikes digitate, in terminal pairs, or rarely 3 or 4.*

6. *P. conjugatum* Berg. (Chapm. Fl. S. States, Suppl., p. 666.) Culms decumbent and branching at base, 1 to 2 feet high, slender, smooth; leaves flat, thin, 2 to 3 inches long, gradually pointed; sheaths compressed, spikes 2, conjugate, divergent (rarely with a third), $2\frac{1}{4}$ to 3 inches long; spikelets in 2 rows, one-half line long, roundish ovate, ciliate on the margins, empty glumes very thin, 2-nerved, the middle nerve wanting.—Louisiana and Mississippi.

7. *P. notatum* Flugge. (Vasey in Bull. Torr. Club, XIII. 163. Rhizome creeping; culm simple, erect or ascending; leaves lanceolate-acuminate, flat, 4 lines wide, lower 6 inches long; sheaths compressed; spikes 2, 2 to 3 inches long, in 2 series, ovate, smooth, obtusish, empty glumes 3- to 5-nerved.—Introduced on ballast ground, Philadelphia.

8. *P. distichum* Linn. (Gray's Manual, 6th ed., p. 629.) Culms decumbent and rooting, becoming erect, 1 to $1\frac{1}{4}$ feet high; leaves flat, 2 to 5 inches long, smooth; sparsely pubescent; spikes 2, rarely 3, $1\frac{1}{2}$ to $2\frac{1}{2}$ inches long; spikelets in 2 rows, ovate, acute, empty glumes 3-nerved, smooth or sparsely hairy, 1 line long or a little more.—Low or sandy grounds, Southern States, westward to California.

9. *P. vaginatum* Swartz. (Chapm. Fl. S. States, p. 570.) (*P. reimarioides* Chapm.) Stems widely rooting, the ascending branches varying from short and entirely covered with the leaf sheaths to slenderer and 1 foot long, with the leaves distant; leaves rarely flat, mostly involute and almost subulate; the sheaths loose and large; spikes 2 to 4, 1 to 2 inches long; spikelets in 2 rows, ovate-lanceolate, acute or acuminate, $1\frac{1}{2}$ lines long or more, empty glumes 3-nerved.—In ditches and wet ground, Florida near the Gulf coast.

It is difficult to distinguish some forms of this from the preceding species.

(b) *Spikes single and terminal, or one terminal and one (rarely more) additional, approximate, with sometimes axillary peduncled ones.*

10. *P. monostachyum* Vasey. Chapm. Fl. S. States, Suppl., p. 665. Culms erect, stout, rigid, smooth, 2 to 3 feet, the upper joint very long; lower sheaths inflated, longer than the internodes, ligule short, obtuse, blade elongated (the lower 1 foot or more), convolute, rigid; spike 6 to 8 inches long, erect, the spikelets imbricate, about $1\frac{1}{2}$ lines long, smooth; first glume 3-nerved, rather shorter than the spikelet, second glume equaling the flowering one; occasionally with a long peduncled axillary spike, and sometimes the spikelets with a third small sterile glume.—Southern Flora (*Dr. Garber*) and Texas (*G. C. Nealley*).

Differs from *P. rectum* Nees. in its much stouter culm and leaves, and twice as long a spike.

11. *P. setaceum* Michx. (Gray's Manual, 6th ed., p. 628.) (*P. debile* and *P. ciliatifolium* Michx.) Culms decumbent or erect, 1 to 2 feet high, slender; leaves 2 to 6 inches long, variable in width, smooth or pubescent; sheaths generally hairy; spikes slender, the terminal one long-peduncled, 2 to 4 inches long; rachis narrow; spikelets in pairs in two rows, shortly pedicled, about three-fourths line, ovate, obtuse, smooth, or pubescent.—Widespread, New England to Florida, westward to Texas and Mexico. Var. *CILIATIFOLIUM* (*P. ciliatifolium*, *P. dasyphyllum* Ell.) Culms stouter and taller, leaves 4 to 6 lines wide, hairy on the margins or all over; spikelets larger, smooth or pubescent, and in one form grandular.—Maryland to Florida and Texas.

(e) Spikes 2 to 5, rarely more, not digitate.

* Spikelets 1 line long or less.

12. *P. caespitosum*, Flügge. (Vasey in Bull. Torr. Club, XIII. 164.) Culms caespitose. 1 to 1½ feet high, slender; leaves flat, the lower ones 3 to 6 inches long, three-fourths line wide, smooth, sparsely ciliate at the base, upper sheaths very long; spikes 3 to 4, 1 to 2 inches long, at intervals of about 1 inch; rachis very narrow; spikelets very small (one-half to three-fourths line), elliptical, smooth, puberulent, or glandular, irregularly in 3 rows, in pairs, one pedicelled; empty glumes 3- to 5-nerved.—Florida (*A. H. Curtiss*).

14. *P. Drummondii*. (*Dimorphostachys Drummondii* Fourn.; *P. lentiginosum* Presl.† Vasey in Bull. Torr. Club, XIII. 164.) Culms 2 to 4 feet high, branching below, smooth; leaves 6 to 10 inches long, 3 to 5 lines wide; panicle terminal, sometimes with lateral branches; spikes 3 to 4, arcuate, 3 to 4 inches long, rather slender; spikelet in 2 or 3 rows, rather lax, 1 line long, oval, pubescent and granular spotted, generally with a small lower glume, as in *Panicum*. Intermediate between *P. setaceum* and *P. laeve*.—Florida (*J. H. Simpson*) and Texas (*G. C. Nealley*, No. 350 *Drummond*).

* * Spikelets from 1 to 1½ lines long.

15. *P. elatum* Richard. (Vasey in Bull. Torr. Club, XII. 167.) Culm erect, sub-compressed, striate, glabrous; sheaths and leaves glabrous, the leaves linear, elongated, narrowly acuminate, scabrous at least above; ligule membranaceous, short; axis of panicle, scabrous; spikes 5 to 7, subfasciculate, sessile, approximate, erect or subfalcate, elongated; spikelets in twos, short-pedicelled, narrowly obovate, twice as wide as the axis; glumes obovate, 5-nerved, smooth; valves longitudinally punctulate, striate.

This description is from Doell's *Gramineæ Brasiliensis*. A specimen with this name from Florida is in Gray Herb.

16. *P. lividum* Trin. (Vasey, Bull. Torr. Club, XIII. 164.) Culms 2 to 2½ feet high, smooth, simple; leaves long and narrow, smooth, sheaths compressed; spikes 4 to 5, ½ inch to 1 inch distant, 1 to 1½ inches long, erect; spikelets compressed oval or ovate, acutish, smooth, in 3 or 4 rows, imbricated, sometimes pale, sometimes purplish.—Texas (*Nealley 807, E. Halls*.)

17. *P. Buckleyanum* Vasey. Bull. Torr. Club, XIII. 167. Culms 3 feet high, firm (not robust), smooth, pale green; leaves elongated, complanate, narrow (2 lines), smooth; spikes 3 to 6, 1 to 1½ inches distant, 1 to 1½ inches long; rachis straight, narrow; spikelets in pairs, in three or four rows, imbricated, about 1½ lines long, lance-ovate, acute, sparsely pubescent, slightly longer than the obtuse flower.—Texas (*Buckley*).

18. *P. laeve* Michx. (Gray's Manual, 6th ed., p. 628.) Culms erect, sometimes decumbent at base, rather slender, 2 to 4 feet high; leaves variable in width and length, smooth, or the sheaths sometimes pubescent; spikes 2 to 6, usually 3 or 4, about 1 inch apart, spreading, somewhat hairy in the axil, 2 to 5 inches long; rachis narrow and flexuous; spikelets in 2 rows, about 1½ to 1½ lines long, smooth, roundish; empty glumes 5-nerved.—Massachusetts to Texas.

Var. *BREVIFOLIUM*, leaves 4 to 6 inches long, 4 to 6 lines wide. (*P. undulosum* Le Conte.)

Var. *ANGUSTIFOLIUM*, tall; lower leaves a foot or more long and narrow spikes 4 to 6 inches long. (*P. angustifolium* Le Conte.)

19. *P. præcox* Walt. (Chapm., Fl. S. States, p. 571.) (*P. lentiferum* Lam.†) Culms erect, 2 to 4 feet high, simple; leaves long and narrow, 8 to 12 inches long, 2 to 4 lines wide, smooth or pubescent; spikes 3 to 6, 1 to 1½ inches apart, erect, 1½ to 3 inches long; rachis straight and flat; spikelets in pairs, mostly in three rows, orbicular compressed, about 1½ lines long; empty glumes smooth, 3-nerved.—North Carolina to Texas.

Var. CURTISIANUM (*P. Curtisianum* Steudel.), larger and stouter; spikes 6 to 8; spikelets large; leaves and sheaths hairy.—Florida.

20. **P. pubiflorum** Rupr. (*P. Hallii* Vasey & Scribn., *P. remotum* Remy(?): Vasey in Bull. Torr. Club, XIII. 165.) Culms decumbent and branching below, from strong creeping rootstocks, leafy, 2 to 3 feet high, stout, nodes (especially the lower ones) pubescent; leaves 6 to 9 inches long, 4 to 6 lines wide, scabrous on the margin, acuminate; margin of the sheath ciliate; ligule membranaceous, short; panicle 3 to 4 inches long, of 3 to 6 spikes; spikes $1\frac{1}{2}$ to 3 inches long, firm, dense; rachis broad; spikelets in pairs, in 3 or 4 rows, 1 to $1\frac{1}{2}$ lines long, oblong, obtuse; empty glumes pubescent.—Louisiana to Texas (804 *E. Hall*). A form or variety occurs from Arkansas to Tennessee, which seems to differ only in the smooth glumes of the spikelets.

Var. GLAUCUM Scribn. Another form occurs in Southwestern Texas and Mexico, which has more rigid culms and leaves, is very glaucous, and the spikelets sometimes in 2 rows. (*Dr. Havard & C. G. Pringle.*)

21. **P. plicatulum** Michx. (*P. undulatum* Poir: Chapm. Fl. S. States, p. 571.) Culms 2 to 3 feet high, rather slender; lower leaves long and narrow, smooth; spikes 3 to 5, 1 to 2 inches distant, $1\frac{1}{2}$ to 2 inches long; rachis narrow; spikelets in pairs, mostly in 3 rows, 1 to $1\frac{1}{2}$ lines long, oblong ovoid, obtuse, plano-convex; empty glumes smooth, 3-nerved, the second or flat one becoming plicate or marked with linear elevations on the margins; spikelets becoming brown or blackish.—Florida to Texas.

22. **P. purpurascens** Ell. (Vasey in Bull. Torr. Club, XIII. 167.) (Probably *P. Bosnianum* Flügge). Culms decumbent below, becoming somewhat erect, 2 to 3 feet long, glabrous, branching below (often much branched); leaves long (6 to 15 inches), 4 to 6 lines wide, smooth, except on the glabrous margins, the lower sheaths and culms often dark purple; panicle 4 to 6 inches long; spikes 3 to 12, commonly 7 to 9 on the main culm and 3 to 5 on the branches, 2 to 3 inches long; rachis rather wide, smooth; spikelets in pairs, mostly in 4 rows, about 1 line long, roundish, oval, obtuse.—Florida to Alabama.

23. **P. racemosum** Nutt. (Chapm., Fl. S. States, p. 571.) (*P. Alabamense* Trin.) Culms simple, erect, from strong scaly rootstocks, 2 to 3 feet high; leaves broadly linear, flat, mostly fringed on the margins; sheaths hairy or smoothish, purplish below; spikes, 2 to 4, slender, erect, 3 to 4 inches long; rachis slender, somewhat flexuous; spikelets rather distant and interrupted, singly or in pairs, distinctly pediceled, the pedicel sometimes 3 times as long as the spikelets; spikelets $1\frac{1}{2}$ lines long, oblong or obovate; empty glumes smooth, 5- to 7-nerved.—Dry sandy soil, North Carolina, Florida, and westward to Louisiana.

24. **P. dilatatum** Poir. (Vasey in Bull. Torr. Club, XIII. 166.) (*P. ovatum* Trin.) Culms stout, 3 to 4 feet high; leaves 10 to 12 inches long, 4 lines wide, smooth; spikes 4 to 7, erect or spreading, lax, 2 to 4 inches long; common axis slender; spikelets in 4 rows, $1\frac{1}{2}$ lines long, ovate, acute, pubescent, villous on the margins; empty glumes acute, longer than the fertile flowers.—Virginia to Florida and Texas.

Var. DECUMBENS. Like the preceding, but only 3 to 4 spikes, and the culms decumbent or sometimes prostrate.—Louisiana (*A. B. Langlois*).

25. **P. difforme** Le Conte. (Vasey in Bull. Torr. Club, XIII. 166.) Culms from strong creeping rootstocks, 3 feet high, stout, smooth; leaves rigid, flat, 5 to 6 inches long, 3 to 4 lines wide, somewhat scabrous, smoothish or pubescent; panicle long, naked below, of 2 to 4 spikes, 1 to 2 inches distant; spikes $1\frac{1}{2}$ to 3 inches long, thick, firm; spikelets $1\frac{1}{2}$ lines long in 2 or 3 rows, ovate-oblong, obtuse, smooth; empty glumes 3-nerved.—North Carolina to Florida (3,570 *A. H. Curtiss* distribution.)

Intermediate between *P. laeve* and *P. floridanum*.

26. **P. floridanum** Michx. (Chapm. Fl. S. States, p. 571.) Culms 3 to 4 feet high, erect, rigid; leaves long (1 to 2 feet), 3 to 6 lines wide, hairy or smooth; spikes 3 to 7, 1 to 2 inches distant, erect, 3 to 5 inches long, thick; rachis rather narrow,

flexuous; spikelets mostly in 3 rows, nearly 2 lines long, broadly oval, obtuse; empty glumes smooth, 3- to 5-nerved. In the type the leaves and sheaths are villous.—North Carolina to Texas and Arkansas.

Var. *GLABRATUM* Engelm. Leaves and sheaths smooth; same range.

27. *P. giganteum* Baldw. in Bull. Torr. Club, XIII. 166. Culms 4 to 6 feet high, erect, stout; leaves 1 to 2 feet long, three-fourths to 1 inch wide, smooth or sparsely pubescent; spikes 3 to 4, 5 to 8 inches long, spreading and becoming reflexed, in two or three rows; spikelets rarely 2 lines long, oval, smooth; empty glumes 3- to 5-nerved.—Florida (*A. H. Curtiss, Dr. Baldwin*).

Perhaps a large variety of the preceding.

(*d*) *Spikes more numerous, 20 or more.*

28. *P. virgatum* L. var. *PUBIFLORUM* Vasey. Culms 3 to 5 feet high, stout, smooth, simple; leaves 1 to 1½ feet long, 3 to 4 lines wide, smooth, margins scabrous; sheaths shorter than the internodes (6 to 10 inches long), smooth, ligule short, ciliate; panicle 6 to 9 inches long, of twenty or more appressed spikes, mostly alternate or some of the lower fasciculate in twos or threes, the lower 3 inches long, rather lax, gradually diminishing upward, crowded near the top; spikelets 1 to 1½ lines long, compressed ovate, acute, pubescent, and hairy on the margins, in three or four rows; empty glumes acute, 3-nerved, a little longer than the fertile glume.—Texas (*G. C. Nealley*) and Louisiana (*A. B. Langlois*).

ANTHÆNANTIA Beauv.

Spikelets loosely racemose on the slender erect branches of the lax, contracted panicle, containing one perfect terminal flower and one male or neuter one; the outer, empty glumes, hairy, 5-nerved, equal, as long as or longer than the flower; perfect flower, with rigid, membranaceous glume and palet (the apex soft), the sterile flower of a thin membranaceous palet.

1. *A. villosa* Benth. (*Aulaxanthus ciliatus* Ell.; *Panicum ignoratum* Kth.: Chapm. Fl. S. States, p. 577.) Culms erect, simple, smooth, 2 to 3 feet high; leaves linear-lanceolate, pointed, strongly nerved, fringed on the margins, the lower ones widely spreading; panicle racemose; spikelets 2 lines long, obovate; sterile flower with 3 stamens; anthers and stigmas yellow.—Florida, North Carolina to Texas.

2. *A. rufa* Benth. (*Aulaxanthus rufus* Ell.; *Panicum rufum* Kth.: Chapm. Fl. S. States, p. 577.) Culms erect, 2 to 3 feet high, smooth; leaves erect, linear-lanceolate, the lower erect, 1 to 2 feet long; sterile flower neutral; anthers and stigmas purple, otherwise like the preceding; leaves and spikelets often purplish.—Florida to Louisiana and Mississippi.

AMPHICARPUM Kth.

Spikelets of two kinds, those of the simple terminal panicle generally perfect, but infertile; the fertile ones borne singly at the ends of subterranean runner-like pedicels, these much larger than the others. The spikelets 1-flowered; those of the panicle with two nearly equal, smooth, pointed, membranaceous, 5-nerved outer glumes; the flowering glume and palet rigid membranaceous, nearly as long as the outer glumes; the spikelets of the runners with thickened, many-nerved, outer glumes, and the flowering glume and palet indurated.

1. *A. Purshii* Kth. (*Gray's Manual*, 6th ed., p. 634.) (*Milium amphicarpum* Pursh.) Culms, tufted, erect from fibrous roots, naked above; leaves lanceolate, mostly near the base, rather thin, and with the sheaths clothed with rigid spreading hairs; panicle

strict, narrow, with few elongated, narrow, erect branches; spikelets 2 to 2½ lines long, oblong, nearly sessile; empty glumes nearly equal, 5-nerved; flowering glume oblong, pointed, striate; fertile flowers on long peduncles at the base of culm twice as large as the others; the grain oblong, 2 to 3 lines long.—Pine barrens, New Jersey to Florida.

2. **A. Floridanum**. Chapm., Fl. S. States, p. 572. Culms erect, 1 to 3 feet high, branching at the base, from creeping rootstocks; leaves linear-lanceolate, rigid, smooth, 2 to 5 inches long; sheaths fringed on the margins; panicle strict, narrow, with few, erect branches; spikelets 3 lines long, oblong, acute; empty glumes equal, 5-nerved; flowering glume smooth, striate, acute; fertile flowers much as in the preceding species; the anthers imperfect; grain compressed-globose, pointed, inclosed in the hardened flowering glume and palet.—Banks of the Apalachicola River, Florida.

ERIOCHLOA H. B. K.

Spikelets with a peculiar cup-like or annular swelling of the pedicel just below the base, nearly sessile in one or two rows along one side of the slender branches of single panicle. The spikelets with one perfect flower, or with a second male or neutral one; the outer glumes empty, hairy, nearly equal, membranaceous, acute, or acuminate (awned in one species); the perfect flower somewhat shorter, coriaceous, obtuse, or mucronate pointed; the imperfect flower when present consisting of a very thin palet, with or without stamens.

1. **E. sericea** Munro, MS. Perennial; culms erect, 2 to 2½ feet high, simple, leafy; leaves narrow, 4 to 10 inches long, softly pubescent; sheaths mostly shorter than the internodes; panicle terminal, linear, 6 to 8 inches long, consisting of 6 to 10 sessile, alternate, appressed branches, the lower 1 to 1½ inches long, the spikelets imbricated in 2 rows, each about 2 lines long, 1-flowered, perfect flower oblong-ovate, very short-pointed.—Texas and New Mexico.

2. **E. Lemmoni** Vasey and Scribn. Culms 1½ to 2 feet high, decumbent and much branched below; leaves rather short and wide, 3 to 6 inches long, one-half to three-fourths inch wide, lanceolate, acuminate, pubescent, as are the loose sheaths; terminal and lateral panicles 3 to 4 inches long, compressed, of about 6 simple sessile branches or spikes, spreading horizontally in flower, becoming appressed; branches 1 to 1½ inches long, loosely flowered; spikelets shortly-pedicel, ovate-lanceolate, acuminate, 2 lines long, spreading nearly at right angles to the rachis; flowering glume one-fourth shorter than the outer, tipped with a short point; sterile flower of 3 stamens.—Arizona, New Mexico and Mexico.

3. **E. punctata** Hamil. (*E. polystachya* H. B. K. †: Kunth Gram. I. 30.) Culms much branched below, 2 feet high, leafy; leaves 6 to 10 inches long, 4 to 6 lines wide; panicles 3 to 4 inches long, of 6 to 10 loosely flowered spikes, contiguous, 1 to 2 inches long; spikelets short-pedicel, about 2 lines long, the empty glumes oblong-lanceolate, sparsely pubescent, the upper short-awned; flowering glume one-third to one-half shorter than the spikelet, oblong, with a short awn-like point.—Southern Kansas to Mexico.

Var. **MINOR** Vasey. Smaller than the preceding, the leaves narrower, spikes fewer and shorter, the spikelets smaller, the empty glumes acute, the flowering glume proportionally longer.—Texas (No. 2087, Wright, Nealley).

4. **E. longifolia** Vasey. (*E. mollis* var. *longifolia* Vasey Bull. Torr. Club. XIII. p. 25.) Culms tufted, erect, 2 to 2½ feet high, slender; leaves very narrow, 1 to 2 lines wide, 10 to 18 inches long, erect, smooth; panicle 4 to 6 inches long, of 5 to 8 nodding, loosely flowered spikes, the lower ones with slender pedicels one-half to three-fourths inch long; spikelets 2 lines long, 2-flowered; empty glumes pubescent, ovate, acuminate; fertile flower with a short awn; sterile flower with a palet and 3 anthers.—South Florida (*A. H. Curtiss*).

5. *E. mollis* Kth. Gram. i. p. 30. (*Panicum molle* Michx.?) Culms stout, 2 to 4 feet high, sometimes branched, leafy; leaves linear-lanceolate, rather rigid, acuminate, smooth, erect, 10 to 18 inches long, 3 to 6 lines wide; sheaths long, smooth, striate; panicle 6 to 12 inches long, with numerous (15 to 20 or more) more or less spreading branches, the lower 2 to 3 inches long; rachis and upper part of stem downy, pubescent; spikelets 2-flowered, 2 to 2½ lines long, acute; the sterile flower with 3 stamens; fertile glume oblong, hardly acute.—South Carolina to Florida (*A. H. Curtiss*).

PANICUM Linn.

Spikelets with one perfect terminal flower, and usually a second one male only or rudimentary. Empty glumes 2 or 3, one smaller than the other, often minute, or rarely wanting. The glume of the perfect flower with its palet usually of a coriaceous texture, and obtuse or obtusish. The second flower when present a thin palet and 3 stamens, or the palet wanting. Inflorescence spicate or paniculate.

§ 1. DIGITARIA Benth.

Panicles of several spikes or spike-like branches, digitate or approximate at the top of the culm; spikelets usually small and in alternate pairs along one side of the flattened rachis, 1 sessile and 1 short-pediceled; empty glumes 2, or sometimes 3, the lower one then being minute.

1. *P. glabrum* Gaudin.
2. *P. sanguinale* Linn.
3. *P. filiforme* Linn.
4. *P. serotinum* Trin.

§ 2. TRICHACHNE Benth.

Spikelets densely silky-hairy, or fringed with long hairs, sessile or short-pediceled, in pairs or clustered along the rachis of the numerous simple, erect, spikes or branches of the panicle, acute; lower glume very minute.

5. *P. leucophæum* H. B. K.
6. *P. lachnanthum* Torr.

§ 3. SUBSPICATA Vasey.

Panicle linear or narrow, the branches short, sessile, erect or appressed, or the apex spicate.

(a) *Branches densely flowered.*

7. *P. paspaloides* Pers.
8. *P. Curtisi* Chapm.
9. *P. obtusum* H. B. K.
10. *P. reticulatum* Torr.
11. *P. Texanum* Buckl.

(b) *Branches lax flowered.*

12. *P. Chapmani* Vasey.
13. *P. Reverchoni* Vasey.
14. *P. subspicatum* Vasey.
15. *P. stenodes* Griseb.

§ 4. PLATYPHYLLA Vasey.

Panicle of few (3 to 6) simple, mostly sessile, spreading branches; the spikelets sessile in two rows on one side of a flattened rachis, as in *Paspalum*, but with a small lower glume.

- 16. *P. platyphyllum* Munro.
- 17. *P. plantagineum* Link.

§ 5. BRACHIARIA Benth.

Branches erect or somewhat spreading, not appressed, mostly approximate and sessile.

- 18. *P. prostratum* Lam.
- 19. *P. cæspitosum* Swartz.
- 20. *P. fuscum* Swartz.
- 21. *P. grossarium* Linn.

§ 6. POLYSTACHYÆ Benth.

Branches of the panicle numerous, spreading, single or subfasciculate, simple, or with some short branchlets, flowering to the base (except in *P. hians*); spikelets sessile or very short pediceled.

- 22. *P. barbinode* Trin.
- 23. *P. gymnocarpon* Ell.
- 24. *P. repens* Linn.
- 55. *P. anceps* Michx. (some forms).
- 25. *P. laxum* Swartz.
- 26. *P. hians* Ell.

§ 7. EUPANICUM Benth.

Branches of the panicle subdivided, single or fascicled, spreading and usually naked below, with the spikelets pediceled, sometimes long-pediceled.

(a) *Panicle small, narrow; branches few, erect, or somewhat spreading.*

- 27. *P. ciliatissimum* Buckl.
- 28. *P. Xanthophysum* Gray.
- 29. *P. pedicellatum* Vasey.
- 30. *P. depauperatum* Mühl.
- 31. *P. angustifolium* Ell.

(b) *Panicle small but diffuse, oval or oblong.*

- 32. *P. nitidum* Lam.
- 33. *P. laxiflorum* Lam.
- 34. *P. dichotomum* Linn.
- 35. *P. neuranthum* Griseb.
- 36. *P. Joorii* Vasey.
- 37. *P. nudicaule* Vasey.
- 38. *P. consanguineum* Kth.
- 39. *P. scoparium* Lam.
- 40. *P. Wilcoxianum* Vasey.

(c) *Panicle larger, oval, or oblong.*

- 41. *P. sphærocarpon* Ell.
- 42. *P. microcarpon* Muhl.

43. *P. viscidum* Ell.
 44. *P. commutatum* Schultes.
 45. *P. clandestinum* Linn.

(d) *Panicle larger, oval, or oblong.*

46. *P. latifolium* Linn.
 47. *P. scabriusculum* Ell. † Chapm.

(e) *Panicle effuse; branches capillary and much subdivided, except in P. sparsiflorum (P. angustifolium Chapm.)*

48. *P. capillare* Linn.
 49. *P. capillarioides* Vasey.
 50. *P. autumnale* Bosc.
 51. *P. Hallii* Vasey & Scrib.
 52. *P. proliferum* Lam.
 53. *P. miliaceum* Linn.
 54. *P. verrucosum* Muhl.
 55. *P. sparsiflorum*.

(f) *Tall grasses, with ample and diffuse panicle.*

56. *P. anceps* Michx.
 57. *P. agrostoides* Muhl.
 58. *P. bulbosum* H. B. K. and var. *avenaceum*.
 59. *P. maximum* Jacq.
 60. *P. amarum* Ell.
 61. *P. virgatum* Linn.
 62. *P. Havardii* Vasey.

§ 8. FRUTESCENTES Vasey.

Culms frutescent, spikelets large and turgid, empty glumes loose.

63. *P. divaricatum* Linn.

§ 9. VILLIFLORA Vasey.

Panicle diffuse, spikelets very large, the glumes very silky-villous.

64. *P. Urvilleanum* Kth.

§ 10. ECHINOCHLOA Benth.

Spikelets densely crowded in 3 or 4 rows, along the simple, alternate spikes or branches of the panicle; empty glumes scabrous or hirsute, acute or sometimes long awned.

65. *Panicum colonum* Linn.
 66. *Panicum Crus-galli* Linn.

§ 11. HYMENACHNE Benth.

The small very numerous spikelets usually crowded in a long cylindrical spike or confined panicle; outer glumes acuminate, the second twice as long as the fruiting ones, gibbous at the base.

67. *P. gibbum* Ell.

§ 1. DIGITARIA Benth.

1. *P. glabrum* Gaudm. (Gray's Manual, 6th ed., p. 630), (*Digitaria humifusa* Pers.) Culms spreading, prostrate or erect, 5 to 12 inches long; leaves 1 to 2 inches long, smooth or pubescent; spikes 2 to 6, spreading, 1 to 2 inches long, approximate; spike-

lets oblong, about 1 line long, obtusish; empty glumes, mostly two (the lower one often wanting), pubescent, both equaling the flower.—In cultivated and waste grounds, less common than the following. Var. *MISSISSIPPIENSIS* Gattinger. Taller (6 to 20 inches high), spikes longer ($1\frac{1}{2}$ to $3\frac{1}{2}$ inches), spikelets acutish.—Vicinity of Nashville, Tenn. (*Dr. Gattinger*).

2. *P. sanguinale* Linn. (CRAB-GRASS). (Gray's Manual, 6th ed., p. 630.) Culm erect or decumbent, usually rooting at the lower joints, leaves and sheaths smooth or hairy, variable in length and breadth; spikes 3 to 10 or 15, spreading, digitate or approximate, 3 to 6 inches long; spikelets oblong-lanceolate, about $1\frac{1}{2}$ lines long, acute, smoothish, pubescent; first glume minute, second half to two-thirds as long as the spikelet, third equaling the spikelet.—Naturalized everywhere.

Var. *CILIARE* Vasey Proc. Am. Acad. XXIV. p. 80, (*P. ciliare* Retz). Glumes ciliate-fringed.

Var. *SIMPSONI* Vasey n. var. With the general habit of *P. sanguinale*, but perennial; culms 2 to 3 feet long, from long-rooting rhizomes; spikes about 8, each 5 to 6 inches long; spikelets about $1\frac{1}{2}$ lines long; empty glumes two, equal, smooth, 7-nerved, acuminate.—Manatee, Fla. (*J. H. Simpson*), and Mississippi (*S. M. Tracy*).

3. *P. filiforme* Linn. (Gray's Manual, 6th ed., p. 630), (*Digitaria filiformis* Muhl.) Culms very slender, 1 to 3 feet high, erect, simple, or sparingly branched; leaves narrowly linear, 3 to 10 inches long, erect, somewhat pubescent, and with sheaths hairy; spikes 2 to 8, erect or somewhat spreading, 2 to 6 inches long; spikelets 1 line long or less, oblong, acute; empty glumes two, the lower slightly shorter and the upper equaling the flower.—Sandy or gravelly ground; Maine to Florida and westward.

4. *P. serotinum* Trin. (Chapm. Fl. S. States, Suppl., p. 666), (*Digitaria serotina* Michx.; *D. villosa* Ell.) Perennial, extensively creeping, much branched, making a thick carpet; flowering culms 6 to 10 inches; leaves short, erect, hairy, 1 to $2\frac{1}{2}$ inches long, sheaths villous; spikes 3 to 5, about 2 inches long, narrow; spikelets less than 1 line long, acute; two empty glumes, the first one-quarter to one-third as long, and the second nearly as long, as the spikelet.—North Carolina to Florida and westward.

§ 2. TRICHACHNE Benth.

5. *P. leucophæum* H. B. K. Nov. Gen. I. p. 97. Culms stout, 2 to 4 feet high, erect; leaves broadly linear, 1 foot long, scabrous above, ligule ciliate; panicle racemose, contracted, dense, 6 to 10 inches long; the simple branches numerous, erect, fasciculate, 2 to 4 inches long; spikelets linear-lanceolate, acuminate, about 2 lines long; lower glume minute, second nearly as long as, and the third equaling, the perfect flower, which is linear-lanceolate and mucronate-pointed.—Low, rich ground, South Florida (*Chapman, Curtiss, etc.*).

6. *P. lachnanthum* Torr. Culms rather slender, 2 to 3 feet high; leaves much narrower and shorter, panicle shorter, more slender, with fewer and shorter spikes; spikelets smaller, 1 to $1\frac{1}{2}$ lines long, ovate-lanceolate, the perfect flower ovate-lanceolate, acute and mucronate-pointed—mostly on dry hills, Texas, Arizona and New Mexico.

§ 3. SUBSPICATA Vasey.

7. *P. paspaloides* Pers. (Chapm. Fl. S. States, Suppl., p. 666.) Culms 2 to 3 feet high, decumbent and rooting below, smooth, stout, leafy; leaves narrow, 6 to 10 inches long, becoming somewhat involute, and with the sheaths smooth; panicle 5 to 10 inches long, strict, of 10 to 20 appressed, sessile, simple branches, the lower ones 1 to $1\frac{1}{2}$ inches long, upper gradually shorter; spikelets ovate-oblong, obtusish, smooth, 1 to $1\frac{1}{2}$ lines long, imbricate in two rows on the narrow axis; the lower glume truncate-obtuse, one-third as long, and second glume two-thirds as long as the spikelets (also thin and obtuse).—In ditches or water, Florida to Texas and Mexico.

8. *P. Curtisii* Chapm. Fl. S. States, p. 573. Culms 3 to 4 feet high, often

rooting at the lower joints; leaves linear-lanceolate, plane, rigid, 6 to 9 inches long, 6 to 9 lines wide, smooth; sheaths smooth or hairy; panicle slender, spike-like, 6 to 8 inches long, of numerous appressed slender, single, or fascicled branches, the lower ones remote; spikelets ovate-lanceolate, acutish, about 1 line long; lower glume acute, keeled, half as long as the spikelet; the second a little shorter than the third, which equals the acutish perfect flower; second and third glumes strongly 3- to 5-nerved, sterile flower triandrous. Closely resembles the preceding.—Ponds and swamps, Florida to Texas.

9. *P. obtusum* H. B. K. (Kunth Gram., II. t. 116.) Culms $1\frac{1}{2}$ to 2 feet high, firm, leafy; sending off long (sometimes 8 to 10 feet) runners from the base; leaves 4 to 6 inches long, 2 to 3 lines wide; panicle 3 or 4 inches long, narrow, composed of four to seven approximate, appressed, sessile branches, the lower ones about 1 inch long, the upper becoming very short, densely flowered; spikelets mostly in alternate pairs, of which one is sessile, the other short-pedicelled, forming three to four rows, turgid, oblong, obtuse, and $1\frac{1}{2}$ lines long; lower glume two-thirds as long as the spikelet, 5-nerved, second glume 7-nerved, third 5-nerved, a little longer than the fertile flower; sterile flower triandrous.—Mexico, Texas, New Mexico to Colorado.

10. *P. reticulatum* Torr. Culms 10 to 15 inches high, much branched below, leafy; leaves $1\frac{1}{2}$ to 3 inches long, acute, scabrous or pubescent, as also are the sheaths; panicle 2 to 3 inches long, lateral ones shorter, close or dense; branches single or fasciculate, unequal, $1\frac{1}{4}$ or 2 inches long, the longer with interrupted spikelets, which are about $1\frac{1}{2}$ lines long, single or in pairs, one sessile and one pedicelled, obovate, acutish; first glume one-fourth to one-third as long as the spikelet, acutish, second and third strongly 5- to 7-nerved, and conspicuously reticulately veined.—Texas to Arizona.

11. *P. Texanum* Buckley. Culms stout, 2 to 4 feet high, branching from a decumbent and sometimes rooting base, leafy, smooth; leaves lanceolate, 4 to 10 inches long, 6 to 12 lines wide, smoothish or scabrous above and on the margins; sheaths softly and sparsely pubescent, nodes pubescent; panicle (the base generally inclosed in the upper sheath) 4 to 8 inches long, $\frac{1}{4}$ to 1 inch wide, of 5 to 10 erect, rather slender, simple, erect branches 1 to 3 inches long, closely flowered; rachis scabrous-pubescent; spikelets single or in pairs, alternate along the angular rachis, oblong, lanceolate, acute, 2 to $2\frac{1}{4}$ lines long, smooth, or finely pubescent; first glume broadly ovate, half to two-thirds as long as the spikelets, acute, 5-nerved; second and third glumes equaling the spikelet, strongly 5- to 7-nerved, perfect flower ovate or oblong-ovate, acutish, transversely wrinkled with fine reticulated striæ. Cultivated for a forage grass.—Texas.

12. *P. Chapmani* Vasey. Bull. Torr. Club, XI. p. 61. (*P. tenuiculmum* Chapman Meyer.) Culms filiform, $1\frac{1}{2}$ to $2\frac{1}{4}$ feet high, erect, simple; leaves chiefly radical, linear, half as long as the culm, about 2 lines wide, upper ones shorter; panicle 6 to 12 inches long, of eight to twelve remote, slender, erect spikes, the upper ones short and few- (3- to 6-) flowered, sessile, one-half inch long, the lower longer, sometimes subdivided, and with long, sheathed peduncles; rachis flexuous, bristle-like at the apex; spikelets about one line long, ovate; lower glume one-half as long as the spikelet, obtuse; upper glume 9-nerved.—Florida (*Chapman, Curtiss, Garber*).

13. *P. Reverchonii* Vasey. (Dept. Agr. Bot. Div. Bull. No. 8, p. 25.) Culms filiform from a thick, strong rootstock, erect, 10 to 18 inches high, simple; leaves chiefly radical, long and narrow, half as long as the culm; panicle 3 to 6 inches long, slender, an interrupted spike, at least above, below with short, 3- to 5-flowered, remote, fasciculate branches; spikelets $1\frac{1}{4}$ lines long, plano-convex, obtusish; lower glume one-half as long as the spikelet, 3-nerved, second and third 7-nerved; rachis terminated by a short bristle, sometimes also a bristle below the spikelets.—Texas (*Reverchon*). Distributed by Reverchon as *Setaria unisetata*.

14. *P. subspicatum* Vasey. (Dept. Agr. Bot. Div. Bull. No. 8, p. 25.) Culms 10 to 18 inches high, leafy; upper leaves longer than the lower (lowest 1 inch, highest 5 inches), 1 to 3 lines wide, rather rigid, light green, acute; panicle spicate at apex,

3 to 5 inches long, below with 5 or 6 short, approximate, appressed, rather lax branches, $\frac{1}{4}$ inch to 1 inch long; spikelets 1 line long, a little curved; lower glume one-half as long as the spikelet; second glume 7-nerved; third glume 5-nerved; rachis with a short bristle at apex and sometimes a bristle below the spikelets.—Texas (*Buckley, Nealley*). These three (12, 13, and 14) form a natural group. Leaves shorter and more rigid, spike shorter and closer, and spikelets smaller than in the preceding.

15. *P. stenodes* Griseb. Fl. W. Ind., p. 547. (*P. anceps* var. *strictum* Chapm.) Culms 2 to 3 feet high, wiry, smooth; leaves erect, rigid, narrow (1 to 2 lines), 3 to 4 inches long; panicle narrow, 2 to 3 inches long, of five to six slender, short, appressed branches, sessile or nearly so, mostly single, sometimes two or three together; spikelets about 1 line long, lanceolate, acute; first glume half as long as the spikelet; second and third 5-nerved, acute.—In ponds and water, Florida to Alabama (*Dr. Mohr*) and Texas (*Nealley*).

§ 4. PLATYPHYLLA Vasey.

16. *P. platyphyllum* Munro. Culms decumbent and rooting at the lower joints, 1 to 2 feet high, branching below, pale green in color; leaves lanceolate, 3 to 4 inches long, 4 to 6 lines wide, smooth, firm, the base clasping; margins scabrous, pale green; sheaths smooth, striate, the upper one inclosing the base of the panicle consisting of 3 to 5 simple, sessile, alternate, slightly spreading, distant branches, each $1\frac{1}{2}$ to 3 inches long; spikelets sessile, and alternate on a flattened rachis; lower glume thin, obtuse, one-third as long as the second and third, the latter 5-nerved, smooth, and one-third longer than the obtuse fertile flower; sterile flower a glume only.—Texas (*E. Hall, G. C. Nealley*).

17. *P. plantagineum* Link: Hort. i. 206. Much like the preceding, but stouter and larger, with longer and wider leaves (6 to 10 inches by 6 to 9 lines); the spikes more remote, longer (2 to 4 inches), and the lower peduncled in the sheaths; spikelets much like the preceding.—Introduced on ballast ground at Philadelphia.

§ 5. BRACHIARIA Benth.

18. *P. prostratum* Lam. (Chapm. Fl. S. States, suppl., p. 666. *P. cæspitosum* Swartz f.) Culms creeping and rooting at the base, then ascending, 1 to 2 feet long, with rather distant leaves ($1\frac{1}{4}$ to 2 inches long), lanceolate or ovate-lanceolate, acute, clasping at the ciliate base; sheaths shorter than the internodes; panicle exerted, short, about 2 inches long, of 5 to 8 simple or sub-simple branches, the lowest 1 to $1\frac{1}{4}$ inches long, closely flowered; rachis frequently with stiff hairs; spikelets three-quarters of a line long, smooth; first glume one-quarter as long as the spikelet, second and third equal; perfect flower striate-punctulate, mucronate-pointed. Our specimens agree with *Trinius*, Fig. 185 A.—Louisiana (*Langlois*) and Texas (*Nealley*).

19. *P. cæspitosum* Swartz. f. (Swartz. Fl. W. Indies.) Culms numerous, succulent, and thickish, rooting at the base, ascending to 1 or 2 feet long; leaves crowded below, erect, linear-lanceolate, 2 to 4 inches long, 3 to 4 lines wide, ciliate on the margins, striate; lower sheaths inflated; panicle about 2 inches long, of 5 to 8 branches becoming long exerted; rachis and branches hairy and angular, lower branches about 1 inch long; spikelets $1\frac{1}{4}$ to $1\frac{1}{2}$ lines long, ovate-oblong, acute, lower glume one-third as long as the spikelet; perfect flower as in the preceding, but larger. The whole plant pale green.—Probably in Texas and New Mexico, certainly in Chihuahua, Mexico (*Pringle*, No. 375).

20. *P. fuscum* Swartz. (*P. fasciculatum* Swartz: Chapm. Fl. S. States, p. 574.) Culms 1 to 3 feet high, decumbent and branching at base; leaves linear or lanceolate-linear, 3 to 10 inches long, glabrous or pubescent; panicle 3 to 6 inches long, spreading, the branches simple or more or less fasciculated below, the lower about 2

inches long; rachis hairy; spikelets in pairs or in small clusters. $1\frac{1}{2}$ lines long, acutish, lower glume about one-third as long as the spikelet, deltoid, second and third glumes 5- to 7-nerved, and cross-nerved.—Texas.

Var. MAJOR. Culms stouter, 2 to 3 feet high; branched; sheaths and leaves scabrous-punctulate or smoothish, leaves broader, acuminate; panicle fuller, 3 to 6 inches long, branches more numerous (up to 20 or 30), scattered and fasciculate; rachis and branches scabrous, and with scattered hairs.

Var. FASCICULATUM (*P. fasciculatum* Swartz). Leaves longer and wider (8 to 10 lines wide), panicle 4 to 5 inches long, the branches very numerous, spikelets becoming dark brown.—Southern Florida.

21. *P. grossarium* Linn. Amoen. v. p. 392.

Specimens from ballast ground at Philadelphia have been referred to this species, but if correct it seems too near *P. fuscum*.

§ 6. POLYSTACHYÆ Benth.

Small forms *P. anceps* might come in this group.

22. *P. barbinode* Trin. (PARA GRASS). (Icon. XXVII. t. 318), (*P. molle* Swartz). Culms 2 to 6 feet high, stout, ascending; nodes villous; leaves linear-acuminate, glabrescent; panicle lax, 6 to 8 inches long; branches mostly simple, fascicled, spreading, about 2 inches long, somewhat distant; spikelets 1 to $1\frac{1}{2}$ lines long, glabrous, one-sided, spreading; lowest glume deltoid, one-fourth as long as the spikelet, 1-nerved, second and third equaling the spikelet, 5-nerved; fertile flower ellipsoidal, bluntish.—Introduced and cultivated in the South.

23. *P. gymnocarpon* Ell. (Chapm. Fl. S. States, p. 573.)—Perennial. Culms 2 to 4 feet high, erect, rigid, smooth; leaves lanceolate, smooth, 1 foot long or more, 1 inch or more wide, cordate at base; sheaths shorter than the internodes, striate, nodes black; panicle large, 9 to 15 inches long, branches 4 to 6 inches long, erect-spreading, scattered or 2 to 3 together, racemose; spikelets in nearly sessile clusters of 3 to 6, appressed along the branches, somewhat one sided, $2\frac{1}{2}$ to 3 lines long, lanceolate; outer glumes nearly alike, lanceolate-subulate, rough-keeled, 2 to 3 times longer than the perfect flower; first glume 3-nerved, a little to one-third shorter than the second and third about 5-nerved; the third glume or neutral flower with a palea one-half as long.—Florida to Texas.

24. *P. repens* Lim. (Chapm. Fl. S. States, suppl., p. 666.) Culms $1\frac{1}{2}$ to 2 feet high, from strong creeping rhizomes, leafy, covered below with loose sheath with short or deficient blades, the blades becoming longer upward, conduplicate or involute, the uppermost 3 to 4 inches long, sometimes pubescent at the base; panicle erect, thin, 3 to 4 inches long; the branches alternate, naked at base, erect or slightly spreading, the lower ones each with 2 or 3 rather long, appressed branchlets, short-pedicel and appressed, interrupted or racemose along the slender branches, 1 line long, oval, acute, smooth; the lower glume broad, obtuse, one-third as long as the spikelet, second and third about 7-nerved.—Sandy shores of the Gulf, Florida to Texas.

Var. CONFERTUM Vasey. Culms shorter, leaves very divergent and rigid, panicle more condensed, the branches shorter and spikelets more crowded, lower glume rather longer and less obtuse.—Mobile, Ala., to Vera Cruz, Mex. (2177 *F. Muller.*)

P. anceps Michx. See No. 55.

25. *P. laxum* Swartz. (Griseb. Fl. W. Indies, p. 548), of this group, common in the West Indies, is probably also in southern Florida, but I have seen no authentic specimens.

26. *P. hians* Ell. (Chapm. Fl. S. States, p. 573.) Perennial. Culms slender, smooth, 6 to 18 inches high, simple, from slender, wiry, creeping root-stocks; leaves linear, 3 to 5 inches long, 1 to 2 lines wide, smooth, erect; panicle rather small, 3 to 5 inches long, the slender, racemose branches 1 to 2 inches long, erect-spreading, mostly single and distant, the lower third naked; spikelets about 1 line long, in small, nearly sessile, approximate clusters; outer glumes ovate, acute, generally 3-

nerved, the lower one-half as long as the spikelet, third glume longer than the second and having a thick, rigid, obovate palet rather longer than its glume, and spreading apart from it, hence probably the name *hians*, from *hio*, to gape.—North Carolina to Texas.

27. *P. ciliatissimum* Buckl. Culms procumbent and much branched, often rooting at the joints, at first short-jointed and much condensed, with leaves 1 to 1½ inches long, and the panicles short and invaginate, becoming elongated, with long-exserted peduncle (lateral and terminal) becoming 1½ to 2 inches long, narrow, with a few short, few-flowered, appressed branches, and linear-lanceolate, acuminate leaves 2 to 4 inches long, ciliate on the margins below, with sparsely ciliate and hairy sheaths, the nodes white-woolly; spikelets ovate, acute, 2 lines long, pubescent or villous; the lower glume lanceolate, acute, 3-nerved, smooth, except at the base, two-thirds as long as the spikelet; second 11- to 13-nerved, pubescent to densely villous, with a smooth, acute, hardened point; the third, or flowering glume of the sterile flower a little shorter than the second, 5-nerved, ciliate on the margins, its palet equally long, ovate, thin; the fertile flower one-fourth to one-third shorter than the largest glume, obtusish, minutely furrowed.—Texas.

§ 7. EUPANICUM Benth.

28. *P. Xanthophysum* Gray. (Gray's Manual, 6th ed., p. 631.) Culms erect, 1 to 2 feet high, simple or branched near the base; leaves lanceolate, acuminate, 4 to 6 inches long, 5 to 10 lines wide, smooth, except the scabrous margins, strongly 9- to 11-nerved, rather contracted at the ciliate, clasping base; panicle long-exserted, 2 to 4 inches long, of a few, simple, erect or appressed, few-flowered branches; spikelets obovate, 1½ lines long, minutely downy; lower glume about half the length of the spikelet, second and third about 9-nerved. Plant yellowish green.—Canada to Pennsylvania and Wisconsin.

29. *P. pedicellatum* Vasey. Culms 1 to 2 feet high, slender, branching below, smooth; culm leaves 2 to 3 inches long, 2 to 3 lines wide, gradually tapering to an acute point, erect, somewhat rigid; main panicle long-exserted, the lateral ones less so, all small and few-flowered, 1½ to 2 inches long, of 4 or 5 short branches, each only 2- to 3-flowered; spikelets long-pedicelated, oblong-obovate, obtuse, 1½ lines long, slightly pubescent, the lowest glume at some distance from the others, ovate, 1-nerved, nearly half as long as the spikelet; second and third glumes oblong, obtuse, 7-nerved.—Texas (*J. Reverchon*).

Resembles *P. angustifolium*, Ell., but is smaller, with smaller, fewer-flowered panicle, and rather smaller spikelets.

30. *P. depauperatum*, Muhl. (Gray's Manual, 6th ed., p. 633.) Culms erect, simple, tufted, 6 to 16 inches high; leaves of the culm about three, erect, narrowly linear, 3 to 6 inches long; sheaths usually pubescent; panicle small, 1 to 2 inches long, contracted sometimes overtopped by the upper leaves; spikelets 1 to 1½ lines long, obovate; lower glume one-third the length of the 7- to 9-nerved upper ones.—New England, New York, Pennsylvania, Virginia, Florida, Texas, Arkansas and Missouri.

31. *P. angustifolium* Ell., *non* Chapman. Elliott's Bot. S. Car., i. p. 129. Culms weak, slender, smooth, 1 to 2 feet long, diffusely branched from the base; leaves linear, 3 to 5 inches long, 1 to 2 lines wide; sheaths short, nodes thickened; panicles simple, terminal and lateral, 3 to 5 inches long; the few branches single, capillary, distant, 1 to 3 inches long, bearing each 2 to 6 spikelets (mostly in pairs at the end of the branches); spikelets oblong-obovate, acute, 1½ lines long, the outer glumes papillose-hispid, the lower one minute, acutish.—South Carolina to Texas.

32. *P. nitidum* Lam. (Gray's Manual, 6th ed., p. 632.) Culms 10 to 20 inches high, slender but firm, rarely branched, smooth; leaves mostly at the base of culm, lanceolate or lance-linear, 1 to 2 inches long, rather rigid, and with the sheaths smooth, the culm leaves few and smaller; panicle ovate or oblong, 1½ to 2½ inches long; branches verticillate below, the lower ones 1 to 1½ inches long, spreading, ca-

pillary, numerous flowered; purplish spikelets on pedicels 2 to 4 times as long, oval, one-half to two-thirds line long, pubescent, the lowest glume one-fourth to one-third the length of the spikelet.

Var. *MINOR* (*P. ramulosum*, of Chapm. Suppl., but I think can not be the plant of Michx.). Lower than the type (6 to 8 inches high); tufted; leaves narrower and smaller; panicle 1 to 1½ inches long; rachis smooth; spikelets smooth or nearly so; second and third glumes 5-nerved.—Florida.

Var. *ENSIFOLIUM* (*P. ensifolium* Baldw.). Radical leaves linear-lanceolate, 1½ inches long, smooth, those of the slender (8 to 12 inches long) culm distant, small (about one-half inch), and horizontally divergent; panicle depauperate, less than an inch long, the rays single and few-flowered.—Florida. Described from Dr. Chapman's specimens.

Var. *MAJOR*. Here could be placed several variable forms, mostly smooth, but with stouter culms, a more open, less dense panicle, with fewer and stouter branches (sometimes reflexed), and fewer and larger spikelets.

33. *P. laxiflorum* Lam. (Gray's Manual, 6th ed., p. 633.) Culms erect, weak, 6 to 18 inches high, rarely branched, smooth below the panicle; leaves linear or lanceolate-linear, 3 to 7 inches long, 3 to 4 lines wide, mostly radical, the 2 or 3 of the culm little shorter, acuminate, nearly smooth except on the ciliate margins, pale green or yellowish-green; sheaths mostly shorter than the leaves, sparsely and retrorsely villose; ligule a ring of soft, white hairs; panicle capillary, 2 or 3 inches long; branches sparingly divided from the base, mostly single, alternate and few-flowered, spreading; the rachis and branches sparsely long-hairy; spikelets long-pedicel, 1 line long, oval or elliptical, obtuse, strigosely pubescent, lower empty glume ovate, 1-nerved, one-quarter as long as the spikelet; second and third glumes 7- to 9-nerved; fertile flower as long as the spikelet, acutish.—In sandy woods.

Var. *PUBESCENS*. Culm rather stouter, and pubescent, 12 to 15 inches high; leaves hairy, shorter, lanceolate, the lower 2 to 2½ inches long, 3 to 5 lines wide, the upper about 1 inch, upper sheath elongated; panicle 2 to 3½ inches long, the branches and spikelets more numerous, and spikelets smaller; lowest glume roundish ovate, one-third as long as the spikelets; second and third glumes 5- to 7-nerved. Closely approaches *P. nitidum*, and is perhaps the *P. nitidum* var. *ciliatum* Torr.

34. *P. dichotomum*, Linn. (Gray's Manual, 6th ed., p. 633.) Culm 10 to 30 inches high; at first mostly simple, smooth, or pubescent, bearing a more or less exserted, spreading, compound panicle, 1 to 4 inches long, and lanceolate, flat leaves; those of the culm larger above, 3 to 4 inches long; those at the root tufted, usually ovate-lanceolate, short, and thick; the culms commonly branching later in the season, the branches often clustered, and bearing smaller, mostly included panicles; spikelets ½ of a line long oblong-obovate, pubescent or downy, lower glume one-third as long as the spikelet.

Var. *BARBULATUM*. With the nodes barbed, and with the sheaths smooth or pubescent.

Var. *VIRIDE*. Smooth all over, leaves light green and narrower.

Var. *DIVARICATUM*. Erect, 6 to 9 inches high, slender, smooth, very much branched above the base, caespitose, the radical leaves very short and tufted, those of the culm and branches very narrowly linear or involute, acuminate, about 1 inch long, divaricate, the numerous panicles small, racemose, few-flowered; the spikelets on alternate filiform pedicels ¼ to 1 inch long; spikelets three-fourths of a line long, oval-oblong, smooth; third glume equaling the spikelet 7-nerved; fertile flower as long as the spikelet.

Var. *VILLOSUM* (*P. villosum* Ell.). Culms decumbent, branching from the first; leaves scabrous above; ciliate, sheaths and culms villous, panicle thinner and fewer-flowered.

Var. *ELATUM*. Culms tall (2 to 3 feet), erect, smooth; cauline leaves 4 to 5 inches long, 5 to 6 lines wide, smooth, very acute; panicle 4 inches long, smooth; the branches long, erect, spreading, rather sparsely flowered; spikelets a little more

than 1 line long, smooth, oblong, acutish, the lower glume ovate, acute or acutish, nearly half as long as the spikelet, fertile flower shorter than the spikelet.

35. *P. neuranthum* Griseb. (Pl. Cubens. p. 232). Erect or ascending, about 1 foot high, slender, smooth; leaves linear-acuminate, 2 to 4 inches long, firm, flat or subinvolute; terminal panicle long exserted, 1 to 2 inches long, with few-flowered, divergent branches, the lateral panicles numerous, narrow, short (less than 1 inch long), oval, pubescent; lower glume minute, deltoid, nearly nerveless, one-third to one-fourth as long as the spikelet, second and third 7-nerved, equaling the fertile flower, which is ovoid, obtuse, and smooth.

Var. RAMOSUM Griseb. Ascending, much branched, leaves flat or involute, very narrow; spikelets 1 line long, elliptical, obtuse.—South Carolina, Florida, to Texas.

36. *P. Joorii* Vasey. Culms about 1 foot high, much branched above, very leafy; leaves 4 to 6 inches long, 6 to 10 lines wide, thinnish, smooth, those of the extreme branches smaller; panicles numerous, small, inclosed in the sheaths, few-flowered; spikelets oblong, over 1 line long, sparsely pubescent.—Louisiana (*Dr. J. F. Joor*) and Mississippi (*S. M. Tracy*).

This is very unusual in its abundant large leaves and condensed form, growing in dense tufts.

37. *P. nudicaule* Vasey. Culms $1\frac{1}{2}$ to 2 feet high, slender, with 2 or 3 long internodes; leaves mostly near the base, linear-lanceolate, 2 to 4 inches long, 2 to 3 lines wide, smooth, light green, the 2 to 3 culm-leaves distant, narrow, giving the culm a naked appearance; panicle long exserted, small, smooth, 2 to 3 inches long, 1 inch wide, sparsely flowered, branches alternate; spikelets elliptical-oblong, acute, $1\frac{1}{2}$ lines long, smooth, the lower glume very small (one-fifth as long as the spikelet); second glume 7-nerved; third, 5-nerved; fertile flower one-fourth shorter than the spikelet.—Swamps, Santa Rosa County, Florida (*A. H. Curtiss*).

38. *P. consanguineum* Kth. (Gray's Manual, 6th ed., p. 633) (*P. villosum* Ell.). Culms about $1\frac{1}{2}$ feet high, erect, branching in age; leaves linear-lanceolate, mostly about 3 inches long, 2 to 5 lines wide, the later ones almost filiform, somewhat pubescent, sheaths villose; panicle 2 to 3 inches long, open, rather thin; spikelets 1 to $1\frac{1}{2}$ lines long, pubescent.—South Carolina to Florida.

39. *P. scoparium* Lam. (Gray's Manual, 6th ed., p. 632). (*P. pauciflorum* Ell.) Culms erect, becoming branched and reclining, 1 to 2 feet high, somewhat scabrous; leaves erect, about 3 inches long, 4 to 5 lines wide, faintly nerved, scabrous on the margins, hairy fringed near the base, the sheaths bristly with stiff spreading hairs or smoothish; the panicle 2 to 3 inches long, spreading, open, branches smooth, mostly simple, alternate, rather few-flowered; spikelets $1\frac{1}{2}$ to $1\frac{3}{4}$ lines long, oval to obovate, hairy or smoothish; lower glume about one-third as long as spikelet.—New England to California and southward. A widespread species.

Var. MAJOR (*P. scoparium* Ell.). This differs from the preceding in its stouter, rougher culm, larger leaves, 4 to 6 inches long, three-fourths of an inch wide (1 to $1\frac{1}{2}$ inches wide, Elliott), soft-pubescent below, and its spikelets 2 lines long.—We have only seen this from South Carolina (*Dr. Ravenel*).

Var. ANGUSTIFOLIUM. Culms tall and erect, 2 to 3 feet high, branching; leaves longer and narrower than the type, 3 or 4 inches long, 3 to 4 lines wide, rather rigid; sheaths sparsely pubescent; panicle long-exserted, 3 to 4 inches long.—South Carolina (*Dr. Ravenel*), Illinois (*Dr. Schenck*) and Fortress Monroe, Va. (*Dr. Vasey*).

Var. LIEBERGII (*P. Liebergii* Scribn.) Culms tall and erect, unbranched, 2 feet high; leaves lanceolate, distant, 3 to 4 inches long, 6 to 9 lines wide, scabrous or papillose, hairy, about 11-nerved; sheath shorter than the internodes; panicle about 3 inches long, 1 inch wide, the fewish branches erect-spreading and few-flowered.—Plymouth County, Iowa (*John Lieberg*).

40. *P. Wilcoxianum*. Culms about 6 inches high, entire or sparingly branched and with the leaves more or less white-hairy; leaves linear-lanceolate, erect, acuminate, 2 to 3 inches long, hairy both sides, rather rigid, sheaths striate, hairy,

mostly longer than the internodes, ligule obsolete; panicle oblong, rachis zigzag, 1 inch long; lower branches subverticillate, short; spikelets about $1\frac{1}{2}$ lines long, pubescent; lower glume ovate, one-fourth as long as the spikelet; second and third glumes with 5 to 7 broad nerves, the third hardly as long as the flowering glume.—Nebraska (*Dr. T. E. Wilcox*). Perhaps a depauperate form of the preceding.

41. *P. sphærocarpon* Ell. (*Chapm. Fl., S. States, Suppl. p. 667.*) Culms 15 to 24 inches long, 5 to 7 lines wide, lanceolate, acute, obscurely nerved, smooth except at the ciliate-cordate base; sheaths shorter than the joints, smooth; panicle 3 to 4 inches long, spreading; spikelets oval, five-eighths to three-fourths of a line long, smoothish lower glume one-third as long as the spikelet.—Dry or moist ground, of same range as the next species. Differs from *P. dichotomum* in its wider, more rigid, smooth, pale leaves, with cordate base.

Var. FLORIDANUM. Culms $1\frac{1}{2}$ to $2\frac{1}{2}$ feet high, rigidly erect; leaves rigid, erect, 6 to 7 on the culm, lanceolate, smooth, about 3 inches long, 5 to 6 lines wide, the margins near the base, and sheaths ciliate; panicle oval to oblong, 3 to 5 inches long, and spikelets one-half line long, pubescent, the lower glume $\frac{1}{2}$ or $\frac{1}{3}$ as long as the spikelet.—Florida.

Described by Dr. Chapman as *P. sphærocarpon* Ell., but it hardly agrees with Elliott's description. It is intermediate between *P. microcarpon* and *P. sphærocarpon*.

42. *P. microcarpon* Muhl. (*Gray's Manual, 6th ed., p. 633.*) (*P. multiflorum* Ell.) Culms 2 to 3 feet high, stout, erect, smooth; leaves 4 to 7 inches long, 9 to 12 lines wide, lanceolate, gradually tapering to a slender point, with nine to eleven nerves, roughish above and on the margin, sometimes bristly-ciliate at the rounded, clasping base, smooth on the under side, sheaths mostly longer than the internodes, smooth except on the margins; ligule nearly obsolete, panicle becoming long-peduncled, 3 to 7 inches long, 1 to 2 inches broad, spreading, multiflorous, branches mostly verticillate, very numerous, flowering to the base, spikelets mostly long-pedicelated, oval, five-eighths of a line long, nearly smooth, lower glume one-fourth as long as spikelet, second glume 7-nerved.—Low ground, Massachusetts to Texas.

43. *P. viscidum* Ell. (*Gray's Manual, 6th ed., p. 632.*) Culms 2 to 4 feet high, stout, becoming much branched, leafy, velvety-downy all over, except a narrow ring below each node; sheaths soft-downy, the hairs spreading or reflexed and often viscid, leaves downy or smoothish, lanceolate, 4 to 8 inches long, diffuse, the branches numerous and much subdivided, spikelets fully 1 line long, oblong-obovate, pubescent, lower glume one-fourth to one-fifth as long as the 7- to 9-nerved upper one.—Common.

44. *P. commutatum* Schultes. (*Chapm. Fl., S. States, Suppl. p. 667.*) (*P. nervosum* Muhl.) Culms 2 to $2\frac{1}{2}$ feet long, erect, unbranched, rather slender, smooth; leaves at the base rigid, ovate-lanceolate, the three or four culm leaves firm but not rigid, mostly 3 to 4 inches long, 8 to 12 lines wide, acuminate, cordate at base, smooth except on the margins, sheaths smooth or somewhat pubescent, much shorter than the nodes; panicle peduncled, 3 to 5 inches long, 2 to 3 inches wide, open, rather thin, branches smooth, single or subverticillate; spikelets rather long-pedicelated, oblong, sparsely hairy, 1 to $1\frac{1}{2}$ lines long; lower glumes one-third as long as the spikelet, second about 5- and third 7-nerved.—Pennsylvania to Texas. A fine species, in appearance like *P. clandestinum*, but more slender, with shorter leaves and smaller spikelets, which are early deciduous.

Var. MINOR, differs from the preceding in its rather smaller size ($1\frac{1}{2}$ to 2 feet), and smaller panicle, and the spikelets more persistent.—Southern States.

45. *P. clandestinum* Linn. (*Gray's Manual, 6th ed., p. 632.*) Culms rigid, 2 to 3 feet high, leafy to the top, rarely branched, upper nodes smooth, the lower often hairy; sheaths smoothish, or the lower ones often rough with papillose, bristly hairs, shorter than the internodes, leaves large, lanceolate to oblong-lanceolate, 4 to 8 inches long, 9 to 15 lines wide, with a cordate, clasping base, very taper-pointed, smooth except the rough margins; panicle at first partially sheathed, becoming long-pedunculate, some-

what oblong in outline, 4 to 6 inches long, open and becoming spreading, branches verticillate; spikelets $1\frac{1}{2}$ lines long, slightly pubescent or smooth, oblong-ovate to obovate; the lower glume acutish, nearly one-half as long as the spikelet, second and third equal, many nerved; perfect flower oblong, pointed.—New England to Virginia, North Carolina, and westward to Illinois.

46. *P. latifolium* Linn. (Gray's Manual, 6th ed., p. 632.) Culms 1 to $2\frac{1}{2}$ feet high, smooth, mostly simple, the nodes (generally) and the collar of the sheath soft woolly-hairy; sheaths smooth or more or less pubescent; leaves broadly lanceolate from a cordate, clasping base, 3 to 4 inches long, $\frac{3}{4}$ to $1\frac{1}{2}$ inches wide, tapering to a point, roughish above, smooth, or sparsely hairy below, 11- to 13-nerved; panicle more or less exserted, becoming long-peduncled, 2 to 4 inches long, the branches mostly alternate, spreading, rather few flowered; spikelets $1\frac{1}{2}$ to 2 lines long, obovate, sparsely pubescent; the lower glume one-third, or less than one-half as long as the spikelet, upper one about 9-nerved.—Maine to Texas.

Var. MOLLE. Downy all over.—Virginia to Louisiana.

Var. AUSTRALIS. Leaves more contracted at base, and spikelets larger (2 to $2\frac{1}{2}$ lines).—Alabama to Texas.

47. *P. scabriusculum* Ell. ? Chapm. (Chapm. Fl. S. States, p. 576). (*P. Nealleyi* Vasey.) Culms 3 to 4 feet high, firm, smooth, rarely branched; leaves linear-lanceolate, 4 to 8 inches long, one-half inch wide, long-pointed, firm, mostly smooth except near the base; sheaths shorter than the joints, mostly smooth, or sometimes sparsely pubescent; panicle larger, 5 to 8 inches long, diffuse, smooth, branches mostly alternate, much divided, the larger ones 3 inches long; spikelets ovate, acutish, sparingly pubescent when young, becoming smooth; lower glume small; second glume strongly 7- to 9-nerved.—North Carolina to Texas.

This is the *P. scabriusculum* described by Chapman, but does not appear to me to answer that of Elliott, who compares his with *P. virgatum*.

48. *P. capillare* Linn. (Gray's Manual, 6th ed., p. 630.) Culms 10 to 20 inches high, mostly branched at the base, rather robust, erect or ascending; sheaths and usually the leaves copiously hairy or hirsute; panicles, lateral and terminal, half to two-thirds the length of the plant, vaginate below, much branched, the branches divaricate when old; spikelets ovoid to oblong or lanceolate, obtusish, acute or even acuminate, $\frac{3}{4}$ to nearly 2 lines long, smooth, on long capillary pedicels; lower glume one-half to two-thirds as long as the spikelet, obtuse to acuminate, fertile flower obtusish, rather shorter than the spikelet.—All over the continent.

Var. CAMPESTRE Gattinger. Culms slender, $1\frac{1}{2}$ to 2 feet high, much branched, leaves and sheaths sparsely hirsute, panicle, rather pyramidal, much shorter than in the type, 4 to 6 inches long, more open and thinly flowered, spikelets three-fourths of a line long, smooth, oblong, rather acute, lower glume obtusish.—Tennessee (*Dr. Gattinger*).

Var. FLEXILE Gattinger. Culms slender, $1\frac{1}{2}$ to $2\frac{1}{2}$ feet high, branched below, leaves linear, 6 to 10 inches long, narrow, erect, smooth or smoothish, sparsely ciliate on the margins and sheaths, panicle longer and narrower than in the preceding, 5 to 9 inches long, 2 to 4 inches wide, branches slightly spreading, single or in twos, smooth; spikelets $1\frac{1}{2}$ lines long, lanceolate-acuminate, lower glume acute, perfect flower one-third shorter than the spikelet.—Tennessee (*Dr. Gattinger*).

49. *P. capillarioides* Vasey. Contr. U. S. Herb. 1, p. 54. In habit and appearance much like *P. capillare*, but generally less hirsute, and with a smaller panicle. The branches of the panicle are more rigid. The spikelets are twice as large and more clustered at the end of the branches. They are 2 lines or more long; long-conical and acuminate.—Texas (*Mr. G. C. Nealley, Miss Mary B. Croft*).

50. *P. autumnale* Bosc. (Gray's Manual, 6th ed., p. 630.) (*P. divergens* Muhl.) Culms 12 to 18 inches high, erect or decumbent below; leaves comparatively small, 2 or 3 inches long, 2 to 3 lines wide, smooth except on the scabrous or undulate margins; sheaths smooth or the lower ones, sparsely hairy, ligule membranaceous, obtuse,

conspicuous; panicle very effuse, one-third the length of the culm or more, the capillary branches long and sparingly divided, often reflexed at maturity, and somewhat scabrous, the axils sometimes sparsely hairy, the branchlets or pedicles long, naked, and terminated by a single spikelet, spindle shaped or obovate, 1 to 1½ lines long, acute; the lower glume very minute (one-sixth to one eighth as long as the spikelet); second and third glumes acute, ciliate near the apex, or in southwestern specimens (var. *pubiflorum*) pubescent all over, but little longer than the acute flowering glume.—Illinois to Texas and the Southern States.

51. *P. Hallii* Vasey. Bull. Torr. Club, xi. p. 61. Culms slender, 1 to 2 feet high, branching; leaves slender, 4 to 6 inches long; sheaths sparsely pubescent or smooth; panicle open, diffuse, 4 to 5 inches long, sparsely flowered; spikelets 1½ lines long, acute, smooth; lower glumes half as long as spikelets, perfect flower a little shorter.—Texas. More slender than *P. capillare*, with smoother culms, smaller panicles, stouter branches, and rather larger spikelets.

This species has resemblance to *P. capillare* on one side and to *P. proliferum* on the other. From the first, it is distinguished by its more erect slender culms, never more than sparsely pubescent, smaller panicle, with erect-spreading stouter branches, and usually larger or thicker spikelets; from the second, by its smaller size, more erect culms, and smaller panicles, with shorter branches.

52. *P. proliferum* Lam. (Gray's Manual, 6th ed., p. 630.) Annual; culms usually thickish, often succulent, branching, geniculate at the decumbent or procumbent base, 1½ to 3 feet long, glabrous; leaves linear, 6 to 12 inches long, sheaths flattened, glabrous, ligule ciliate; panicles terminal and lateral, 4 to 12 inches long, the long, slender primary branches at length spreading and diffuse; spikelets 1 to 1½ lines long, pale green, sometimes purplish, appressed, short pediceled, lower glume broad, obtusish, about one-fourth as long as the spikelet; perfect flower a little shorter than the spikelet.—Damp places, Maine to Texas.

Var. *GENICULATUM* (*P. geniculatum* Ell.) Culms 3 to 6 feet high, succulent, sometimes nearly an inch thick at the base, bent and branching at the joints, leaves sometimes 2 feet long and 6 to 10 lines wide; sheaths much inflated when young, sometimes a little hairy at the base; panicle sometimes 2 feet long, very diffuse. A valuable grass.—Southern States to Texas.

53. *P. miliaceum* Linn. Sp. Plant, 86. Culms 2 to 4 feet high, erect, branched, pubescent; sheaths loose, striate, hirsutely pubescent; leaves flat, linear-lanceolate, 6 to 10 inches long, 4 to 8 lines wide, smoothish above, sparsely pubescent below; panicle oblong, nodding, 6 to 10 inches long, branches verticillate, erect-spreading (not diffuse), solitary or in pairs, angular, hispid, or scabrous; spikelets ovate, acuminate, glabrous, 2 lines long; lower glume broad, very acuminate, 5-nerved, about one-half as long as the spikelet; the third glume 7- to 9-nerved, a little longer than the oval, acute, biconvex, perfect flower.—Cultivated and rarely escaped from cultivation. Valuable for forage.

54. *P. verrucosum* Muhl. (Gray's Manual, 6th ed., p. 631.) Culms slender, 1 to 3 feet long, somewhat branching, smooth; leaves linear-lanceolate, 3 to 4 inches long, 2 to 3 lines wide, and with the sheaths glabrous; panicles mostly terminal, 6 to 10 inches long, diffusely-spreading, branches mostly single, capillary, rather few flowered; spikelets ¾ to 1 line long, obovate or oval, obtuse or abruptly acute; the outer glumes roughened with fine warts, the lower one about one-fourth as long as the spikelet; perfect flower acute, about equaling the spikelet.—New England to Florida and Mississippi.

55. *P. sparsiflorum* Vasey. (*P. angustifolium* Chapm. non Ell.: Chapm. Fl. S. States, p. 574.) Culms weak, slender, smooth, 1 to 2 feet long, diffusely branched from the base; leaves linear, 3 to 5 inches long, 1 to 2 lines wide; sheaths short; nodes thickened; panicles simple, terminal and lateral, 3 to 5 inches long, the few branches single, capillary, distant, 1 to 3 inches long, bearing each 2 to 6 spikelets, mostly in pairs at the end of the branchlets; spikelets oblong-obovate, acute, 1½ lines

long, the outer glumes papillose-hispid, the lower one minute, acutish.—South Carolina to Texas.

56. *P. anceps* Michx. (Gray's Manual, 6th ed., p. 631.) Culms flattened, erect, 2 to 3 feet high, less stout than in *P. agrostoides*, from strong creeping root-stocks; leaves rather broadly linear, a foot or more long, 4 to 5 lines wide, smooth or the lower ones with the sheaths pubescent; panicles contracted, lateral and terminal, 6 to 12 inches long, the branches from single to verticillate, rather distant, particularly below, generally very abundantly flowered; spikelets 1 to $1\frac{1}{2}$ lines long, ovate-lanceolate, pointed, the apex a little curved; lower glume about one-half as long as the spikelet; upper glume 5- to 7-nerved.

Var. PUBESCENS. Leaves and sheaths more or less pubescent; panicle and branches slender; spikelets ovate lanceolate, acute, little more than 1 line long.—Mobile, Ala. (Dr. Mohr).

Var. ANGUSTA. Lower sheaths villose; leaves very long and narrow, erect, rigid; spikelets narrowly lanceolate, acuminate, $1\frac{1}{2}$ lines long, the lower glume one-third as long as the spikelet.—Texas. (G. C. Nealley.)

Var. DENSIFLORUM. Leaves broad; panicle glomerate and interrupted, the branches densely flowered; spikelets lanceolate, $1\frac{1}{2}$ lines long.—Texas (J. F. Riggs).

57. *P. agrostoides* Spreng. (Gray's Manual, 6th ed., p. 631.) Culms flattened, erect, stout, 2 to 4 feet high, usually in thick clumps, glabrous, much branched above, the branches erect; leaves linear, 1 to 2 feet long, 3 to 4 lines wide, smooth as also the compressed sheaths; panicles terminal and lateral, 4 to 12 inches long, oblong, becoming pyramidal, very full, the lower branches 2 to 3 inches long, much subdivided to the base; spikelets racemose, very short pediceled, crowded and mostly one-sided on the branches, ovate-oblong to lanceolate, $\frac{3}{4}$ to $1\frac{1}{2}$ lines long; lower glumes acute or acutish, half as long as the spikelet; second and third glumes 5-nerved, half longer than the perfect flower, the latter slightly bearded at the apex.—In wet ground.

Varies in the size and form of the spikelets, which in the Western form seldom exceed a line long; there is an Eastern form in which the spikelets are lanceolate, about $1\frac{1}{2}$ lines long, and the perfect flower small and conspicuously stalked.

58. *P. bulbosum* H. B. K. Nov. Gen. I. p. 99. Rhizoma creeping, thick, bulbous; culms 4 to 5 feet high, smooth, stout, with long internodes; leaves long and narrow (1 to 2 feet by 2 to 4 lines), smooth, or the lower ciliate below; panicle about 1 foot long, spreading, copious, pale green; branches scattered and verticillate, the lower 4 to 5 inches long, much subdivided nearly to the base, branchlets slender and numerous flowered; spikelets sometimes in pairs or racemose, $1\frac{1}{2}$ lines long, smooth, obtuse or acutish, not acuminate; lower glume half or rather more than half as long as the spikelet, broad, three-nerved, acutish; second and third glumes equal, 5-nerved, the third with a narrow palet; perfect flower as long as the spikelet, oblong, lanceolate, abruptly acute, the point sometimes a little roughened.—Texas, New Mexico and Arizona.

Var. MINOR (*P. maximum*, var. *bulbosum* Munro). A smaller form, about 2 feet high, with the panicle much reduced.—In same region.

Probably *P. avenaceum* Kth. is not different.

59. *P. maximum* Jacq. Coll. I. p. 76. (*P. jumentorum* Pers.) Culms erect, 3 to 5 feet high, glabrous; nodes softly pubescent; leaves linear, 1 to $1\frac{1}{2}$ feet long, 9 to 12 lines wide, rather rigid, margin scabrous; sheaths smooth; panicle $1\frac{1}{2}$ feet long, much branched, hispid or scabrous, the branches verticillate, long and contracted, racemose, scabrous; spikelets mostly short-pediceled, $1\frac{1}{2}$ lines long, ovate, smooth, acute; lower glumes about one-third as long as the spikelets; second glume shorter than the spikelet; perfect flower acute.—Introduced and cultivated in the South.

60. *P. amarum* Ell. (Gray's Manual, 6th ed., p. 631.) Culms 2 to 3 feet high, from a stout running root stock, thick, columnar, nearly one-half inch in diameter; leaves nearly flat, almost coriaceous, glaucous, 1 to $1\frac{1}{2}$ feet long, 4 to 6 lines wide, tapering

to a long, slender point; sheaths glabrous, striate; panicle 1 foot or more in length, appressed, or becoming somewhat spreading, the lower branches verticillate, 6 inches long, subdivided nearly to the base, narrowly paniculate; spikelets rather racemose, ovate, $2\frac{1}{4}$ lines long, acute; glumes thick, the lower glume about two-thirds the length of spikelet, acute; second glume the longest, 7-nerved, acuminate; third glume rather shorter and obtusish; perfect flower linear-oblong, obtuse, one-fourth shorter than the spikelet.—Grows among the sand hills on the seashore. South Carolina to Florida.

Var. MINOR Vasey & Scribn. Leaves involute; panicle shorter, narrower, distantly branched, comparatively few-flowered, the branches rather glomerate and unequal; spikelets rather large ($2\frac{1}{4}$ to 3 lines); the lower glumes longer, or nearly as long as the spikelet.—Fort Monroe, Va., and northward, near the coast.

61. **P. virgatum** Linn. (Gray's Manual, 6th ed., p. 631.) Stout, erect, unbranched, 3 to 5 feet high, from strong, creeping root-stocks; leaves flat, very long (1 foot or more), 3 to 4 lines wide, smooth; panicle compound, 6 to 18 inches long; branches single to verticillate, generally very numerous and becoming diffuse, spreading or drooping; spikelets on rough pedicels, $1\frac{1}{2}$ to 2 lines long, ovate to ovate-lanceolate, pointed, smooth; lower glume more than half the length of the spikelet (sometimes two-thirds), 5-nerved; second 5-nerved; third 5- to 7-nerved, acute to acuminate, larger than the perfect flower; sterile flower with 3 stamens; widely diffused and quite variable.—Maine to Florida, and throughout the interior of the country. The Atlantic form has spikelets about $1\frac{1}{2}$ lines long. The Western form has spikelets about 2 lines long, the glumes acuminate. A form on the Atlantic coast has the panicle quite close and rather oblong, and may be called **var. CONFERTA**; another form (**var. ELONGATA**) has a very long and narrow panicle, with spikelets even $2\frac{1}{4}$ lines long.

62. **P. Havardii** Vasey. Bull. Torr. Club, XIV. p. 95. (*P. virgatum* var. *macrospermum*, Vasey.) With the habit of Western forms of *P. virgatum*, but much stouter; culms 5 to 6 feet high, with rigid, involute, long-pointed, glaucous leaves, ligule a ring of short hairs; panicle $1\frac{1}{2}$ feet long, diffuse, the branches less abundantly flowered; spikelets 3 lines long; lowest glume one-half as long as the spikelet, prominently 5- to 7-nerved; second glume 9-nerved, ovate, acuminate; third glume 5- to 7-nerved, its thick palea nearly as long; fertile flower about one-fourth shorter than the spikelet.—Guadalupe Mountains, Texas (*Dr. Havard, G. C. Nealley*).

§ 8. FRUTESCENTES Vasey.

63. **P. divaricatum** Linn. (Chapm. Fl. S. States, p. 575.) Shrubby, smooth; culms 6 to 8 feet high with short and spreading branches; leaves lanceolate, acuminate, 2 to 4 inches long, 2 to 6 lines wide, deciduous from the persistent sheaths; panicles terminating the branches, 1 to 3 inches long, nearly simple or branched, the branches rather distant and diverging, half to 1 inch long, rather sparsely subdivided; spikelets smooth, 2 lines long, tumid, obovate, nodding, on pedicels as long or longer; lower glume triangular-ovate, one-third as long as the spikelet; second and third glumes as long as the spikelet, very broad, 9- to 11-nerved; apex of the fertile flower downy-tipped.—Southern Florida.

§ 9. VILLIFLORA Vasey.

64. **P. Urvilleanum** Kth. (Bot. Cal. II. p. 259.) Culms $1\frac{1}{2}$ to 2 feet high, from a strong running root-stock, the whole plant densely soft-hairy; near the base short-jointed and covered with weather-worn leaves or sheaths; leaves rigid, 12 to 18 inches long, 3 lines wide at the base, becoming convolute, and ending in a long, setaceous point, the upper ones exceeding the panicle, the latter 6 to 10 inches long, open, but rather contracted, the branches semiverticillate or scattered, the shorter ones flowering to the base; the longer ones (3 to 4 inches long) racemosely subdivided

and flower bearing toward the ends or throughout; spikelets 2½ to 3 lines long, ovate, acute; the empty glumes silky-villous; lower glume 7-nerved, two-thirds as long as the 15-nerved second glume; third glume rather shorter, 11- to 13-nerved; perfect flower oblong, glabrous, except on the margins, these long-ciliate.—In sand, southern California to Arizona.

§ 10. ECHINOCHLOA Benth.

65. *P. colonum* Linn. (*P. Walteri* Ell: Chapm. Fl. S. S. p. 577.) Culms 1 to 2 feet high, erect or decumbent at the base; leaves flat, glabrous; panicle 2 to 4 inches long, of several simple one-sided, distant, usually erect branches or sessile spikes, one-half to three-fourths inch long. Spikelets about 1 line long, ovoid, densely crowded in about 4 rows; outer glumes coarsely pubescent, or rarely glabrous, the first rarely half as long as the second and third, these nearly equal, often ending in short points, but not awned.—Introduced in the South, very common from Texas to California.

66. *P. Crus-galli* Linn. (Gray's Manual, 6th ed., p. 633.) Usually annual, culms coarse, decumbent, usually branching below, 2 to 4 feet high; leaves long, rough; sheaths rough, hispid or smooth; panicle dense, of numerous simple sessile spikes 1 to 2 inches long; spikelets crowded and clustered, outer glumes strongly hispid, acute or sometimes with long hispid awns. Introduced and very common. In the South appearing to be native. Very variable in size and appearance.

Var. *HIRSUTUM*, Torr.—Sheaths hirsute-pubescent or smooth; glumes long-awned.

Var. *MUTICUM*, glumes without awns.

§ 11. HYMENACHNE Benth.

67. *P. gibbum* Ell. (Chapm. Fl. S. States, p. 573.) Culms branched, decumbent; 2 to 3 feet high; leaves linear-lanceolate, acuminate to a long point, 6 to 12 inches long, one-half to three-fourths inch wide; panicle 5 to 6 inches long, confined; the branches appressed, 1 to 2 inches long; spikelets loosely crowded on pedicels about their own length, about 1½ lines long, oblong, obtuse; the lower glume 5-nerved one-fourth as long as the second, the latter strongly 11-nerved, gibbous at the base; sterile flower with 3 stamens; fertile flower smooth, half as long as the spikelet.—Swamps South Carolina to Florida and Mississippi.

OPLISMENUS Beauv.

Spikelets in small, sessile, distant clusters of the simple panicle, the spikelets one-sided in the clusters, the lower and the second empty glumes always (and the third frequently) awned, the lower long-awned.

1. *O. setarius* R. & S. (*Panicum hirtellum* Linn: Chapm. Fl. S. States, 577.) Culms weak, decumbent and rooting below, 1 to 2 feet long; leaves ovate-lanceolate, 1 to 1½ inches long; panicle racemose, 3 to 4 inches long, consisting of 5 to 9 small sessile clusters of spikelets, each of 3 to 5; lower empty glume with an awn 3 to 4 times as long as the spikelet, second a little shorter, the third less than a line long.—Florida to Texas, coastwise.

SETARIA Beauv.

Spikelets in a cylindrical spike-like or sometimes interrupted panicle. Below the articulation of the spikelets are several, usually many, bristles, which are supposed to be abortive branchlets and persistent after the fall of the spikelets. The spikelets contain one terminal fertile flower (its glume and palea indurated and striate), and usually a lower

male or sterile one. Empty glumes 3, the lower one small, the second usually shorter than the third, the flowering glume indurated; the second flower when present consisting of a thin palet and sometimes 4 stamens.

• *Bristles barbed upward.*

1. *Setaria viridis* Beauv. (GREEN FOXTAIL, PIGEON GRASS.) (Gray's Manual, 6th ed., p. 634.) Spikes 2 to 4 inches long, strictly erect, cylindrical, dense, tawny yellow (except in varieties); flowering glume transversely wrinkled, bristles 6 to 10 in cluster, much longer than the spikelets.—Very common in cultivated fields, etc.

2. *S. glauca* Beauv. (FOXTAIL, PIGEON GRASS.) (Gray's Manual, 6th ed., p. 634.) Spikes 2 to 4 inches long, strictly erect, cylindrical, dense, tawny yellow (except in varieties); flowering glume transversely wrinkled; bristles 6 to 10 in a cluster much longer than the spikelets.—Extensively naturalized.

There is a smooth, perennial form in the Southern and Southwestern States, called by Dr. Chapman var. *LÆVIGATA*. There is also a form in the South with purplish bristles.

3. *S. imberbis* R. & S. Syst. II. 891. Spikes very narrow (2 to 3 lines wide), 2 to 3 inches long, not so dense as in *S. glauca*, and the bristles (yellow to purple) much shorter, as long or twice as long as the spikelets; leaves narrow, erect.—Texas and southwestward.

4. *S. corrugata* Schultes. (Chapm. Flora S. States, p. 578.) (*Panicum corrugatum* Ell.) Culms 2 to 4 feet high, often branched below; leaves narrow, 6 to 12 inches long; spike cylindrical or tapering to the apex, dense, erect, or bending, 3 to 6 inches long; branches of panicle 6- to 10-flowered; fertile flower, strongly convex, transversely rugose, smaller than in *S. glauca*; bristles much exceeding the spikelets; purplish.—Dr. Chapman says, "Dry soil, Florida and Georgia."

5. *S. Italica* Kth. (Gray's Manual, 6th ed., p. 634.) Culms 1½ to 3 feet high; leaves wide; spikes oblong to cylindrical, dense, more or less compound, thick, nodding; bristles yellowish or purplish, longer or shorter than the spikelets.

Exceedingly variable under cultivation. Cultivated as millet or Hungarian grass.—A native of Europe, rarely spontaneous.

6. *S. composita* Kth. (Chapm. Fl. S. States, p. 578.) Culms smooth, 2 to 4 feet long; leaves 1 foot or more long, the fringed sheaths rough, hairy at the throat; panicle 6 to 12 inches long, loose, compound, tapering to the apex, the lower clusters spreading or scattered, ½ to 1 inch long; perfect flower, acute, with faint transverse lines. Much like *S. setosa*.—Dry, sandy soil, Florida, Apalachicola to Key West.

7. *S. macrostachya* H. B. K. † perhaps *S. magna* Griseb. (Kunth Enum. Plant, I, p. 154.) Culms 4 to 8 feet high, thick, smooth; leaves ½ to 1 inch wide, a foot or more long, very rough; spike 1 foot to 18 inches long, nearly cylindrical, tapering at the apex, very dense, the lower clusters scattered; fertile flower smooth, smaller than in the preceding bristles 1 or 2 to each spikelet, much longer than the clusters.—Swamps along the coast North Carolina to Florida and west to Mississippi. Confused by Dr. Chapman with *S. Italica*.

8. *S. setosa* Beauv. Agrost, p. 178. (*Panicum setosum* Trin. †) Culms 2 to 4 feet high, apparently annual, sometimes branched below, smooth; leaves often 1 foot long, three-fourths inch wide, sometimes scabrous; ligule ciliate, lower sheaths shorter than the internodes; panicle 6 to 10 inches long, not cylindrical, tapering to the apex erect or somewhat nodding, loose or somewhat dense, compressed, the erect, spreading branches ½ to 1 inch long; lower glume one-fourth, second glume three-fourths as long as the third, perfect flower acute, transversely rugose.—Texas, New Mexico, Arizona and Mexico. Resembles No. 6, but with smaller spikelets. Seems to pass gradually into the next species.

9. *S. caudata* R. & S. Syst. II. p. 495. Culms 2 to 3 feet high, apparently perennial, much branched, sometimes decumbent and rooting below; panicle cyl-

indrical or nearly so, dense or sometimes interrupted, 3 to 6 inches long, 3 to 4 lines thick; leaves narrow, 1 to 3 lines wide; spikelets as in the preceding species, bristles usually much shorter.—Texas to Arizona and Mexico.

10. *S. pauciseta* Vasey. This species differs from the preceding in the smaller and more slender culms, apparently annual, the much looser, shorter, few flowered spikes, smaller, shorter leaves, and smaller spikelets, and corresponds better to the figure of *S. caudata* of Pl. 96, Trin.—Texas (No. 2096 C. Wright, Nealley), also Mexico (No. 381 Pringle).

**Bristles downwardly barbed.

11. *S. verticillata* Beauv. (Gray's Manual, 6th ed., p. 634.) Spike cylindrical, dense, 2 to 3 inches long, the clusters apparently whorled; bristles short, adhesive.—In cultivated ground, adventitious from Europe.

CENCHRUS Linn.

Spikelets as in *Panicum*, awnless, but inclosed 1 to 5 together in a globular and bristly involucre, which becomes coriaceous, and forms a hard, rigid, and deciduous bur; the involucre sessile in a terminal spike.

1. *C. tribuloides* Linn. (Gray's Manual, 6th ed., p. 634.) Annual; culms ascending, branching, 6 to 12 inches high; leaves flat; spike oblong, of 8 to 20 spherical heads; involucre more or less downy, armed above with stout, compressed, broadly subulate, erect, or spreading spines; bristles none, or usually several below the spines, spikelets 2- to 3-flowered.—Sandy soil, extensively distributed.

2. *C. echinatus* Linn. (Chapm. Fl. S. States, p. 578.) Culms erect or ascending, 1 to 2 feet high; leaves flat; spike cylindrical, 4 to 6 inches long, of 20 to 25 roundish involucre, downy, spiny above, and with a row of rigid barbed bristles above the base; 3- to 5-flowered; involucre purplish.—Field and waste grounds, North Carolina to Mexico.

3. *C. incertus* M. A. Curtis. (Chapm. Fl. S. States Suppl., p. 667.) Smooth, strict, nearly simple, erect or ascending, 2 to 3 feet long; leaves linear, folded; the lower sheaths longer than the internodes; spikes cylindrical, many-flowered, involucre naked and acute at the base, the 10 or 11 stout spines ciliate; spikelets geminate, smooth; sterile flower triandrous. (*C. strictus* Chapm.)—Sandy coast Florida to North Carolina. Description from Dr. Chapman's Southern Flora.

4. *C. myosuroides* H. B. K. (Chapm. Fl. S. States, Suppl. p. 667.) (*Panicum cenchroides* Ell.) Culms 4 to 8 feet high, erect; leaves long, rigid, flat, or becoming convolute toward the point; spikes cylindrical, 3 to 6 inches long, densely many-flowered; involucre small, 1-flowered, armed with 20 or more slender (not compressed) spines, as long as the spikelet.—South Florida, Georgia to Texas and westward.

PENNISETUM Pers.

Spikelets with one terminal perfect flower, and a second male or neuter one below it, solitary, or two or three together, closely surrounded by an involucre of usually numerous simple or plumose bristles which disarticulate from the pedicel with the spikelets. The spikelets crowded in a spike-like panicle, or on pedunculated spike-like branches. The lower empty glume is small, the second and third larger and longer than the perfect flower, the glume of which is thicker and more rigid; sterile flower consisting of a membranaceous palet.

1. *P. setosum* Rich. (Kth. Enum. Pl. I. p. 161.) Culm 4 feet high; leaves linear-acuminate, glabrous; spike cylindrical, dense, 6 to 7 inches long, involu-

eres sessile several of the bristles more than twice as long as the single spikelet; lower empty glume small (one-sixth as long as spikelet), second and third equaling the perfect flower, the latter linear-lanceolate.—Lastero Bay, Florida (*A. P. Garber*, 1878).

P. typhoideum Rich. (CAT-TAIL MILLET.) (*Penicillaria* Willd.) This species is frequently cultivated in the South for fodder.

STENOTAPHRUM Trin.

Spikelets 2-flowered, the terminal one perfect and fertile, the lower one male or imperfect, the lowest empty glume short and obtuse, the second the largest, the two flowering glumes rather smaller, palets of both flowers similar in texture. The spikelets embedded, singly or two or three together, in alternate excavations of the broad flattened rhachis of a spike-like panicle.

1. **S. Americanum** Schrank. (Chapm. Fl. S. States, p. 579.) (*Rottboellia dimidiata* Ell.) Culms flattened, erect, 6 to 12 inches high, from creeping root-stocks, smooth; leaves 2 to 6 inches long, obtuse, flat or folded, contracted at the base; spikes 2 to 5 inches long, lateral and terminal, pedunculate; fertile spike sessile; the upper glume 7-nerved, three times as long as the lower one; palet of the sterile flower coriaceous, like that of the perfect one. Along the coast in most tropical countries. South Carolina to Florida and west to Texas.

HYDROCHLOA Beauv.

Spikelets 1-flowered, in small, simple, monœcious spikes ($\frac{1}{2}$ to 1 inch long), mostly included in the sheaths of the upper leaves, 3 to 5 male spikelets in the terminal spikes, and a few female spikelets in the axillary spikes; stamens 6. Stigmas elongated.

1. **Hydrochloa Caroliniensis** Beauv. (Chapm. Fl. S. States, p. 549.) Spikelets 1-flowered, consisting of two nearly equal hyaline glumes, or one glume and a palet, as they are sometimes considered; leaves short, oblong-linear.—North Carolina to Florida and Mississippi.

LUZIOLA Juss.

Flowers monœcious, in separate spreading panicles, the staminate spikelets larger than the fertile ones. Spikelets 1-flowered, awnless, the male spikelets terminal on each branch. Stamens 5 to 11, anthers linear. Styles 2, short; flowering glume with many prominent nerves. Creeping, narrow-leaved aquatic or marsh grasses.

1. **Luziola Alabamensis** Chapm. Fl. S. States, p. 584. Culms 4 to 6 inches high, simple, rooting at the lower joints; leaves few, the lower much exceeding the culm, the elongated purple sheath inclosing the base of the panicle, the latter few flowered, 1 to 3 inches long, the male and female on separate culms; glume and palet of male spikelets lanceolate, 7-nerved; those of the pistillate spikelets ovate-lanceolate, 11- to 13-nerved; grain smooth.—Brooklyn, Ala., also Mobile, Ala. (*Dr. Mohr*).

2. **L. Peruviana** Juss. (Persoon's Synopsis, II. p. 575). Culms creeping and rooting at the lower joints; flowering culms erect, 3 to 10 inches high; radical leaves often 12 inches long, narrow; male flowers much larger than the female ones, white; female panicles spreading, 1 to 2 inches long. In low ditches and low grassy lands.—Louisiana (*A. B. Langlois*). Mr. Langlois says it is attractive all summer by its fine white male spikes.

ZIZANIA Linn.

A reed-like aquatic grass, 6 to 10 feet high, with broad leaves 2 to 3 feet long; panicles often 2 feet long, the long branches somewhat appressed above, spreading below, the upper ones pistillate, the lower male; the female spikelets almost subulate, long-awned, the male spikelets awnless. Fruit linear, slender, $\frac{1}{2}$ inch long.

1. *Zizania aquatica* Linn. (WILD RICE, INDIAN RICE, WATER OATS.) (Gray's Manual, 6th ed., p. 635.) Annual, culms 5 to 10 feet high, leaves linear-lanceolate; panicle ample, pyramidal.--Swampy borders of streams and in the shallow muddy borders of lakes. Very widely diffused, New England to Texas and Florida and northwestward to Minnesota.

ZIZANIOPSIS Doell. & Asch.

Tall, aquatic grasses with the habit of *ZIZANIA*, the perfect spikelets terminating the branches of the spreading panicle, the male spikelets at the base of each branch. Fruit a globular nut, with a hard, shining, easily separable pericarp. Stigmas united.

1. *Z. miliacea* Doell. & Asch. Culms stout, 4 to 8 feet high; leaves long (2 feet), 1 inch wide or more; panicle 1 to 2 feet long, the branches at first oppressed, becoming spreading. In ditches and wet grounds.—Southern States to Texas.

ORYZA Linn.

Spikelets* elongated, much compressed laterally, empty glumes of two small scales or bristles, and underneath these, two more minute rudimentary empty glumes. Flowering glume conduplicate and keeled, usually awned; palea narrow, 1-nerved. Stamens 6. Fruit long-obtuse, closely enveloped by the fruiting glume, and compressed laterally, with two lateral furrows. Embryo short, curved.

1. *O. sativa* Linn. Sp. Pl. p. 465. (CULTIVATED RICE). Panicles contracted and rough, flowering glumes prominently 5-nerved.

LEERSIA Swartz.

Spikelets 1-flowered, flat, articulated on short pedicels along the slender branches of a terminal panicle. Glumes 2, strongly compressed or conduplicate, awnless, bristly ciliate on the keels, the lower one much the larger. No palea. Stamens 1 to 6. Stigmas 2; styles short, distinct. Perennial grasses, the leaves and sheaths usually rough with minute prickles or bristly hairs.

1. *L. hexandra* Swartz. (Chapm. Fl. S. States, p. 549.) Culms 2 to 6 feet high, slender, often branching below; leaves 4 to 6 inches long, rather rigid, variable in width, sheaths scabrous; panicle exserted, erect, contracted, 3 to 5 inches long; spikelets 2 lines long, lanceolate to oblong, acute, margins short, fringed, hispid on the keel; stamens 6, styles 2, distinct.—Low grounds near the coast.

2. *L. oryzoides* Swartz. (WHITE GRASS, CUT-GRASS). (Gray's Manual, 6th ed., p. 635.) Culms erect or decumbent, rather stout, branching or simple, 3 to 4 feet high, leaves light green, very rough; panicle rather large and diffusely branched, 6 to 18 inches long; spikelets about 2 lines long, oval or oblong, hispid-ciliate on the keel, very short-pointed, short-pedicelled; stamens 3.—Common in wet places.

* This foreign species is introduced because so extensively cultivated in the Southern States.

3. *L. Virginica* Willd. (WHITE GRASS). (Gray's Manual, 6th ed., p. 635.) Culms slender, decumbent, branching below; panicle simple, narrow, 3 to 6 inches long, branches alternate, slender, the lower branches sparingly divided, naked below; spikelets appressed, oblong, $1\frac{1}{2}$ lines long, short-pointed, smooth or sparingly ciliate on margins; stamens 2.—Wet or moist woods, common.

4. *L. monandra*, Swartz. (Chapm. Fl. S. States, Suppl., p. 661). Culms slender, $1\frac{1}{2}$ to 2 feet high; leaves small, sheaths rough; panicle small, simple, becoming spreading, branches capillary, alternate, distant, flowering near the extremity; spikelets pale, semiovate, obtusish, less than a line long, smooth; stamen 1.—In moist woods, Texas (*G. C. Nealley*).

PHALARIS Linn.

Spikelets crowded in a clustered or spike-like panicle, 1-flowered; glumes 5, the outer large, the inner pair smaller and imperfect or scale-like, one on each side the terminal or perfect flower, the fifth being the flowering glume of the perfect flower. The glume-like palea one nerve. Outer glumes 3-nerved, compressed, keeled, boat-shaped; second pair linear; perfect flower shorter than spikelet, the glume becoming coriaceous or cartilaginous. Grain smooth and shining.

* *Glumes not winged on the back or slightly winged.*

1. *P. arundinacea* Linn. (REED CANARY GRASS). (Gray's Manual, 6th ed., p. 639.) Culms stout, 2 to 4 feet high; leaves flat, about one-half inch wide; panicle 3 to 5 inches long, narrow, the short branches spreading during anthesis, becoming appressed; spikelets 2 lines long; outer glumes acute; the imperfect pair one-half as long as the perfect flower.—Widespread in northern or mountainous districts.

2. *P. Lemmonii* Vasey. Culms rather slender, $1\frac{1}{2}$ to 3 feet high; leaves narrow, acuminate, ligule conspicuous, 3 lines long; panicle spike-like, 2 to 3 inches long, nearly cylindrical, dense; outer glumes 2 to $2\frac{1}{2}$ lines long, acute to acuminate; second pair very short (about $\frac{1}{2}$ line) somewhat unequal, with short pedicels; flowering glume lanceolate, acuminate, little shorter than the outer ones, pubescent; palea nearly as thick as its glume and a little shorter.—Santa Cruz, California (*J. G. Lemmon, Dr. Anderson*).

3. *P. amethystina* Trin. (Bot. Cal. II. p. 265.) Culm stout, tufted, 2 to 8 feet high, from a perennial root; leaves broad, the sheaths often purplish; panicle spike-like, oblong, 1 to 2 inches long, dense, usually purplish; spikelets 3 to $3\frac{1}{2}$ lines long; outer glumes narrowly winged, straight, acutish; inner pair of glumes hairy, more than half as long as the perfect flower, which is 2 lines long or more.—California to Oregon.

* * *Glumes decidedly winged on the back.*

4. *P. intermedia* Bosc. (Bot. Cal. II. p. 264.) (*P. Americana* Ell.) Culms variable, stout or slender, $1\frac{1}{2}$ to 4 feet high, smooth; leaves short, often glaucous; sheaths more or less inflated; spike-like panicle 1 to 4 inches long, ovoid to cylindrical; spikelets $2\frac{1}{2}$ lines long; outer glumes strongly winged on the keel, acute; second pair of glumes linear, hairy, about half the length of the perfect one, the latter long-pointed, hairy, and one-third shorter than the outer glumes.—Texas to California.

Var. MICROSTACHYA (*P. microstachya* DC.) Culms slender, 6 to 18 inches high; leaves short, the uppermost inflated; spike-like panicle $\frac{1}{2}$ to 1 inch long, oval; outer glumes lanceolate, slender-pointed, broadly-keeled, twice as long as the hairy, ovate flower.—Florida to Texas.

5. *P. angusta* Nees. (Fl. Brasil. II. p. 391.) (*P. intermedia*, var. *angusta* Chapm.) Culms stout, 2 to 3 feet high; panicle cylindrical, dense, 3 to 6 inches long, nar-

row; spikelets 2 lines long; outer glumes winged on the keel, abruptly acute, serrulate on the keel, second pair linear, slightly unequal, one-third as long as the perfect flower, the latter one-third shorter than the outer glumes, and not long-pointed as in *P. intermedia*.—Louisiana, Texas to California.

6. *P. Canariensis* Linn. (CANARY GRASS.) (Gray's Manual, 6th ed., p. 639.) Culms 1 to 3 feet high; leaves flat, the upper sheaths much inflated; panicle 1 to 1½ inches long, ovoid, very dense; outer glumes broad, with a conspicuously winged keel, white on the margin, with a distinct green line within; second pair of glumes small, lanceolate, smooth; perfect flower silky-hairy.—Introduced and escaped from cultivation. The seed is a common and favorite bird seed.

ANTHOXANTHUM Linn.

Panicle spike-like, narrow; spikelets apparently 3-flowered, only the terminal one perfect, outer empty glumes unequal, herbaceous; those of the 2 imperfect flowers clothed with brown hairs, awned from the lobed apex; flowering glume and 3-nerved palet short membranaceous. Stamens 2.

1. *A. odoratum* Linn. (SWEET VERNAL GRASS.) (Gray's Manual, 6th ed., p. 630.) Culms erect, slender, 1 to 2 feet high; leaves flat, hairy; sheaths often hairy; ligule short, obtuse; panicle 1 to 4 inches long, interrupted below; spikelets 3 to 4 lines long; inner pair of sterile glumes 2-lobed, long-awned; perfect flower equal to the inner glumes.—Introduced from Europe. Very fragrant.

HIEROCHLOE Gmelin.

Panicle open and spreading; spikelets 3-flowered, compressed, the lower two staminate only, the upper or terminal one perfect, outer empty glumes equal, scarious, 3-nerved; flowering glumes much thicker, chartaceous, 5-nerved, those of the male flowers sometimes short-awned; that of the perfect flower awnless; male flowers with 3 stamens, perfect flowers with 2 stamens; palet of the male flowers 2-nerved, that of the perfect flower 1-nerved.

The dried plants have a vanilla-like odor, on which account they were formerly strewn before church doors on holidays.

H. macrophylla Thurb. (Bot. Cal. II. p. 265.) Culms 2 to 3 feet high, tufted, leaves 12 to 18 inches long, 4 to 8 lines broad, scabrous above and on the margins; panicle 4 to 6 inches long, the branches somewhat distant, in pairs; spikelets 2½ lines long; glumes obtuse, those of the male flowers fringed on the margin, notched at the broad apex, and often with a slight awn; glume of the perfect flower smooth and shiny below.—California (*Bolander*) and Oregon (*Howell*).

2. *H. borealis* R. & S. (VANILLA GRASS.) (Gray's Manual, 6th ed., p. 639.) Culms 1 to 2 feet high; from a creeping root-stock; leaves (all but the lower) with short blades and long sheaths; panicle pyramidal, 2 to 4 inches long, branched in pairs, flowering above the middle; outer glumes acuminate and longer than the flowers; glumes of the male flowers acute, and sometimes mucronate or bristle-pointed.—Moist ground chiefly northward and northwestward; New England to Wisconsin, on the mountains and northward to Alaska.

3. *H. alpina* R. & S. (Gray's Manual, 6th ed., p. 639.) Culms 10 to 18 inches high; lower leaves very narrow; panicle 1½ to 2 inches long, the branches few flowered; outer glumes 3 lines long, obtuse; glumes of one of the male flowers long awned below the middle, that of the other short awned from near the apex.—Alpine mountain tops, New York, New England, and northward.

4. *H. pauciflora* R. Br. (*Chloris* Melville, p. 35.) Root creeping, culms erect,

leafy below, radical leaves subulate, margin involute, those of the culm shorter than the loose sheaths; raceme erect, simple; spikelets ovate; scarious glumes ovate, very smooth, the lower one smaller; the flowering glume of the upper male flower emarginate-setigerous, the seta very short; terminal flower awnless.—Melville Island (*Parry*).

ARISTIDA Linn.

Spikelets 1-flowered, in a spicate, or an open, branching panicle, generally on filiform pedicels; empty glumes mostly unequal, often bristle-pointed; flowering glume narrow, rolled around the flower, and terminating with a trifid awn, rarely the lateral branches of the awn wanting. Palea small, thin, enclosed in the flowering glume.

§ 1. *Upper portion of flowering glume not articulated to lower portion.*

* *Panicle close and spike like, awns unequal, lateral ones minute, erect, the long middle awn horizontal or turned back.*

1. *A. ramosissima* Engelm. (Gray's Manual, 6th ed., p. 640.) Culms much branched, 1 to 2 feet high, spikes terminating the main and lateral branches; branches of the panicle 3 to 4 inches long, mostly in twos, erect; spikelets about 1 inch long, without the awn; lower glume 6 to 8 lines long, 5-nerved; upper one 8 to 10 lines long, 3-nerved, toothed, and slightly awned at apex; middle awn nearly an inch long, becoming strongly hooked-recurved; lateral awns varying from 1 to 2 lines long, to almost deficient.—Illinois, Missouri and Kentucky.

2. *A. basiramea* Engelm. (Gray's Manual, 6th ed., p. 640.) Culms tufted, much branched, 1 foot high; panicles 3 to 4 inches long, the branches erect-appressed, in pairs below, longer pediceled than in the preceding species; lower glume about 6 and upper about 8 lines long; middle awn 6 to 9 lines long, about twice coiled and horizontal, lateral awns 3 to 6 lines long, very slender and erect.—Missouri, Wisconsin, Nebraska and Minnesota.

3. *A. dichotoma* Michx. (Gray's Manual, 6th ed., p. 640.) Culms 6 to 18 inches high, much branched, the branches rather long, panicle 1 to 3 inches long, strict, branches of panicle in twos below, few flowered; glumes slightly unequal, about 3 to 4 lines long, little longer than flowering glume; middle awn once or twice coiled, 3 to 4 lines long, and reflexed; lateral awns one-half to 1 line long.—Throughout the country east of the Missouri River.

** *Awns nearly equal.*

4. *A. simplicifolia* Chapm. Fl. S. States, Suppl. p. 662. Culms slender, about 2 feet high, simple or sparingly branched, leaves flat; racemes 6 to 9 inches long, loosely flowered, 1 or 2 at each node; glumes nearly equal, awn-pointed, rough on the keel, longer than the flowering glume, middle awn circular, recurved near the base, thick and scabrous, about 8 lines long, lateral awns more slender, horizontal, 6 lines long.—Florida (*Chapman*) and Alabama (*Dr. Mohr*).

Var. *TEXANA*. Spikelets smaller, lateral awns 1 to 2 lines long.—Texas.

5. *A. gyrans* Chapm. Fl. S. States, Suppl., p. 662. Culms slender, 1½ to 2 feet high, simple; leaves convolute-filiform; panicle simple, 6 inches long, the few simple branches appressed; lower glume truncate, short awned, as long as the flowering glume, the upper a third longer, attenuate; flowering glume long stipitate, the awns nearly equal, curved, twisted together at the base.—Florida and Cuba (No. 3430 *Wright*).

6. *A. gracilis* Ell. Bot. S. Car. i. p. 152. (Gray's Manual, 6th ed., p. 640.) Culms slender, 1 to 2 feet high, simple or much branched, panicle about 6 inches long, spike-like, branches few flowered, almost sessile; glumes nearly equal, 3 to 4 lines long; middle awn 3 to 6 inches long, lateral ones from 1 to 3 or more inches long; the awns very variable in length.—Widely diffused, Massachusetts to Texas.

7. **A. Nealleyi**. (*A. stricta* var. *Nealleyi*, Contr. U. S. Herb. 1. p. 55.) Perennial, culms slender, erect, $1\frac{1}{2}$ to 2 feet long, leaves setaceous involute, 3 to 4 inches long, 3 to 4 on the culm, naked above; panicle erect, strict, about 4 inches long, few flowered; glumes nearly equal, $3\frac{1}{2}$ to 4 lines long; flowering glume about 6 lines long, the neck twisted 2 or 3 rounds; awns nearly equal, slender, erect-spreading, 6 lines long.—Texas, Colorado City to Valverde County (*Nealley*).

8. **A. stricta** Michx. (Gray's Manual, 6th ed., p. 640.) Culms 2 to 3 feet high, erect, rigid, simple, densely tufted from a perennial root; leaves involute-setaceous, rigid, more or less hairy at the base; panicle spike-like, erect, narrow, rather dense, about 1 foot long; the upper glumes 5 to 6 lines long, rather longer than the lower, both awn pointed; flowering glume 4 lines long, with a short acute stipe; awns nearly equal, 5 to 6 lines long, or the middle one one-third longer, all recurved when mature.—In pine barrens, Virginia to Mississippi.

Var. **CONDENSATA**. (*Aristida condensata* Chapm.) Culms stout, simple, 2 or 3 feet high; leaves long, flat below, becoming involute; panicle branches rather longer, flowering glume 3 lines long.—Florida (*Dr. Chapman*).

9. **A. spiciformis** Ell. Bot. S. Car. 1. p. 141. Culms 1 to 2 feet high, simple, rigid, erect; leaves convolute, rigid, the radical ones more than a foot long, the cauline 6 to 10 inches; panicle spike-like, 4 to 8 inches long, oblong or cylindrical, densely flowered, branches fascicled, crowded; empty glumes unequal, each awn-pointed, and including the awns, 7 to 10 lines long, the body very unequal, the lower 2, the upper 4 or 5 lines long; floral glume very slender, linear, nearly 1 inch long to the division; awns nearly equal, widely spreading, about 1 inch long.—South Carolina to Florida.

10. **A. palustris** Vasey. (*A. virgata* var. (?) *palustris* Chapm. Fl. S. States, p. 555.) Perennial, tufted, culms 3 to 5 feet high, rigid, erect; leaves very long, 1 to 2 feet, sometimes involute, flat below; panicle $1\frac{1}{2}$ to 2 feet long, narrow, spike-like, branches appressed, the lower 2 to 3 inches long, sessile; glumes nearly equal, about 5 to 6 lines long, the lower 3-nerved, upper 1-nerved, flowering glume 4 lines long, with a slender terete stipe $\frac{1}{2}$ to $\frac{3}{4}$ line long, lateral awns about 8 lines long, middle awn 10 to 12 lines, all diverging.—Margins of pine-barren ponds, Florida.

11. **A. virgata** Trin. Acta Petrop. 1829, p. 86. Perennial? Culms $1\frac{1}{2}$ to 2 feet high; simple leaves, narrowly linear, flat, 3 to 6 inches long; panicle spike-like, narrow; lower branches appressed, somewhat distant, in twos or threes, one short, the other 1 to 2 inches long; empty glumes, 3 to $3\frac{1}{2}$ lines long; flowering glume, 2 lines long; smooth, stipe very short and sharp-pointed; middle awn about 6 lines long, lateral ones about 4 lines.

This species was included in Chapman's Flora of the Southern States, but has not recently been in the South, neither has it been recognized at the North, although Trinius describes it as from Philadelphia, but specimens collected at Point Norris, New Jersey, last summer, by Mr. Jesse H. Holmes, answer fairly to this description and seem to be intermediate between *A. gracilis* and small forms of *A. purpurascens* or of *A. stricta*.

12. **A. bromoides** H. B. K. Nov. Gen. 1. p. 100. (*A. dispersa* Trin. var. *bromoides*). Culms 10 to 18 inches high, commonly much branched, forming close tufts, slender; radical leaves few and short, those of the culm 2 or 3, 1 or 2 inches long, involute-setaceous, sheaths shorter than internodes; panicle 1 to 3 inches long, spike-like, erect or secund, the branches solitary or clustered, flowering nearly to the base; glumes unequal, the lower 2 lines and upper 3 to 4 lines long, 1-nerved; flowering glume 3 to 4 lines long with white hairy callus; awns about equal, 3 to 5 lines long.—Texas, New Mexico, Arizona, South Carolina and Mexico.

This is a pretty distinct form in general, but frequently becomes large and branching and verges into *A. dispersa* Trin.

13. **A. Reverchoni** Vasey. Bull. Torr. Club, XIII. p. 52. Perennial, culms erect, simple, about $1\frac{1}{2}$ feet high, radical leaves rather numerous, 3 to 6 inches long, com-

monly curved, cauline, about 3, similar, panicle spike-like, close, 4 to 6 inches long, purple, lower branches mostly in pairs, unequal, the longer about 1 inch long, all appressed; lower glume 4 lines and upper about 6 lines long, flowering glume 5 to 6 lines long, gradually tapering above, smooth; awns 8 to 10 lines long, smooth, nearly equal.—Texas (*J. Reverchon, G. C. Nealley*).

Var. **AUGUSTA**, panicle narrow, otherwise nearly the same.—Comanche Peak (*Reverchon*), Texas (*G. C. Nealley*). This species approaches closely *A. purpurea*, but appears to be sufficiently distinct.

* * * *Panicle loose, branches mostly short.*

14. **A. purpurascens** Poir. (Gray's Manual, 6th ed., p. 641.) Perennial? Culms 2 to 3 feet long, smooth, rarely branching; leaves long, becoming involute; panicle spike-like, erect or nodding, 10 to 18 inches long, closely flowered, lower branches 1 to 2 inches long, appressed; lower glume about 5 lines, upper 4 lines long, both 1-nerved, flowering glume 3 lines long, spotted; middle awn about 1 inch long, lateral ones 9 to 10 lines; stipe short, narrowed to the sharp point.—Massachusetts to Kansas, south to Texas and Florida.

Var. **MINOR** Vasey. Culms more branching, panicle thinner and more flexuous, flowers and awns rather shorter.—Southern States to Texas.

15. **A. oligantha** Michx. (Gray's Manual, 6th ed., p. 640.) Culms 1 to 2½ feet high, tufted, from a perennial root, much branched, panicles lateral and terminal, a nearly simple loose raceme 3 to 5 inches long, the branches rarely sessile, the lower in pairs, few-flowered; empty glumes nearly equal, 10 to 12 lines long, floral glume 7 to 9 lines long, long-tapering above, awns capillary, 1½ to 3 inches long.—Maryland to Kansas, south to Florida and Texas, also on the Pacific coast.

16. **A. lanata** Poir. (Gray's Manual, 6th ed., p. 641.) Perennial, culms tall and stout, 2 to 4 feet long, leaves flat, 1 to 2 feet long, long-pointed, rough on upper side, sheaths woolly; panicle 1 to 2 feet long, nodding, loosely spike-like, with the branches somewhat spreading, the lower unequal, 1 to 2 inches long, rather remote, somewhat woolly in the axils; lower glume 7 to 8 lines long, upper one 4 to 4½ lines, both 1-nerved; flowering glumes 5 lines long, stipe short, smooth, middle awn spreading, 9 lines long, lateral ones about 5 lines long.—Delaware to Florida.

17. **A. dispersa** Trin. & Rupr. Gram. Agrost., p. 129. Annual? Culms branching, of variable height, panicle 1 to 6 inches long, contracted, generally purplish, lower branches mostly in twos or threes, unequal (½ to 1 inch), flowering nearly to the base; glumes unequal or nearly equal, lower 3 to 4 lines, upper 4 to 5 lines long; flowering glume about 3 lines; awns nearly equal, 5 to 8 lines long, spreading.—Texas to California.

18. **A. purpurea** Nutt. (Gray's Manual, 6th ed., p. 640.) This species was defined by Nuttall in the Trans. Amer. Philos. Society, Vol. v. new series, 1837, and is practically as follows: Panicle rather erect, slender; empty glumes aristulate, bifid at apex; awns capillary, very long; leaves short scabrous; perennial, leaves narrow, short and scabrous, ligule pilose; culms about 1 foot high, panicle many flowered, a little spreading, branches capillary, flowers commonly in pairs, bluish-purple; one of the glumes nearly twice the length of the other, the longer glume exceeding the flowering glume; awns equal, capillary, nearly three times the length of the flowering glume and scabrous, the flowering glume minutely stipitate.—On the grassy plains of the Red River in arid situations.

This is one of the most variable species we have, and has a wide distribution in the West and Southwest. Our present acquaintance with the genus requires its division into several varieties; indeed Trinius found it necessary to make two varieties, and one or two more are needed to complete the species.

Var. **FENDLERIANA**. (*A. Fendleriana* Steud.) Perennial, culms tufted, 8 to 12 inches high, very slender and erect, branching near the base; radical leaves abundant, nearly capillary, involute, 3 to 4 inches long, those of the culm about 3,

1 or 2 inches long; panicle 3 to 4 inches long, thin; branches erect or becoming spreading, few-flowered, mostly in twos below, with short capillary pedicels; empty glumes variable, 4 to 6, 4 to 8, or 5 to 10 lines respectively; awns nearly equal, capillary 1 to 2½ inches long.

Var. **HOOKERI** Trin. More robust, 1½ feet high, with coarser and longer leaves, panicle more spreading than in the preceding and more numerous flowered; spikelets larger, glumes longer, awns varying 2½ to 4½ inches long.

Var. **CALIFORNIA** Vasey. Culms tall, 2 to 2½ feet high, with long leaves (often 1 foot long), panicle flexuous, 5 to 7 inches long, lower branches often 5 to 7 at the nodes, 1 to 3 inches long, spreading, capillary, and naked below; empty glumes 3 to 6 lines respectively, awns about 2 inches long.—Western Texas to California.

Var. **MICRANTHA**. Culm 1 to 1½ feet high, slender, flexuous, leaves much as in 1st var., but culms usually decumbent at base and branching, the branches mostly in twos or threes, capillary, few-flowered, spreading or reflexed, spikelets usually smaller than in any other form (lower 3 to 4, upper 4 to 6 lines long).—Western Texas.

19. **A. Arizona** Vasey. Bull. Torr. Club, XIII. p. 27. Perennial, culms 2 to 2½ feet high, erect, unbranched, stout; leaves flat, becoming involute, 6 to 12 inches long; panicle strict erect, 6 to 10 inches long, the branches mostly single or in twos, erect, about 2 inches long, each 2- to 5-flowered; spikelets approximate, sessile, or nearly so; empty glumes nearly equal, 6 to 8 lines long, the lower one 3-nerved, awn pointed; flowering glume 7 to 8 lines long, twisted below the awns, hispid, awns nearly equal, spreading, 10 to 12 lines long.—New Mexico and Arizona. Differs from *A. purpurea* in its larger size, close, rigid panicle, and nearly equal glumes, the lower one 3-nerved.

* * * * * *Panicles spreading, branches longer.*

20. **A. Harvardii** Vasey. Bull. Torr. Club, XIII. p. 27. Culms about 1 foot high, erect, rather slender; leaves setaceous, 3 to 6 inches long, about 6 on the culm; glumes nearly equal, about 5 lines long, 1-nerved, narrow, acuminate; flowering glume about as long, with a short hairy callus, tapering to the apex; awns erect, spreading, nearly equal, 6 to 7 lines long; the panicle usually 4 to 6 inches long, open, the branches at first erect, in age becoming horizontal or reflexed, pyramidal, in pairs or fascicled below; lower branches 2 inches long, naked below, spikelets rather distant.—Western Texas (*Dr. Harvard*) and New Mexico. Possibly this includes *A. Palmeri*.

21. **A. Humboldtiana** Trin. & Rupr. Gram. Agrost., p. 118. (*A. divaricata* H. B. K.) Perennial, tufted, culms erect, simple, 1 to 2 feet long; leaves narrow or convolute, rather short and rigid, in twos and threes, the lower often 5 or 6 inches long, flower-bearing above the middle, widely spreading except those included in the sheath, few-flowered; empty glumes nearly equal, awl-pointed, 5 to 6 lines long; flowering glume slightly shorter; awns subequal, lateral, 4 to 5 lines, middle one 6 to 8 lines long.—Texas to Southern California and Mexico.

Var. **MINOR**. Smaller, culms about 1 foot high; panicle exserted, 5 to 6 inches long, pyramidal, branches 2 to 3 inches long; empty glumes 4 to 5 lines long, awns nearly equal, 4 to 5 lines long.—Texas, Arizona, to California.

* * * * * *Lateral awns minute or wanting.*

22. **A. Schiediana** Trin. & Rupr. Gram. Agrost. p. 120. Perennial, culms 2 to 2½ feet high, erect; leaves filiform-convolute, 6 to 12 inches long, glabrous; panicle ½ to 1 foot long, depauperate, the branches solitary or in pairs, distant, 3 to 5 inches long, suberect or widely spreading, rigid, often one-sided, flowering beyond the middle; empty glume nearly equal, 4 to 5 lines long; flowering glume 6 to 7 lines long, the apex tapering and twisted; lateral awns minute, one-half line long or less, erect the middle one spreading, 4 to 6 lines long.—Texas, New Mexico to Mexico.

23. *A. divergens*. (*A. Schiediana* var. *minor* Vasey, Torr. Bull. XIII. p. 28.) Culms 12 to 15 inches high, erect, simple; leaves involute, 6 to 10 inches long; panicle 5 to 7 inches long becoming pyramidal, sheathed at base by the uppermost leaf; branches at first erect spreading, becoming divergent, 1 to 3 inches long, solitary above, the lower divided at the base into 3 or 4 nearly equal divisions (appearing verticillate), again divided above the middle; spikelets diverging; empty glumes 3 to 4 lines long; floral glume 5 lines, becoming somewhat twisted in age; the lateral awns wanting or nearly so; middle awn 5 to 6 lines long, straight.—Texas to Arizona.

Smaller and less robust than *A. Schiediana*, not having the long naked branches of that species.

24. *A. scabra* Kth. (Chapm. Fl. S. States, Suppl., p. 663.) Culm without nodes, except at the base, from creeping root-stock $1\frac{1}{2}$ to 3 feet high; leaves radical, setaceously attenuated, panicle large, spreading; the branches single or 2 to 5 in a cluster, long (6 to 8 inches), naked below; spikelets appressed; glumes awn-pointed, about 5 lines long; floral glumes about 5 lines long; middle awn 9 to 12 lines long; the lateral ones 2 to 6 lines long; stamens 2.—Florida (*Dr. Chapman*). Apparently the same from Mexico. Remarkable for its long scapiform culms. Kunth's species is described as without lateral awns.

25. *A. Orcuttiana* Vasey. Bull. Torr. Club, XIII. p. 25. Culms about 2 feet high, stout below, above becoming slender, very leafy; leaves near the base with loose open sheaths and rather broad blades, the upper narrow, becoming involute, 5 to 8 inches long or more; panicle, long and open, 4 to 5 inches long; branches rather distant, mostly single, flexuous, the lower ones about 3 inches long, with the lower half naked; lower glume about 5 lines long, the upper one-quarter shorter; flowering glume with the awn 9 lines long, the lateral awns obsolete or nearly so; the main awn bent near the middle and twisted below.—Southern California (*C. R. Orcutt*) and Arizona (*M. E. Jones*.) The panicle is small for the size of the plant, and comparatively few flowered. It approaches *Aristida Schiediana*.

26. *A. Floridana* Chapm. (*Streptachne Floridana* Chapm.; Fl. S. States, p. 554.) Culms 2 feet high, simple, slender, erect; leaves long, filiform, convolute, smooth; sheaths hairy at throat; panicle 1 foot long, narrow, erect, the branches in pairs, scattered; spikelets short-stalked; empty glumes equal, linear, purple, 1-nerved, the lower awn-pointed; palea (floral glume) raised on a slender bearded stalk, linear-subulate, gradually tapering into the long compressed curved awn; no lateral awns.—South Florida (*Dr. Blodgett*).

§ 2. *Awns united and articulated to the floral glume.*

27. *A. tuberculosa* Nutt. (Gray's Manual, 6th ed., p. 641.) Culms from an annual root, 10 to 18 inches high, branched below; panicles racemose, loose, rigid, about 6 inches long; the branches rather distant, the lower in pairs, one short and few-flowered, the other elongated (2 to 3 inches long) and many-flowered; empty glumes 1 inch long, awn-tipped; floral glume about 10 lines long to the separation of the awns, a rather long, sharp, densely-hairy stipe, and a distinct articulation at its apex, the proper glume about 5 lines long, the prolongation above twisted 3 or 4 coils to the division of the nearly equal bent and divergent (sometimes reflexed) awns, which are $1\frac{1}{2}$ to 2 inches long.—Massachusetts to Minnesota and southward.

28. *A. desmantha* Trin. & Rupr. Gram. Agrost. p. 109. Culms $1\frac{1}{2}$ to 2 feet high, much branched; leaves convolute, 6 to 10 inches long, panicle rather narrow, erect, 4 to 6 inches long; the branches mostly in twos, one short, the other longer (2 to 3 inches), naked below, the spikelets fascicled above, short-pedicled; empty glumes nearly equal, 7 to 8 lines long, subulate-awned at apex; floral glume 4 to 5 lines long, including the sharp stipe, and to the articulation; the junction of the awns near or at the articulation, and the curving and spreading awns about 1 inch long.—Texas and Indian Territory.

29. *A. Californica* Thurb. Bot. Cal. II. p. 289. (*A. Jonesii* Vasey.) Annual; culms 5 to 10 inches high, densely tufted; much branched; often geniculate below;

leafy below, radical leaves subulate, margin involute, those of the culm shorter than the loose sheaths; raceme erect, simple; spikelets ovate; scarious glumes ovate, very smooth, the lower one smaller; the flowering glume of the upper male flower emarginate-setigerous, the seta very short; terminal flower awnless.—Melville Island (*Parry*).

ARISTIDA Linn.

Spikelets 1-flowered, in a spicate, or an open, branching panicle, generally on filiform pedicels; empty glumes mostly unequal, often bristle-pointed; flowering glume narrow, rolled around the flower, and terminating with a trifid awn, rarely the lateral branches of the awn wanting. Palea small, thin, enclosed in the flowering glume.

§ 1. *Upper portion of flowering glume not articulated to lower portion.*

* *Panicle close and spike like, awns unequal, lateral ones minute, erect, the long middle awn horizontal or turned back.*

1. *A. ramosissima* Engelm. (Gray's Manual, 6th ed., p. 640.) Culms much branched, 1 to 2 feet high, spikes terminating the main and lateral branches; branches of the panicle 3 to 4 inches long, mostly in twos, erect; spikelets about 1 inch long, without the awn; lower glume 6 to 8 lines long, 5-nerved; upper one 8 to 10 lines long, 3-nerved, toothed, and slightly awned at apex; middle awn nearly an inch long, becoming strongly hooked-recurved; lateral awns varying from 1 to 2 lines long, to almost deficient.—Illinois, Missouri and Kentucky.

2. *A. basiramea* Engelm. (Gray's Manual, 6th ed., p. 640.) Culms tufted, much branched, 1 foot high; panicles 3 to 4 inches long, the branches erect-appressed, in pairs below, longer pediceled than in the preceding species; lower glume about 6 and upper about 8 lines long; middle awn 6 to 9 lines long, about twice coiled and horizontal, lateral awns 3 to 6 lines long, very slender and erect.—Missouri, Wisconsin, Nebraska and Minnesota.

3. *A. dichotoma* Michx. (Gray's Manual, 6th ed., p. 640.) Culms 6 to 18 inches high, much branched, the branches rather long, panicle 1 to 3 inches long, strict, branches of panicle in twos below, few flowered; glumes slightly unequal, about 3 to 4 lines long, little longer than flowering glume; middle awn once or twice coiled, 3 to 4 lines long, and reflexed; lateral awns one-half to 1 line long.—Throughout the country east of the Missouri River.

** *Awns nearly equal.*

4. *A. simplicifolia* Chapm. Fl. S. States, Suppl. p. 662. Culms slender, about 2 feet high, simple or sparingly branched, leaves flat; racemes 6 to 9 inches long, loosely flowered, 1 or 2 at each node; glumes nearly equal, awn-pointed, rough on the keel, longer than the flowering glume, middle awn circular, recurved near the base, thick and scabrous, about 8 lines long, lateral awns more slender, horizontal, 6 lines long.—Florida (*Chapman*) and Alabama (*Dr. Mohr*).

Var. TEXANA. Spikelets smaller, lateral awns 1 to 2 lines long.—Texas.

5. *A. gyrans* Chapm. Fl. S. States, Suppl., p. 662. Culms slender, 1½ to 2 feet high, simple; leaves convolute-filiform; panicle simple, 6 inches long, the few simple branches appressed; lower glume truncate, short awned, as long as the flowering glume, the upper a third longer, attenuate; flowering glume long stipitate, the awns nearly equal, curved, twisted together at the base.—Florida and Cuba (No. 3430 *Wright*).

6. *A. gracilis* Ell. Bot. S. Car. i. p. 152. (Gray's Manual, 6th ed., p. 640.) Culms slender, 1 to 2 feet high, simple or much branched, panicle about 6 inches long, spike-like, branches few flowered, almost sessile; glumes nearly equal, 3 to 4 lines long; middle awn 3 to 6 inches long, lateral ones from 1 to 3 or more inches long; the awns very variable in length.—Widely diffused, Massachusetts to Texas.

row; spikelets 2 lines long; outer glumes winged on the keel, abruptly acute, serrulate on the keel, second pair linear, slightly unequal, one-third as long as the perfect flower, the latter one-third shorter than the outer glumes, and not long-pointed as in *P. intermedia*.—Louisiana, Texas to California.

6. *P. Canariensis* Linn. (CANARY GRASS.) (Gray's Manual, 6th ed., p. 639.) Culms 1 to 3 feet high; leaves flat, the upper sheaths much inflated; panicle 1 to 1½ inches long, ovoid, very dense; outer glumes broad, with a conspicuously winged keel, white on the margin, with a distinct green line within; second pair of glumes small, lanceolate, smooth; perfect flower silky-hairy.—Introduced and escaped from cultivation. The seed is a common and favorite bird seed.

ANTHOXANTHUM Linn.

Panicle spike-like, narrow; spikelets apparently 3-flowered, only the terminal one perfect, outer empty glumes unequal, herbaceous; those of the 2 imperfect flowers clothed with brown hairs, awned from the lobed apex; flowering glume and 3-nerved palet short membranaceous. Stamens 2.

1. *A. odoratum* Linn. (SWEET VERNAL GRASS.) (Gray's Manual, 6th ed., p. 630.) Culms erect, slender, 1 to 2 feet high; leaves flat, hairy; sheaths often hairy; ligule short, obtuse; panicle 1 to 4 inches long, interrupted below; spikelets 3 to 4 lines long; inner pair of sterile glumes 2-lobed, long-awned; perfect flower equal to the inner glumes.—Introduced from Europe. Very fragrant.

HIEROCHLOE Gmelin.

Panicle open and spreading; spikelets 3-flowered, compressed, the lower two staminate only, the upper or terminal one perfect, outer empty glumes equal, scarious, 3-nerved; flowering glumes much thicker, chartaceous, 5-nerved, those of the male flowers sometimes short-awned; that of the perfect flower awnless; male flowers with 3 stamens, perfect flowers with 2 stamens; palet of the male flowers 2-nerved, that of the perfect flower 1-nerved.

The dried plants have a vanilla-like odor, on which account they were formerly strewn before church doors on holidays.

H. macrophylla Thurb. (Bot. Cal. II. p. 265.) Culms 2 to 3 feet high, tufted, leaves 12 to 18 inches long, 4 to 8 lines broad, scabrous above and on the margins; panicle 4 to 6 inches long, the branches somewhat distant, in pairs; spikelets 2½ lines long; glumes obtuse, those of the male flowers fringed on the margin, notched at the broad apex, and often with a slight awn; glume of the perfect flower smooth and shiny below.—California (*Bolander*) and Oregon (*Howell*).

2. *H. borealis* R. & S. (VANILLA GRASS.) (Gray's Manual, 6th ed., p. 639.) Culms 1 to 2 feet high; from a creeping root-stock; leaves (all but the lower) with short blades and long sheaths; panicle pyramidal, 2 to 4 inches long, branched in pairs, flowering above the middle; outer glumes acuminate and longer than the flowers; glumes of the male flowers acute, and sometimes mucronate or bristle-pointed.—Moist ground chiefly northward and northwestward; New England to Wisconsin, on the mountains and northward to Alaska.

3. *H. alpina* R. & S. (Gray's Manual, 6th ed., p. 639.) Culms 10 to 18 inches high; lower leaves very narrow; panicle 1½ to 2 inches long, the branches few flowered; outer glumes 3 lines long, obtuse; glumes of one of the male flowers long awned below the middle, that of the other short awned from near the apex.—Alpine mountain tops, New York, New England, and northward.

4. *H. pauciflora* R. Br. (*Chloris* Melville, p. 35.) Root creeping, culms erect,

3. *L. Virginica* Willd. (WHITE GRASS). (Gray's Manual, 6th ed., p. 635.) Culms slender, decumbent, branching below; panicle simple, narrow, 3 to 6 inches long, branches alternate, slender, the lower branches sparingly divided, naked below; spikelets appressed, oblong, $1\frac{1}{2}$ lines long, short-pointed, smooth or sparingly ciliate on margins; stamens 2.—Wet or moist woods, common.

4. *L. monandra*, Swartz. (Chapm. Fl. S. States, Suppl., p. 661). Culms slender, $1\frac{1}{2}$ to 2 feet high; leaves small, sheaths rough; panicle small, simple, becoming spreading, branches capillary, alternate, distant, flowering near the extremity; spikelets pale, semiovate, obtusish, less than a line long, smooth; stamen 1.—In moist woods, Texas (*G. C. Nealley*).

PHALARIS Linn.

Spikelets crowded in a clustered or spike-like panicle, 1-flowered; glumes 5, the outer large, the inner pair smaller and imperfect or scale-like, one on each side the terminal or perfect flower, the fifth being the flowering glume of the perfect flower. The glume-like palea one nerve. Outer glumes 3-nerved, compressed, keeled, boat-shaped; second pair linear; perfect flower shorter than spikelet, the glume becoming coriaceous or cartilaginous. Grain smooth and shining.

* *Glumes not winged on the back or slightly winged.*

1. *P. arundinacea* Linn. (REED CANARY GRASS). (Gray's Manual, 6th ed., p. 639.) Culms stout, 2 to 4 feet high; leaves flat, about one-half inch wide; panicle 3 to 5 inches long, narrow, the short branches spreading during anthesis, becoming appressed; spikelets 2 lines long; outer glumes acute; the imperfect pair one-half as long as the perfect flower.—Widespread in northern or mountainous districts.

2. *P. Lemmoni* Vasey. Culms rather slender, $1\frac{1}{2}$ to 3 feet high; leaves narrow, acuminate, ligule conspicuous, 3 lines long; panicle spike-like, 2 to 3 inches long, nearly cylindrical, dense; outer glumes 2 to $2\frac{1}{2}$ lines long, acute to acuminate; second pair very short (about $\frac{1}{2}$ line) somewhat unequal, with short pedicels; flowering glume lanceolate, acuminate, little shorter than the outer ones, pubescent; palea nearly as thick as its glume and a little shorter.—Santa Cruz, California (*J. G. Lemmon, Dr. Anderson*).

3. *P. amethystina* Trin. (Bot. Cal. II. p. 265.) Culm stout, tufted, 2 to 8 feet high, from a perennial root; leaves broad, the sheaths often purplish; panicle spike-like, oblong, 1 to 2 inches long, dense, usually purplish; spikelets 3 to $3\frac{1}{2}$ lines long; outer glumes narrowly winged, straight, acutish; inner pair of glumes hairy, more than half as long as the perfect flower, which is 2 lines long or more.—California to Oregon.

* * *Glumes decidedly winged on the back.*

4. *P. intermedia* Bosc. (Bot. Cal. II. p. 264.) (*P. Americana* Ell.) Culms variable, stout or slender, $1\frac{1}{2}$ to 4 feet high, smooth; leaves short, often glaucous; sheaths more or less inflated; spike-like panicle 1 to 4 inches long, ovoid to cylindrical; spikelets $2\frac{1}{2}$ lines long; outer glumes strongly winged on the keel, acute; second pair of glumes linear, hairy, about half the length of the perfect one, the latter long-pointed, hairy, and one-third shorter than the outer glumes.—Texas to California.

Var. MICROSTACHYA (*P. microstachya* DC.) Culms slender, 6 to 18 inches high; leaves short, the uppermost inflated; spike-like panicle $\frac{1}{2}$ to 1 inch long, oval; outer glumes lanceolate, slender-pointed, broadly-keeled, twice as long as the hairy, ovate flower.—Florida to Texas.

5. *P. angusta* Nees. (Fl. Brasil. II. p. 391.) (*P. intermedia*, var. *angusta* Chapm.) Culms stout, 2 to 3 feet high; panicle cylindrical, dense, 3 to 6 inches long, nar-

ZIZANIA Linn.

A reed-like aquatic grass, 6 to 10 feet high, with broad leaves 2 to 3 feet long; panicles often 2 feet long, the long branches somewhat appressed above, spreading below, the upper ones pistillate, the lower male; the female spikelets almost subulate, long-awned, the male spikelets awnless. Fruit linear, slender, $\frac{1}{2}$ inch long.

1. *Zizania aquatica* Linn. (WILD RICE, INDIAN RICE, WATER OATS.) (Gray's Manual, 6th ed., p. 635.) Annual, culms 5 to 10 feet high, leaves linear-lanceolate; panicle ample, pyramidal.--Swampy borders of streams and in the shallow muddy borders of lakes. Very widely diffused, New England to Texas and Florida and northwestward to Minnesota.

ZIZANIOPSIS Doell. & Asch.

Tall, aquatic grasses with the habit of *ZIZANIA*, the perfect spikelets terminating the branches of the spreading panicle, the male spikelets at the base of each branch. Fruit a globular nut, with a hard, shining, easily separable pericarp. Stigmas united.

1. *Z. miliacea* Doell. & Asch. Culms stout, 4 to 8 feet high; leaves long (2 feet), 1 inch wide or more; panicle 1 to 2 feet long, the branches at first appressed, becoming spreading. In ditches and wet grounds.—Southern States to Texas.

ORYZA Linn.

Spikelets* elongated, much compressed laterally, empty glumes of two small scales or bristles, and underneath these, two more minute rudimentary empty glumes. Flowering glume conduplicate and keeled, usually awned; palea narrow, 1-nerved. Stamens 6. Fruit long-obtuse, closely enveloped by the fruiting glume, and compressed laterally, with two lateral furrows. Embryo short, curved.

1. *O. sativa* Linn. Sp. Pl. p. 465. (CULTIVATED RICE). Panicles contracted and rough, flowering glumes prominently 5-nerved.

LEERSIA Swartz.

Spikelets 1-flowered, flat, articulated on short pedicels along the slender branches of a terminal panicle. Glumes 2, strongly compressed or conduplicate, awnless, bristly ciliate on the keels, the lower one much the larger. No palea. Stamens 1 to 6. Stigmas 2; styles short, distinct. Perennial grasses, the leaves and sheaths usually rough with minute prickles or bristly hairs.

1. *L. hexandra* Swartz. (Chapm. Fl. S. States, p. 549.) Culms 2 to 6 feet high, slender, often branching below; leaves 4 to 6 inches long, rather rigid, variable in width, sheaths scabrous; panicle exserted, erect, contracted, 3 to 5 inches long; spikelets 2 lines long, lanceolate to oblong, acute, margins short, fringed, hispid on the keel; stamens 6, styles 2, distinct.—Low grounds near the coast.

2. *L. oryzoides* Swartz. (WHITE GRASS, CUT-GRASS). (Gray's Manual, 6th ed., p. 635.) Culms erect or decumbent, rather stout, branching or simple, 3 to 4 feet high, leaves light green, very rough; panicle rather large and diffusely branched, 6 to 18 inches long; spikelets about 2 lines long, oval or oblong, hispid-ciliate on the keel, very short-pointed, short-pedicelled; stamens 3.—Common in wet places.

* This foreign species is introduced because so extensively cultivated in the Southern States.

eres sessile several of the bristles more than twice as long as the single spikelet; lower empty glume small (one-sixth as long as spikelet), second and third equaling the perfect flower, the latter linear-lanceolate.—Lastero Bay, Florida (*A. P. Garber*, 1878).

P. typhoideum Rich. (CAT-TAIL MILLET.) (*Penicillaria* Willd.) This species is frequently cultivated in the South for fodder.

STENOTAPHRUM Trin.

Spikelets 2-flowered, the terminal one perfect and fertile, the lower one male or imperfect, the lowest empty glume short and obtuse, the second the largest, the two flowering glumes rather smaller, palets of both flowers similar in texture. The spikelets embedded, singly or two or three together, in alternate excavations of the broad flattened rhachis of a spike-like panicle.

1. **S. Americanum** Schrank. (Chapm. Fl. S. States, p. 579.) (*Rottboellia dimidiata* Ell.) Culms flattened, erect, 6 to 12 inches high, from creeping root-stocks, smooth; leaves 2 to 6 inches long, obtuse, flat or folded, contracted at the base; spikes 2 to 5 inches long, lateral and terminal, pedunculate; fertile spike sessile; the upper glume 7-nerved, three times as long as the lower one; palet of the sterile flower coriaceous, like that of the perfect one. Along the coast in most tropical countries. South Carolina to Florida and west to Texas.

HYDROCHLOA Beauv.

Spikelets 1-flowered, in small, simple, monœcious spikes ($\frac{1}{2}$ to 1 inch long), mostly included in the sheaths of the upper leaves, 3 to 5 male spikelets in the terminal spikes, and a few female spikelets in the axillary spikes; stamens 6. Stigmas elongated.

1. **Hydrochloa Caroliniensis** Beauv. (Chapm. Fl. S. States, p. 549.) Spikelets 1-flowered, consisting of two nearly equal hyaline glumes, or one glume and a palet, as they are sometimes considered; leaves short, oblong-linear.—North Carolina to Florida and Mississippi.

LUZIOLA Juss.

Flowers monœcious, in separate spreading panicles, the staminate spikelets larger than the fertile ones. Spikelets 1-flowered, awnless, the male spikelets terminal on each branch. Stamens 5 to 11, anthers linear. Styles 2, short; flowering glume with many prominent nerves. Creeping, narrow-leaved aquatic or marsh grasses.

1. **Luziola Alabamensis** Chapm. Fl. S. States, p. 584. Culms 4 to 6 inches high, simple, rooting at the lower joints; leaves few, the lower much exceeding the culm, the elongated purple sheath inclosing the base of the panicle, the latter few flowered, 1 to 3 inches long, the male and female on separate culms; glume and palet of male spikelets lanceolate, 7-nerved; those of the pistillate spikelets ovate-lanceolate, 11- to 13-nerved; grain smooth.—Brooklyn, Ala., also Mobile, Ala. (*Dr. Mohr*).

2. **L. Peruviana** Juss. (Persoon's Synopsis, II. p. 575). Culms creeping and rooting at the lower joints; flowering culms erect, 3 to 10 inches high; radical leaves often 12 inches long, narrow; male flowers much larger than the female ones, white; female panicles spreading, 1 to 2 inches long. In low ditches and low grassy lands.—Louisiana (*A. B. Langlois*). Mr. Langlois says it is attractive all summer by its fine white male spikes.

indrical or nearly so, dense or sometimes interrupted, 3 to 6 inches long, 3 to 4 lines thick; leaves narrow, 1 to 3 lines wide: spikelets as in the preceding species, bristles usually much shorter.—Texas to Arizona and Mexico.

10. *S. pauciseta* Vasey. This species differs from the preceding in the smaller and more slender culms, apparently annual, the much looser, shorter, few flowered spikes, smaller, shorter leaves, and smaller spikelets, and corresponds better to the figure of *S. caudata* of Pl. 96, Trin.—Texas (No. 2096 C. Wright, Nealley), also Mexico (No. 381 Pringle).

**Bristles downwardly barbed.

11. *S. verticillata* Beauv. (Gray's Manual, 6th ed., p. 634.) Spike cylindrical, dense, 2 to 3 inches long, the clusters apparently whorled; bristles short, adhesive.—In cultivated ground, adventitious from Europe.

CENCHRUS Linn.

Spikelets as in *Panicum*, awnless, but inclosed 1 to 5 together in a globular and bristly involucre, which becomes coriaceous, and forms a hard, rigid, and deciduous bur; the involucre sessile in a terminal spike.

1. *C. tribuloides* Linn. (Gray's Manual, 6th ed., p. 634.) Annual; culms ascending, branching, 6 to 12 inches high; leaves flat; spike oblong, of 8 to 20 spherical heads; involucre more or less downy, armed above with stout, compressed, broadly subulate, erect, or spreading spines; bristles none, or usually several below the spines, spikelets 2- to 3-flowered.—Sandy soil, extensively distributed.

2. *C. echinatus* Linn. (Chapm. Fl. S. States, p. 578.) Culms erect or ascending, 1 to 2 feet high; leaves flat; spike cylindrical, 4 to 6 inches long, of 20 to 25 roundish involucre, downy, spiny above, and with a row of rigid barbed bristles above the base; 3- to 5-flowered; involucre purplish.—Field and waste grounds, North Carolina to Mexico.

3. *C. incertus* M. A. Curtis. (Chapm. Fl. S. States Suppl., p. 667.) Smooth, strict, nearly simple, erect or ascending, 2 to 3 feet long; leaves linear, folded; the lower sheaths longer than the internodes; spikes cylindrical, many-flowered, involucre naked and acute at the base, the 10 or 11 stout spines ciliate; spikelets geminate, smooth; sterile flower triandrous. (*C. strictus* Chapm.)—Sandy coast Florida to North Carolina. Description from Dr. Chapman's Southern Flora.

4. *C. myosuroides* H. B. K. (Chapm. Fl. S. States, Suppl. p. 667.) (*Panicum cenchrroides* Ell.) Culms 4 to 8 feet high, erect; leaves long, rigid, flat, or becoming convolute toward the point; spikes cylindrical, 3 to 6 inches long, densely many-flowered; involucre small, 1-flowered, armed with 20 or more slender (not compressed) spines, as long as the spikelet.—South Florida, Georgia to Texas and westward.

PENNISETUM Pers.

Spikelets with one terminal perfect flower, and a second male or neuter one below it, solitary, or two or three together, closely surrounded by an involucre of usually numerous simple or plumose bristles which disarticulate from the pedicel with the spikelets. The spikelets crowded in a spike-like panicle, or on pedunculated spike-like branches. The lower empty glume is small, the second and third larger and longer than the perfect flower, the glume of which is thicker and more rigid; sterile flower consisting of a membranaceous palet.

1. *P. setosum* Rich. (Kth. Enum. Pl. I. p. 161.) Culm 4 feet high; leaves linear- acuminate, glabrous; spike cylindrical, dense, 6 to 7 inches long, involu-

male or sterile one. Empty glumes 3, the lower one small, the second usually shorter than the third, the flowering glume indurated; the second flower when present consisting of a thin palet and sometimes 4 stamens.

•*Bristles barbed upward.*

1. *Setaria viridis* Beauv. (GREEN FOXTAIL, PIGEON GRASS.) (Gray's Manual, 6th ed., p. 634.) Spikes 2 to 4 inches long, strictly erect, cylindrical, dense, tawny yellow (except in varieties); flowering glume transversely wrinkled, bristles 6 to 10 in cluster, much longer than the spikelets.—Very common in cultivated fields, etc.

2. *S. glauca* Beauv. (FOXTAIL, PIGEON GRASS.) (Gray's Manual, 6th ed., p. 634.) Spikes 2 to 4 inches long, strictly erect, cylindrical, dense, tawny yellow (except in varieties); flowering glume transversely wrinkled; bristles 6 to 10 in a cluster much longer than the spikelets.—Extensively naturalized.

There is a smooth, perennial form in the Southern and Southwestern States, called by Dr. Chapman var. *LÆVIGATA*. There is also a form in the South with purplish bristles.

3. *S. imberbis* R. & S. Syst. II. 891. Spikes very narrow (2 to 3 lines wide), 2 to 3 inches long, not so dense as in *S. glauca*, and the bristles (yellow to purple) much shorter, as long or twice as long as the spikelets; leaves narrow, erect.—Texas and southwestward.

4. *S. corrugata* Schultes. (Chapm. Flora S. States, p. 578.) (*Panicum corrugatum* Ell.) Culms 2 to 4 feet high, often branched below; leaves narrow, 6 to 12 inches long; spike cylindrical or tapering to the apex, dense, erect, or bending, 3 to 6 inches long; branches of panicle 6- to 10-flowered; fertile flower, strongly convex, transversely rugose, smaller than in *S. glauca*; bristles much exceeding the spikelets; purplish.—Dr. Chapman says, "Dry soil, Florida and Georgia."

5. *S. Italica* Kth. (Gray's Manual, 6th ed., p. 634.) Culms 1½ to 3 feet high; leaves wide; spikes oblong to cylindrical, dense, more or less compound, thick, nodding; bristles yellowish or purplish, longer or shorter than the spikelets.

Exceedingly variable under cultivation. Cultivated as millet or Hungarian grass.—A native of Europe, rarely spontaneous.

6. *S. composita* Kth. (Chapm. Fl. S. States, p. 578.) Culms smooth, 2 to 4 feet long; leaves 1 foot or more long, the fringed sheaths rough, hairy at the throat; panicle 6 to 12 inches long, loose, compound, tapering to the apex, the lower clusters spreading or scattered, ¼ to 1 inch long; perfect flower, acute, with faint transverse lines. Much like *S. setosa*.—Dry, sandy soil, Florida, Apalachicola to Key West.

7. *S. macrostachya* H. B. K. ? perhaps *S. magna* Griseb. (Kunth Enum. Plant, I, p. 154.) Culms 4 to 8 feet high, thick, smooth; leaves ½ to 1 inch wide, a foot or more long, very rough; spike 1 foot to 18 inches long, nearly cylindrical, tapering at the apex, very dense, the lower clusters scattered; fertile flower smooth, smaller than in the preceding bristles 1 or 2 to each spikelet, much longer than the clusters.—Swamps along the coast North Carolina to Florida and west to Mississippi. Confused by Dr. Chapman with *S. Italica*.

8. *S. setosa* Beauv. Agrost, p. 178. (*Panicum setosum* Trin. ?) Culms 2 to 4 feet high, apparently annual, sometimes branched below, smooth; leaves often 1 foot long, three-fourths inch wide, sometimes scabrous; ligule ciliate, lower sheaths shorter than the internodes; panicle 6 to 10 inches long, not cylindrical, tapering to the apex erect or somewhat nodding, loose or somewhat dense, compressed, the erect, spreading branches ¼ to 1 inch long; lower glume one-fourth, second glume three-fourths as long as the third, perfect flower acute, transversely rugose.—Texas, New Mexico, Arizona and Mexico. Resembles No. 6, but with smaller spikelets. Seems to pass gradually into the next species.

9. *S. caudata* R. & S. Syst. II. p. 495. Culms 2 to 3 feet high, apparently perennial, much branched, sometimes decumbent and rooting below; panicle cyl-

and flower bearing toward the ends or throughout; spikelets $2\frac{1}{2}$ to 3 lines long, ovate, acute; the empty glumes silky-villous; lower glume 7-nerved, two-thirds as long as the 15-nerved second glume; third glume rather shorter, 11- to 13-nerved; perfect flower oblong, glabrous, except on the margins, these long-ciliate.—In sand, southern California to Arizona.

§ 10. ECHINOCHLOA Benth.

65. *P. colonum* Linn. (*P. Walteri* Ell: Chapm. Fl. S. S. p. 577.) Culms 1 to 2 feet high, erect or decumbent at the base; leaves flat, glabrous; panicle 2 to 4 inches long, of several simple one-sided, distant, usually erect branches or sessile spikes, one-half to three-fourths inch long. Spikelets about 1 line long, ovoid, densely crowded in about 4 rows; outer glumes coarsely pubescent, or rarely glabrous, the first rarely half as long as the second and third, these nearly equal, often ending in short points, but not awned.—Introduced in the South, very common from Texas to California.

66. *P. Crus-galli* Linn. (Gray's Manual, 6th ed., p. 633.) Usually annual, culms coarse, decumbent, usually branching below, 2 to 4 feet high; leaves long, rough; sheaths rough, hispid or smooth; panicle dense, of numerous simple sessile spikes 1 to 2 inches long; spikelets crowded and clustered, outer glumes strongly hispid, acute or sometimes with long hispid awns. Introduced and very common. In the South appearing to be native. Very variable in size and appearance.

Var. *HIRSUTUM*, Torr. —Sheaths hirsute-pubescent or smooth; glumes long-awned.

Var. *MUTICUM*, glumes without awns.

§ 11. HYMENACHNE Benth.

67. *P. gibbum* Ell. (Chapm. Fl. S. States, p. 573.) Culms branched, decumbent; 2 to 3 feet high; leaves linear-lanceolate, acuminate to a long point, 6 to 12 inches long, one-half to three-fourths inch wide; panicle 5 to 6 inches long, confined; the branches appressed, 1 to 2 inches long; spikelets loosely crowded on pedicels about their own length, about $1\frac{1}{2}$ lines long, oblong, obtuse; the lower glume 5-nerved one-fourth as long as the second, the latter strongly 11-nerved, gibbous at the base; sterile flower with 3 stamens; fertile flower smooth, half as long as the spikelet.—Swamps South Carolina to Florida and Mississippi.

OPLISMENUS Beauv.

Spikelets in small, sessile, distant clusters of the simple panicle, the spikelets one-sided in the clusters, the lower and the second empty glumes always (and the third frequently) awned, the lower long-awned.

1. *O. setarius* R. & S. (*Panicum hirtellum* Linn: Chapm. Fl. S. States, 577.) Culms weak, decumbent and rooting below, 1 to 2 feet long; leaves ovate-lanceolate, 1 to $1\frac{1}{2}$ inches long; panicle racemose, 3 to 4 inches long, consisting of 5 to 9 small sessile clusters of spikelets, each of 3 to 5; lower empty glume with an awn 3 to 4 times as long as the spikelet, second a little shorter, the third less than a line long.—Florida to Texas, coastwise.

SETARIA Beauv.

Spikelets in a cylindrical spike-like or sometimes interrupted panicle. Below the articulation of the spikelets are several, usually many, bristles, which are supposed to be abortive branchlets and persistent after the fall of the spikelets. The spikelets contain one terminal fertile flower (its glume and palea indurated and striate), and usually a lower

to a long, slender point; sheaths glabrous, striate; panicle 1 foot or more in length, appressed, or becoming somewhat spreading, the lower branches verticillate, 6 inches long, subdivided nearly to the base, narrowly paniculate; spikelets rather racemose, ovate, $2\frac{1}{2}$ lines long, acute; glumes thick, the lower glume about two-thirds the length of spikelet, acute; second glume the longest, 7-nerved, acuminate; third glume rather shorter and obtusish; perfect flower linear-oblong, obtuse, one-fourth shorter than the spikelet.—Grows among the sand hills on the seashore. South Carolina to Florida.

Var. MINOR Vasey & Scribn. Leaves involute; panicle shorter, narrower, distantly branched, comparatively few-flowered, the branches rather glomerate and unequal; spikelets rather large ($2\frac{1}{2}$ to 3 lines); the lower glumes longer, or nearly as long as the spikelet.—Fort Monroe, Va., and northward, near the coast.

61. *P. virgatum* Linn. (Gray's Manual, 6th ed., p. 631.) Stout, erect, unbranched, 3 to 5 feet high, from strong, creeping root-stocks; leaves flat, very long (1 foot or more), 3 to 4 lines wide, smooth; panicle compound, 6 to 18 inches long; branches single to verticillate, generally very numerous and becoming diffuse, spreading or drooping; spikelets on rough pedicels, $1\frac{1}{2}$ to 2 lines long, ovate to ovate-lanceolate, pointed, smooth; lower glume more than half the length of the spikelet (sometimes two-thirds), 5-nerved; second 5-nerved; third 5- to 7-nerved, acute to acuminate, larger than the perfect flower; sterile flower with 3 stamens; widely diffused and quite variable.—Maine to Florida, and throughout the interior of the country. The Atlantic form has spikelets about $1\frac{1}{2}$ lines long. The Western form has spikelets about 2 lines long, the glumes acuminate. A form on the Atlantic coast has the panicle quite close and rather oblong, and may be called **var. CONFERTA**; another form (**var. ELONGATA**) has a very long and narrow panicle, with spikelets even $2\frac{1}{2}$ lines long.

62. *P. Havardii* Vasey. Bull. Torr. Club, XIV. p. 95. (*P. virgatum* var. *macrospermum*, Vasey.) With the habit of Western forms of *P. virgatum*, but much stouter; culms 5 to 6 feet high, with rigid, involute, long-pointed, glaucous leaves, ligule a ring of short hairs; panicle $1\frac{1}{2}$ feet long, diffuse, the branches less abundantly flowered; spikelets 3 lines long; lowest glume one-half as long as the spikelet, prominently 5- to 7-nerved; second glume 9-nerved, ovate, acuminate; third glume 5- to 7-nerved, its thick palea nearly as long; fertile flower about one-fourth shorter than the spikelet.—Guadalupe Mountains, Texas (*Dr. Havard, G. C. Nealley*).

§ 8. FRUTESCENTES Vasey.

63. *P. divaricatum* Linn. (Chapm. Fl. S. States, p. 575.) Shrubby, smooth; culms 6 to 8 feet high with short and spreading branches; leaves lanceolate, acuminate, 2 to 4 inches long, 2 to 6 lines wide, deciduous from the persistent sheaths; panicles terminating the branches, 1 to 3 inches long, nearly simple or branched, the branches rather distant and diverging, half to 1 inch long, rather sparsely subdivided; spikelets smooth, 2 lines long, tumid, obovate, nodding, on pedicels as long or longer; lower glume triangular-ovate, one-third as long as the spikelet; second and third glumes as long as the spikelet, very broad, 9- to 11-nerved; apex of the fertile flower downy-tipped.—Southern Florida.

§ 9. VILLIFLORA Vasey.

64. *P. Urvilleanum* Kth. (Bot. Cal. II. p. 259.) Culms $1\frac{1}{2}$ to 2 feet high, from a strong running root-stock, the whole plant densely soft-hairy; near the base short-jointed and covered with weather-worn leaves or sheaths; leaves rigid, 12 to 18 inches long, 3 lines wide at the base, becoming convolute, and ending in a long, setaceous point, the upper ones exceeding the panicle, the latter 6 to 10 inches long, open, but rather contracted, the branches semiverticillate or scattered, the shorter ones flowering to the base; the longer ones (3 to 4 inches long) racemosely subdivided

long, the outer glumes papillose-hispid, the lower one minute, acutish.—South Carolina to Texas.

56. *P. anceps* Michx. (Gray's Manual, 6th ed., p. 631.) Culms flattened, erect, 2 to 3 feet high, less stout than in *P. agrostoides*, from strong creeping root-stocks; leaves rather broadly linear, a foot or more long, 4 to 5 lines wide, smooth or the lower ones with the sheaths pubescent; panicles contracted, lateral and terminal, 6 to 12 inches long, the branches from single to verticillate, rather distant, particularly below, generally very abundantly flowered; spikelets 1 to $1\frac{1}{2}$ lines long, ovate-lanceolate, pointed, the apex a little curved; lower glume about one-half as long as the spikelet; upper glume 5- to 7-nerved.

Var. PUBESCENS. Leaves and sheaths more or less pubescent; panicle and branches slender; spikelets ovate lanceolate, acute, little more than 1 line long.—Mobile, Ala. (*Dr. Mohr*).

Var. ANGUSTA. Lower sheaths villose; leaves very long and narrow, erect, rigid; spikelets narrowly lanceolate, acuminate, $1\frac{1}{2}$ lines long, the lower glume one-third as long as the spikelet.—Texas. (*G. C. Nealley*.)

Var. DENSIFLORUM. Leaves broad; panicle glomerate and interrupted, the branches densely flowered; spikelets lanceolate, $1\frac{1}{2}$ lines long.—Texas (*J. F. Riggs*).

57. *P. agrostoides* Spreng. (Gray's Manual, 6th ed., p. 631.) Culms flattened, erect, stout, 2 to 4 feet high, usually in thick clumps, glabrous, much branched above, the branches erect; leaves linear, 1 to 2 feet long, 3 to 4 lines wide, smooth as also the compressed sheaths; panicles terminal and lateral, 4 to 12 inches long, oblong, becoming pyramidal, very full, the lower branches 2 to 3 inches long, much subdivided to the base; spikelets racemose, very short pediceled, crowded and mostly one-sided on the branches, ovate-oblong to lanceolate, $\frac{3}{4}$ to $1\frac{1}{2}$ lines long; lower glumes acute or acutish, half as long as the spikelet; second and third glumes 5-nerved, half longer than the perfect flower, the latter slightly bearded at the apex.—In wet ground.

Varies in the size and form of the spikelets, which in the Western form seldom exceed a line long; there is an Eastern form in which the spikelets are lanceolate, about $1\frac{1}{2}$ lines long, and the perfect flower small and conspicuously stalked.

58. *P. bulbosum* H. B. K. Nov. Gen. I. p. 99. Rhizoma creeping, thick, bulbous; culms 4 to 5 feet high, smooth, stout, with long internodes; leaves long and narrow (1 to 2 feet by 2 to 4 lines), smooth, or the lower ciliate below; panicle about 1 foot long, spreading, copious, pale green; branches scattered and verticillate, the lower 4 to 5 inches long, much subdivided nearly to the base, branchlets slender and numerous flowered; spikelets sometimes in pairs or racemose, $1\frac{1}{2}$ lines long, smooth, obtuse or acutish, not acuminate; lower glume half or rather more than half as long as the spikelet, broad, three-nerved, acutish; second and third glumes equal, 5-nerved, the third with a narrow palet; perfect flower as long as the spikelet, oblong, lanceolate, abruptly acute, the point sometimes a little roughened.—Texas, New Mexico and Arizona.

Var. MINOR (*P. maximum*, var. *bulbosum* Munro). A smaller form, about 2 feet high, with the panicle much reduced.—In same region.

Probably *P. avenaceum* Kth. is not different.

59. *P. maximum* Jacq. Coll. I. p. 76. (*P. jumentorum* Pers.) Culms erect, 3 to 5 feet high, glabrous; nodes softly pubescent; leaves linear, 1 to $1\frac{1}{2}$ feet long, 9 to 12 lines wide, rather rigid, margin scabrous; sheaths smooth; panicle $1\frac{1}{2}$ feet long, much branched, hispid or scabrous, the branches verticillate, long and contracted, racemose, scabrous; spikelets mostly short-pediceled, $1\frac{1}{2}$ lines long, ovate, smooth, acute; lower glumes about one-third as long as the spikelets; second glume shorter than the spikelet; perfect flower acute.—Introduced and cultivated in the South.

60. *P. amarum* Ell. (Gray's Manual, 6th ed., p. 631.) Culms 2 to 3 feet high, from a stout running root stock, thick, columnar, nearly one-half inch in diameter; leaves nearly flat, almost coriaceous, glaucous, 1 to $1\frac{1}{2}$ feet long, 4 to 6 lines wide, tapering

conspicuous; panicle very effuse, one-third the length of the culm or more, the capillary branches long and sparingly divided, often reflexed at maturity, and somewhat scabrous, the axils sometimes sparsely hairy, the branchlets or pedicles long, naked, and terminated by a single spikelet, spindle shaped or obovate, 1 to 1½ lines long, acute; the lower glume very minute (one-sixth to one eighth as long as the spikelet); second and third glumes acute, ciliate near the apex, or in southwestern specimens (var. *pubiflorum*) pubescent all over, but little longer than the acute flowering glume.—Illinois to Texas and the Southern States.

51. *P. Hallii* Vasey. Bull. Torr. Club, xi. p. 61. Culms slender, 1 to 2 feet high, branching; leaves slender, 4 to 6 inches long; sheaths sparsely pubescent or smooth; panicle open, diffuse, 4 to 5 inches long, sparsely flowered; spikelets 1½ lines long, acute, smooth; lower glumes half as long as spikelets, perfect flower a little shorter.—Texas. More slender than *P. capillare*, with smoother culms, smaller panicles, stouter branches, and rather larger spikelets.

This species has resemblance to *P. capillare* on one side and to *P. proliferum* on the other. From the first, it is distinguished by its more erect slender culms, never more than sparsely pubescent, smaller panicle, with erect-spreading stouter branches, and usually larger or thicker spikelets; from the second, by its smaller size, more erect culms, and smaller panicles, with shorter branches.

52. *P. proliferum* Lam. (Gray's Manual, 6th ed., p. 630.) Annual; culms usually thickish, often succulent, branching, geniculate at the decumbent or procumbent base, 1½ to 3 feet long, glabrous; leaves linear, 6 to 12 inches long, sheaths flattened, glabrous, ligule ciliate; panicles terminal and lateral, 4 to 12 inches long, the long, slender primary branches at length spreading and diffuse; spikelets 1 to 1½ lines long, pale green, sometimes purplish, appressed, short pediceled, lower glume broad, obtusish, about one-fourth as long as the spikelet; perfect flower a little shorter than the spikelet.—Damp places, Maine to Texas.

VAR. GENICULATUM (*P. geniculatum* Ell.) Culms 3 to 6 feet high, succulent, sometimes nearly an inch thick at the base, bent and branching at the joints, leaves sometimes 2 feet long and 6 to 10 lines wide; sheaths much inflated when young, sometimes a little hairy at the base; panicle sometimes 2 feet long, very diffuse. A valuable grass.—Southern States to Texas.

53. *P. miliaceum* Linn. Sp. Plant, 86. Culms 2 to 4 feet high, erect, branched, pubescent; sheaths loose, striate, hirsutely pubescent; leaves flat, linear-lanceolate, 6 to 10 inches long, 4 to 8 lines wide, smoothish above, sparsely pubescent below; panicle oblong, nodding, 6 to 10 inches long, branches verticillate, erect-spreading (not diffuse), solitary or in pairs, angular, hispid, or scabrous; spikelets ovate, acuminate, glabrous, 2 lines long; lower glume broad, very acuminate, 5-nerved, about one-half as long as the spikelet; the third glume 7- to 9-nerved, a little longer than the oval, acute, biconvex, perfect flower.—Cultivated and rarely escaped from cultivation. Valuable for forage.

54. *P. verrucosum* Muhl. (Gray's Manual, 6th ed., p. 631.) Culms slender, 1 to 3 feet long, somewhat branching, smooth; leaves linear-lanceolate, 3 to 4 inches long, 2 to 3 lines wide, and with the sheaths glabrous; panicles mostly terminal, 6 to 10 inches long, diffusely-spreading, branches mostly single, capillary, rather few flowered; spikelets ¾ to 1 line long, obovate or oval, obtuse or abruptly acute; the outer glumes roughened with fine warts, the lower one about one-fourth as long as the spikelet; perfect flower acute, about equaling the spikelet.—New England to Florida and Mississippi.

55. *P. sparsiflorum* Vasey. (*P. angustifolium* Chapm. non Ell.: Chapm. Fl. S. States, p. 574.) Culms weak, slender, smooth, 1 to 2 feet long, diffusely branched from the base; leaves linear, 3 to 5 inches long, 1 to 2 lines wide; sheaths short; nodes thickened; panicles simple, terminal and lateral, 3 to 5 inches long, the few branches single, capillary, distant, 1 to 3 inches long, bearing each 2 to 6 spikelets, mostly in pairs at the end of the branchlets; spikelets oblong-obovate, acute, 1½ lines

what oblong in outline, 4 to 6 inches long, open and becoming spreading, branches verticillate; spikelets $1\frac{1}{2}$ lines long, slightly pubescent or smooth, oblong-ovate to obovate; the lower glume acutish, nearly one-half as long as the spikelet, second and third equal, many nerved; perfect flower oblong, pointed.—New England to Virginia, North Carolina, and westward to Illinois.

46. *P. latifolium* Linn. (Gray's Manual, 6th ed., p. 632.) Culms 1 to $2\frac{1}{2}$ feet high, smooth, mostly simple, the nodes (generally) and the collar of the sheath soft woolly-hairy; sheaths smooth or more or less pubescent; leaves broadly lanceolate from a cordate, clasping base, 3 to 4 inches long, $\frac{3}{4}$ to $1\frac{1}{4}$ inches wide, tapering to a point, roughish above, smooth, or sparsely hairy below, 11- to 13-nerved; panicle more or less exserted, becoming long-peduncled, 2 to 4 inches long, the branches mostly alternate, spreading, rather few flowered; spikelets $1\frac{1}{2}$ to 2 lines long, obovate, sparsely pubescent; the lower glume one-third, or less than one-half as long as the spikelet, upper one about 9-nerved.—Maine to Texas.

Var. MOLLE. Downy all over.—Virginia to Louisiana.

Var. AUSTRALIS. Leaves more contracted at base, and spikelets larger (2 to $2\frac{1}{2}$ lines).—Alabama to Texas.

47. *P. scabriusculum* Ell. & Chapm. (Chapm. Fl. S. States, p. 576). (*P. Nealleyi* Vasey.) Culms 3 to 4 feet high, firm, smooth, rarely branched; leaves linear-lanceolate, 4 to 8 inches long, one-half inch wide, long-pointed, firm, mostly smooth except near the base; sheaths shorter than the joints, mostly smooth, or sometimes sparsely pubescent; panicle larger, 5 to 8 inches long, diffuse, smooth, branches mostly alternate, much divided, the larger ones 3 inches long; spikelets ovate, acutish, sparingly pubescent when young, becoming smooth; lower glume small; second glume strongly 7- to 9-nerved.—North Carolina to Texas.

This is the *P. scabriusculum* described by Chapman, but does not appear to me to answer that of Elliott, who compares his with *P. virgatum*.

48. *P. capillare* Linn. (Gray's Manual, 6th ed., p. 630.) Culms 10 to 20 inches high, mostly branched at the base, rather robust, erect or ascending; sheaths and usually the leaves copiously hairy or hirsute; panicles, lateral and terminal, half to two-thirds the length of the plant, vaginate below, much branched, the branches divaricate when old; spikelets ovoid to oblong or lanceolate, obtusish, acute or even acuminate, $\frac{3}{4}$ to nearly 2 lines long, smooth, on long capillary pedicels; lower glume one-half to two-thirds as long as the spikelet, obtuse to acuminate, fertile flower obtusish, rather shorter than the spikelet.—All over the continent.

Var. CAMPSTRE Gattinger. Culms slender, $1\frac{1}{2}$ to 2 feet high, much branched, leaves and sheaths sparsely hirsute, panicle, rather pyramidal, much shorter than in the type, 4 to 6 inches long, more open and thinly flowered, spikelets three-fourths of a line long, smooth, oblong, rather acute, lower glume obtusish.—Tennessee (*Dr. Gattinger*).

Var. FLEXILE Gattinger. Culms slender, $1\frac{1}{2}$ to $2\frac{1}{2}$ feet high, branched below, leaves linear, 6 to 10 inches long, narrow, erect, smooth or smoothish, sparsely ciliate on the margins and sheaths, panicle longer and narrower than in the preceding, 5 to 9 inches long, 2 to 4 inches wide, branches slightly spreading, single or in twos, smooth; spikelets $1\frac{1}{2}$ lines long, lanceolate-acuminate, lower glume acute, perfect flower one-third shorter than the spikelet.—Tennessee (*Dr. Gattinger*).

49. *P. capillarioides* Vasey. Contr. U. S. Herb. 1, p. 54. In habit and appearance much like *P. capillare*, but generally less hirsute, and with a smaller panicle. The branches of the panicle are more rigid. The spikelets are twice as large and more clustered at the end of the branches. They are 2 lines or more long; long-conical and acuminate.—Texas (*Mr. G. C. Nealley, Miss Mary B. Croft*).

50. *P. autumnale* Bosc. (Gray's Manual, 6th ed., p. 630.) (*P. divergens* Muhl.) Culms 12 to 18 inches high, erect or decumbent below; leaves comparatively small, 2 or 3 inches long, 2 to 3 lines wide, smooth except on the scabrous or undulate margins; sheaths smooth or the lower ones, sparsely hairy, ligule membranaceous, obtuse,

mostly longer than the internodes, ligule obsolete; panicle oblong, rachis zigzag, 1 inch long; lower branches subverticillate, short; spikelets about $1\frac{1}{2}$ lines long, pubescent; lower glume ovate, one-fourth as long as the spikelet; second and third glumes with 5 to 7 broad nerves, the third hardly as long as the flowering glume.—Nebraska (*Dr. T. E. Wilcox*). Perhaps a depauperate form of the preceding.

41. *P. sphærocarpon* Ell. (*Chapm. Fl., S. States, Suppl. p. 667.*) Culms 15 to 24 inches long, 5 to 7 lines wide, lanceolate, acute, obscurely nerved, smooth except at the ciliate-cordate base; sheaths shorter than the joints, smooth; panicle 3 to 4 inches long, spreading; spikelets oval, five-eighths to three-fourths of a line long, smoothish lower glume one-third as long as the spikelet.—Dry or moist ground, of same range as the next species. Differs from *P. dichotomum* in its wider, more rigid, smooth, pale leaves, with cordate base.

Var. FLORIDANUM. Culms $1\frac{1}{2}$ to $2\frac{1}{2}$ feet high, rigidly erect; leaves rigid, erect, 6 to 7 on the culm, lanceolate, smooth, about 3 inches long, 5 to 6 lines wide, the margins near the base, and sheaths ciliate; panicle oval to oblong, 3 to 5 inches long, and spikelets one-half line long, pubescent, the lower glume $\frac{1}{2}$ or $\frac{1}{3}$ as long as the spikelet.—Florida.

Described by Dr. Chapman as *P. sphærocarpon* Ell., but it hardly agrees with Elliott's description. It is intermediate between *P. microcarpon* and *P. sphærocarpon*.

42. *P. microcarpon* Muhl. (*Gray's Manual, 6th ed., p. 633.*) (*P. multiflorum* Ell.) Culms 2 to 3 feet high, stout, erect, smooth; leaves 4 to 7 inches long, 9 to 12 lines wide, lanceolate, gradually tapering to a slender point, with nine to eleven nerves, roughish above and on the margin, sometimes bristly-ciliate at the rounded, clasping base, smooth on the under side, sheaths mostly longer than the internodes, smooth except on the margins; ligule nearly obsolete, panicle becoming long-peduncled, 3 to 7 inches long, 1 to 2 inches broad, spreading, multiflorous, branches mostly verticillate, very numerous, flowering to the base, spikelets mostly long-pedicelated, oval, five-eighths of a line long, nearly smooth, lower glume one-fourth as long as spikelet, second glume 7-nerved.—Low ground, Massachusetts to Texas.

43. *P. viscidum* Ell. (*Gray's Manual, 6th ed., p. 632.*) Culms 2 to 4 feet high, stout, becoming much branched, leafy, velvety-downy all over, except a narrow ring below each node; sheaths soft-downy, the hairs spreading or reflexed and often viscid, leaves downy or smoothish, lanceolate, 4 to 8 inches long, diffuse, the branches numerous and much subdivided, spikelets fully 1 line long, oblong-obovate, pubescent, lower glume one-fourth to one-fifth as long as the 7- to 9-nerved upper one.—Common.

44. *P. commutatum* Schultes. (*Chapm. Fl., S. States, Suppl. p. 667.*) (*P. nervosum* Muhl.) Culms 2 to $2\frac{1}{2}$ feet long, erect, unbranched, rather slender, smooth; leaves at the base rigid, ovate-lanceolate, the three or four culm leaves firm but not rigid, mostly 3 to 4 inches long, 8 to 12 lines wide, acuminate, cordate at base, smooth except on the margins, sheaths smooth or somewhat pubescent, much shorter than the nodes; panicle peduncled, 3 to 5 inches long, 2 to 3 inches wide, open, rather thin, branches smooth, single or subverticillate; spikelets rather long-pedicelated, oblong, sparsely hairy, 1 to $1\frac{1}{2}$ lines long; lower glumes one-third as long as the spikelet, second about 5- and third 7-nerved.—Pennsylvania to Texas. A fine species, in appearance like *P. clandestinum*, but more slender, with shorter leaves and smaller spikelets, which are early deciduous.

Var. MINOR, differs from the preceding in its rather smaller size ($1\frac{1}{2}$ to 2 feet), and smaller panicle, and the spikelets more persistent.—Southern States.

45. *P. clandestinum* Linn. (*Gray's Manual, 6th ed., p. 632.*) Culms rigid, 2 to 3 feet high, leafy to the top, rarely branched, upper nodes smooth, the lower often hairy; sheaths smoothish, or the lower ones often rough with papillose, bristly hairs, shorter than the internodes, leaves large, lanceolate to oblong-lanceolate, 4 to 8 inches long, 9 to 15 lines wide, with a cordate, clasping base, very taper-pointed, smooth except the rough margins; panicle at first partially sheathed, becoming long-pedunculate, some-

than 1 line long, smooth, oblong, acutish, the lower glume ovate, acute or acutish, nearly half as long as the spikelet, fertile flower shorter than the spikelet.

35. *P. neuranthum* Griseb. (Pl. Cubens. p. 232). Erect or ascending, about 1 foot high, slender, smooth; leaves linear-acuminate, 2 to 4 inches long, firm, flat or subinvolute; terminal panicle long exserted, 1 to 2 inches long, with few-flowered, divergent branches, the lateral panicles numerous, narrow, short (less than 1 inch long), oval, pubescent; lower glume minute, deltoid, nearly nerveless, one-third to one-fourth as long as the spikelet, second and third 7-nerved, equaling the fertile flower, which is ovoid, obtuse, and smooth.

Var. RAMOSUM Griseb. Ascending, much branched, leaves flat or involute, very narrow; spikelets 1 line long, elliptical, obtuse.—South Carolina, Florida, to Texas.

36. *P. Joorii* Vasey. Culms about 1 foot high, much branched above, very leafy; leaves 4 to 6 inches long, 6 to 10 lines wide, thinnish, smooth, those of the extreme branches smaller; panicles numerous, small, inclosed in the sheaths, few-flowered; spikelets oblong, over 1 line long, sparsely pubescent.—Louisiana (*Dr. J. F. Joor*) and Mississippi (*S. M. Tracy*).

This is very unusual in its abundant large leaves and condensed form, growing in dense tufts.

37. *P. nudicaule* Vasey. Culms $1\frac{1}{2}$ to 2 feet high, slender, with 2 or 3 long internodes; leaves mostly near the base, linear-lanceolate, 2 to 4 inches long, 2 to 3 lines wide, smooth, light green, the 2 to 3 culm-leaves distant, narrow, giving the culm a naked appearance; panicle long exserted, small, smooth, 2 to 3 inches long, 1 inch wide, sparsely flowered, branches alternate; spikelets elliptical-oblong, acute, $1\frac{1}{2}$ lines long, smooth, the lower glume very small (one-fifth as long as the spikelet); second glume 7-nerved; third, 5-nerved; fertile flower one-fourth shorter than the spikelet.—Swamps, Santa Rosa County, Florida (*A. H. Curtiss*).

38. *P. consanguineum* Kth. (Gray's Manual, 6th ed., p. 633) (*P. villosum* Ell.) Culms about $1\frac{1}{2}$ feet high, erect, branching in age; leaves linear-lanceolate, mostly about 3 inches long, 2 to 5 lines wide, the later ones almost filiform, somewhat pubescent, sheaths villose; panicle 2 to 3 inches long, open, rather thin; spikelets 1 to $1\frac{1}{2}$ lines long, pubescent.—South Carolina to Florida.

39. *P. scoparium* Lam. (Gray's Manual, 6th ed., p. 632). (*P. pauciflorum* Ell.) Culms erect, becoming branched and reclining, 1 to 2 feet high, somewhat scabrous; leaves erect, about 3 inches long, 4 to 5 lines wide, faintly nerved, scabrous on the margins, hairy fringed near the base, the sheaths bristly with stiff spreading hairs or smoothish; the panicle 2 to 3 inches long, spreading, open, branches smooth, mostly simple, alternate, rather few-flowered; spikelets $1\frac{1}{2}$ to $1\frac{3}{4}$ lines long, oval to obovate, hairy or smoothish; lower glume about one-third as long as spikelet.—New England to California and southward. A widespread species.

Var. MAJOR (*P. scoparium* Ell.). This differs from the preceding in its stouter, rougher culm, larger leaves, 4 to 6 inches long, three-fourths of an inch wide (1 to $1\frac{1}{2}$ inches wide, Elliott), soft-pubescent below, and its spikelets 2 lines long.—We have only seen this from South Carolina (*Dr. Ravenel*).

Var. ANGUSTIFOLIUM. Culms tall and erect, 2 to 3 feet high, branching; leaves longer and narrower than the type, 3 or 4 inches long, 3 to 4 lines wide, rather rigid; sheaths sparsely pubescent; panicle long-exserted, 3 to 4 inches long.—South Carolina (*Dr. Ravenel*), Illinois (*Dr. Schenck*) and Fortress Monroe, Va. (*Dr. Vasey*).

Var. LIEBERGII (*P. Liebergii* Scribn.) Culms tall and erect, unbranched, 2 feet high; leaves lanceolate, distant, 3 to 4 inches long, 6 to 9 lines wide, scabrous or papillose, hairy, about 11-nerved; sheath shorter than the internodes; panicle about 3 inches long, 1 inch wide, the fewish branches erect-spreading and few-flowered.—Plymouth County, Iowa (*John Lieberg*).

40. *P. Wilcoxianum*. Culms about 6 inches high, entire or sparingly branched and with the leaves more or less white-hairy; leaves linear-lanceolate, erect, acuminate, 2 to 3 inches long, hairy both sides, rather rigid, sheaths striate, hairy,

pillary, numerous flowered; purplish spikelets on pedicels 2 to 4 times as long, oval, one-half to two-thirds line long, pubescent, the lowest glume one-fourth to one-third the length of the spikelet.

Var. MINOR (*P. ramulosum*, of Chapm. Suppl., but I think can not be the plant of Michx.). Lower than the type (6 to 8 inches high); tufted; leaves narrower and smaller; panicle 1 to 1½ inches long; rachis smooth; spikelets smooth or nearly so; second and third glumes 5-nerved.—Florida.

Var. ENSIFOLIUM (*P. ensifolium* Baldw.). Radical leaves linear-lanceolate, 1½ inches long, smooth, those of the slender (8 to 12 inches long) culm distant, small (about one-half inch), and horizontally divergent; panicle depauperate, less than an inch long, the rays single and few-flowered.—Florida. Described from Dr. Chapman's specimens.

Var. MAJOR. Here could be placed several variable forms, mostly smooth, but with stouter culms, a more open, less dense panicle, with fewer and stouter branches (sometimes reflexed), and fewer and larger spikelets.

33. *P. laxiflorum* Lam. (Gray's Manual, 6th ed., p. 633.) Culms erect, weak, 6 to 18 inches high, rarely branched, smooth below the panicle; leaves linear or lanceolate-linear, 3 to 7 inches long, 3 to 4 lines wide, mostly radical, the 2 or 3 of the culm little shorter, acuminate, nearly smooth except on the ciliate margins, pale green or yellowish-green; sheaths mostly shorter than the leaves, sparsely and retrorsely villose; ligule a ring of soft, white hairs; panicle capillary, 2 or 3 inches long; branches sparingly divided from the base, mostly single, alternate and few-flowered, spreading; the rachis and branches sparsely long-hairy; spikelets long-pedicel, 1 line long, oval or elliptical, obtuse, strigosely pubescent, lower empty glume ovate, 1-nerved, one-quarter as long as the spikelet; second and third glumes 7- to 9-nerved; fertile flower as long as the spikelet, acutish.—In sandy woods.

Var. PUBESCENS. Culm rather stouter, and pubescent, 12 to 15 inches high; leaves hairy, shorter, lanceolate, the lower 2 to 2½ inches long, 3 to 5 lines wide, the upper about 1 inch, upper sheath elongated; panicle 2 to 3½ inches long, the branches and spikelets more numerous, and spikelets smaller; lowest glume roundish ovate, one-third as long as the spikelets; second and third glumes 5- to 7-nerved. Closely approaches *P. nitidum*, and is perhaps the *P. nitidum* var. *ciliatum* Torr.

34. *P. dichotomum*, Linn. (Gray's Manual, 6th ed., p. 633.) Culm 10 to 30 inches high; at first mostly simple, smooth, or pubescent, bearing a more or less exserted, spreading, compound panicle, 1 to 4 inches long, and lanceolate, flat leaves; those of the culm larger above, 3 to 4 inches long; those at the root tufted, usually ovate-lanceolate, short, and thick; the culms commonly branching later in the season, the branches often clustered, and bearing smaller, mostly included panicles; spikelets ¾ of a line long oblong-obovate, pubescent or downy, lower glume one-third as long as the spikelet.

Var. BARBULATUM. With the nodes barbed, and with the sheaths smooth or pubescent.

Var. VIRIDE. Smooth all over, leaves light green and narrower.

Var. DIVARICATUM. Erect, 6 to 9 inches high, slender, smooth, very much branched above the base, caespitose, the radical leaves very short and tufted, those of the culm and branches very narrowly linear or involute, acuminate, about 1 inch long, divaricate, the numerous panicles small, racemose, few-flowered; the spikelets on alternate filiform pedicels ¼ to 1 inch long; spikelets three-fourths of a line long, oval-oblong, smooth; third glume equaling the spikelet 7-nerved; fertile flower as long as the spikelet.

Var. VILLOSUM (*P. villosum* Ell.). Culms decumbent, branching from the first; leaves scabrous above; ciliate, sheaths and culms villous, panicle thinner and fewer-flowered.

Var. ELATUM. Culms tall (2 to 3 feet), erect, smooth; cauline leaves 4 to 5 inches long, 5 to 6 lines wide, smooth, very acute; panicle 4 inches long, smooth; the branches long, erect, spreading, rather sparsely flowered; spikelets a little more

nerved, the lower one-half as long as the spikelet, third glume longer than the second and having a thick, rigid, obovate palet rather longer than its glume, and spreading apart from it, hence probably the name *hians*, from *hio*, to gape.—North Carolina to Texas.

27. *P. ciliatissimum* Buckl. Culms procumbent and much branched, often rooting at the joints, at first short-jointed and much condensed, with leaves 1 to 1½ inches long, and the panicles short and invaginate, becoming elongated, with long-exserted peduncle (lateral and terminal) becoming 1½ to 2 inches long, narrow, with a few short, few-flowered, appressed branches, and linear-lanceolate, acuminate leaves 2 to 4 inches long, ciliate on the margins below, with sparsely ciliate and hairy sheaths, the nodes white-woolly; spikelets ovate, acute, 2 lines long, pubescent or villous; the lower glume lanceolate, acute, 3-nerved, smooth, except at the base, two-thirds as long as the spikelet; second 11- to 13-nerved, pubescent to densely villous, with a smooth, acute, hardened point; the third, or flowering glume of the sterile flower a little shorter than the second, 5-nerved, ciliate on the margins, its palet equally long, ovate, thin; the fertile flower one-fourth to one-third shorter than the largest glume, obtusish, minutely furrowed.—Texas.

§ 7. EUPANICUM Benth.

28. *P. Xanthophysum* Gray. (Gray's Manual, 6th ed., p. 631.) Culms erect, 1 to 2 feet high, simple or branched near the base; leaves lanceolate, acuminate, 4 to 6 inches long, 5 to 10 lines wide, smooth, except the scabrous margins, strongly 9- to 11-nerved, rather contracted at the ciliate, clasping base; panicle long-exserted, 2 to 4 inches long, of a few, simple, erect or appressed, few-flowered branches; spikelets obovate, 1½ lines long, minutely downy; lower glume about half the length of the spikelet, second and third about 9-nerved. Plant yellowish green.—Canada to Pennsylvania and Wisconsin.

29. *P. pedicellatum* Vasey. Culms 1 to 2 feet high, slender, branching below, smooth; culm leaves 2 to 3 inches long, 2 to 3 lines wide, gradually tapering to an acute point, erect, somewhat rigid; main panicle long-exserted, the lateral ones less so, all small and few-flowered, 1½ to 2 inches long, of 4 or 5 short branches, each only 2- to 3-flowered; spikelets long-pedicelated, oblong-obovate, obtuse, 1½ lines long, slightly pubescent, the lowest glume at some distance from the others, ovate, 1-nerved, nearly half as long as the spikelet; second and third glumes oblong, obtuse, 7-nerved.—Texas (*J. Reverchon*).

Resembles *P. angustifolium*, Ell., but is smaller, with smaller, fewer-flowered panicle, and rather smaller spikelets.

30. *P. depauperatum*, Muhl. (Gray's Manual, 6th ed., p. 633.) Culms erect, simple, tufted, 6 to 16 inches high; leaves of the culm about three, erect, narrowly linear, 3 to 6 inches long; sheaths usually pubescent; panicle small, 1 to 2 inches long, contracted sometimes overtopped by the upper leaves; spikelets 1 to 1½ lines long, obovate; lower glume one-third the length of the 7- to 9-nerved upper ones.—New England, New York, Pennsylvania, Virginia, Florida, Texas, Arkansas and Missouri.

31. *P. angustifolium* Ell., *non* Chapman. Elliott's Bot. S. Car., i. p. 129. Culms weak, slender, smooth, 1 to 2 feet long, diffusely branched from the base; leaves linear, 3 to 5 inches long, 1 to 2 lines wide; sheaths short, nodes thickened; panicles simple, terminal and lateral, 3 to 5 inches long; the few branches single, capillary, distant, 1 to 3 inches long, bearing each 2 to 6 spikelets (mostly in pairs at the end of the branches); spikelets oblong-obovate, acute, 1½ lines long, the outer glumes papillose-hispid, the lower one minute, acutish.—South Carolina to Texas.

32. *P. nitidum* Lam. (Gray's Manual, 6th ed., p. 632.) Culms 10 to 20 inches high, slender but firm, rarely branched, smooth; leaves mostly at the base of culm, lanceolate or lance-linear, 1 to 2 inches long, rather rigid, and with the sheaths smooth, the culm leaves few and smaller; panicle ovate or oblong, 1½ to 2½ inches long; branches verticillate below, the lower ones 1 to 1½ inches long, spreading, ca-

inches long; rachis hairy; spikelets in pairs or in small clusters, $1\frac{1}{2}$ lines long, acutish, lower glume about one-third as long as the spikelet, deltoid, second and third glumes 5- to 7-nerved, and cross-nerved.—Texas.

Var. MAJOR. Culms stouter, 2 to 3 feet high; branched; sheaths and leaves scabrous-punctulate or smoothish, leaves broader, acuminate; panicle fuller, 3 to 6 inches long, branches more numerous (up to 20 or 30), scattered and fasciculate; rachis and branches scabrous, and with scattered hairs.

Var. FASCICULATUM (*P. fasciculatum* Swartz). Leaves longer and wider (8 to 10 lines wide), panicle 4 to 5 inches long, the branches very numerous, spikelets becoming dark brown.—Southern Florida.

21. *P. grossarium* Linn. Amoen. v. p. 392.

Specimens from ballast ground at Philadelphia have been referred to this species, but if correct it seems too near *P. fuscum*.

§ 6. POLYSTACHYÆ Benth.

Small forms *P. anceps* might come in this group.

22. *P. barbinode* Trin. (PARA GRASS). (Icon. XXVII. t. 318), (*P. molle* Swartz). Culms 2 to 6 feet high, stout, ascending; nodes villous; leaves linear-acuminate, glabrescent; panicle lax, 6 to 8 inches long; branches mostly simple, fascicled, spreading, about 2 inches long, somewhat distant; spikelets 1 to $1\frac{1}{2}$ lines long, glabrous, one-sided, spreading; lowest glume deltoid, one-fourth as long as the spikelet, 1-nerved, second and third equaling the spikelet, 5-nerved; fertile flower ellipsoidal, bluntish.—Introduced and cultivated in the South.

23. *P. gymnocarpon* Ell. (Chapm. Fl. S. States, p. 573.)—Perennial. Culms 2 to 4 feet high, erect, rigid, smooth; leaves lanceolate, smooth, 1 foot long or more, 1 inch or more wide, cordate at base; sheaths shorter than the internodes, striate, nodes black; panicle large, 9 to 15 inches long, branches 4 to 6 inches long, erect-spreading, scattered or 2 to 3 together, racemose; spikelets in nearly sessile clusters of 3 to 6, appressed along the branches, somewhat one sided, $2\frac{1}{2}$ to 3 lines long, lanceolate; outer glumes nearly alike, lanceolate-subulate, rough-keeled, 2 to 3 times longer than the perfect flower; first glume 3-nerved, a little to one-third shorter than the second and third about 5-nerved; the third glume or neutral flower with a palea one-half as long.—Florida to Texas.

24. *P. repens* Lim. (Chapm. Fl. S. States, suppl., p. 666.) Culms $1\frac{1}{2}$ to 2 feet high, from strong creeping rhizomes, leafy, covered below with loose sheath with short or deficient blades, the blades becoming longer upward, conduplicate or involute, the uppermost 3 to 4 inches long, sometimes pubescent at the base; panicle erect, thin, 3 to 4 inches long; the branches alternate, naked at base, erect or slightly spreading, the lower ones each with 2 or 3 rather long, appressed branchlets, short-pedicelated and appressed, interrupted or racemose along the slender branches, 1 line long, oval, acute, smooth; the lower glume broad, obtuse, one-third as long as the spikelet, second and third about 7-nerved.—Sandy shores of the Gulf, Florida to Texas.

Var. CONFERTUM Vasey. Culms shorter, leaves very divergent and rigid, panicle more condensed, the branches shorter and spikelets more crowded, lower glume rather longer and less obtuse.—Mobile, Ala., to Vera Cruz, Mex. (2177 *F. Muller.*)

P. anceps Michx. See No. 55.

25. *P. laxum* Swartz. (Griseb. Fl. W. Indies, p. 548), of this group, common in the West Indies, is probably also in southern Florida, but I have seen no authentic specimens.

26. *P. hians* Ell. (Chapm. Fl. S. States, p. 573.) Perennial. Culms slender, smooth, 6 to 18 inches high, simple, from slender, wiry, creeping root-stocks; leaves linear, 3 to 5 inches long, 1 to 2 lines wide, smooth, erect; panicle rather small, 3 to 5 inches long, the slender, racemose branches 1 to 2 inches long, erect-spreading, mostly single and distant, the lower third naked; spikelets about 1 line long, in small, nearly sessile, approximate clusters; outer glumes ovate, acute, generally 3-

3 to 5 inches long, below with 5 or 6 short, approximate, appressed, rather lax branches, $\frac{1}{2}$ inch to 1 inch long; spikelets 1 line long, a little curved; lower glume one-half as long as the spikelet; second glume 7-nerved; third glume 5-nerved; rachis with a short bristle at apex and sometimes a bristle below the spikelets.—Texas (*Buckley, Nealley*). These three (12, 13, and 14) form a natural group. Leaves shorter and more rigid, spike shorter and closer, and spikelets smaller than in the preceding.

15. *P. stenodes* Griseb. Fl. W. Ind., p. 547. (*P. anceps* var. *strictum* Chapm.) Culms 2 to 3 feet high, wiry, smooth; leaves erect, rigid, narrow (1 to 2 lines), 3 to 4 inches long; panicle narrow, 2 to 3 inches long, of five to six slender, short, appressed branches, sessile or nearly so, mostly single, sometimes two or three together; spikelets about 1 line long, lanceolate, acute; first glume half as long as the spikelet; second and third 5-nerved, acute.—In ponds and water, Florida to Alabama (*Dr. Mohr*) and Texas (*Nealley*).

§ 4. PLATYPHYLLA Vasey.

16. *P. platyphyllum* Munro. Culms decumbent and rooting at the lower joints, 1 to 2 feet high, branching below, pale green in color; leaves lanceolate, 3 to 4 inches long, 4 to 6 lines wide, smooth, firm, the base clasping; margins scabrous, pale green; sheaths smooth, striate, the upper one inclosing the base of the panicle consisting of 3 to 5 simple, sessile, alternate, slightly spreading, distant branches, each $1\frac{1}{2}$ to 3 inches long; spikelets sessile, and alternate on a flattened rachis; lower glume thin, obtuse, one-third as long as the second and third, the latter 5-nerved, smooth, and one-third longer than the obtuse fertile flower; sterile flower a glume only.—Texas (*E. Hall, G. C. Nealley*).

17. *P. plantagineum* Link: Hort. I. 206. Much like the preceding, but stouter and larger, with longer and wider leaves (6 to 10 inches by 6 to 9 lines); the spikes more remote, longer (2 to 4 inches), and the lower peduncled in the sheaths; spikelets much like the preceding.—Introduced on ballast ground at Philadelphia.

§ 5. BRACHIARIA Benth.

18. *P. prostratum* Lam. (Chapm. Fl. S. States, suppl., p. 666. *P. cæspitosum* Swartz?) Culms creeping and rooting at the base, then ascending, 1 to 2 feet long, with rather distant leaves ($1\frac{1}{2}$ to 2 inches long), lanceolate or ovate-lanceolate, acute, clasping at the ciliate base; sheaths shorter than the internodes; panicle exserted, short, about 2 inches long, of 5 to 8 simple or sub-simple branches, the lowest 1 to $1\frac{1}{2}$ inches long, closely flowered; rachis frequently with stiff hairs; spikelets three-quarters of a line long, smooth; first glume one-quarter as long as the spikelet, second and third equal; perfect flower striate-punctulate, mucronate-pointed. Our specimens agree with *Trinius*, Fig. 185 A.—Louisiana (*Langlois*) and Texas (*Nealley*).

19. *P. cæspitosum* Swartz.? (Swartz. Fl. W. Indies.) Culms numerous, succulent, and thickish, rooting at the base, ascending to 1 or 2 feet long; leaves crowded below, erect, linear-lanceolate, 2 to 4 inches long, 3 to 4 lines wide, ciliate on the margins, striate; lower sheaths inflated; panicle about 2 inches long, of 5 to 8 branches becoming long exserted; rachis and branches hairy and angular, lower branches about 1 inch long; spikelets $1\frac{1}{2}$ to $1\frac{1}{2}$ lines long, ovate-oblong, acute, lower glume one-third as long as the spikelet; perfect flower as in the preceding, but larger. The whole plant pale green.—Probably in Texas and New Mexico, certainly in Chihuahua, Mexico (*Pringle*, No. 375).

20. *P. fuscum* Swartz. (*P. fasciculatum* Swartz: Chapm. Fl. S. States, p. 574.) Culms 1 to 3 feet high, decumbent and branching at base; leaves linear or lanceolate-linear, 3 to 10 inches long, glabrous or pubescent; panicle 3 to 6 inches long, spreading, the branches simple or more or less fasciculated below, the lower about 2

rooting; at the lower joints; leaves linear-lanceolate, plane, rigid, 6 to 9 inches long, 6 to 9 lines wide, smooth; sheaths smooth or hairy; panicle slender, spike-like, 6 to 8 inches long, of numerous appressed slender, single, or fascicled branches, the lower ones remote; spikelets ovate-lanceolate, acutish, about 1 line long; lower glume acute, keeled, half as long as the spikelet; the second a little shorter than the third, which equals the acutish perfect flower; second and third glumes strongly 3- to 5-nerved, sterile flower triandrous. Closely resembles the preceding.—Ponds and swamps, Florida to Texas.

9. *P. obtusum* H. B. K. (Kunth Gram., II. t. 116.) Culms $1\frac{1}{2}$ to 2 feet high, firm, leafy; sending off long (sometimes 8 to 10 feet) runners from the base; leaves 4 to 6 inches long, 2 to 3 lines wide; panicle 3 or 4 inches long, narrow, composed of four to seven approximate, appressed, sessile branches, the lower ones about 1 inch long, the upper becoming very short, densely flowered; spikelets mostly in alternate pairs, of which one is sessile, the other short-pedicelated, forming three to four rows, turgid, oblong, obtuse, and $1\frac{1}{2}$ lines long; lower glume two-thirds as long as the spikelet, 5-nerved, second glume 7-nerved, third 5-nerved, a little longer than the fertile flower; sterile flower triandrous.—Mexico, Texas, New Mexico to Colorado.

10. *P. reticulatum* Torr. Culms 10 to 15 inches high, much branched below, leafy; leaves $1\frac{1}{2}$ to 3 inches long, acute, scabrous or pubescent, as also are the sheaths; panicle 2 to 3 inches long, lateral ones shorter, close or dense; branches single or fasciculate, unequal, $1\frac{1}{2}$ or 2 inches long, the longer with interrupted spikelets, which are about $1\frac{1}{2}$ lines long, single or in pairs, one sessile and one pedicelated, obovate, acutish; first glume one-fourth to one-third as long as the spikelet, acutish, second and third strongly 5- to 7-nerved, and conspicuously reticulately veined.—Texas to Arizona.

11. *P. Texanum* Buckley. Culms stout, 2 to 4 feet high, branching from a decumbent and sometimes rooting base, leafy, smooth; leaves lanceolate, 4 to 10 inches long, 6 to 12 lines wide, smoothish or scabrous above and on the margins; sheaths softly and sparsely pubescent, nodes pubescent; panicle (the base generally inclosed in the upper sheath) 4 to 8 inches long, $\frac{1}{4}$ to 1 inch wide, of 5 to 10 erect, rather slender, simple, erect branches 1 to 3 inches long, closely flowered; rachis scabrous-pubescent; spikelets single or in pairs, alternate along the angular rachis, oblong, lanceolate, acute, 2 to $2\frac{1}{2}$ lines long, smooth, or finely pubescent; first glume broadly ovate, half to two-thirds as long as the spikelets, acute, 5-nerved; second and third glumes equaling the spikelet, strongly 5- to 7-nerved, perfect flower ovate or oblong-ovate, acutish, transversely wrinkled with fine reticulated striæ. Cultivated for a forage grass.—Texas.

12. *P. Chapmani* Vasey. Bull. Torr. Club, XI. p. 61. (*P. tenuiculmum* Chapman Meyer.) Culms filiform, $1\frac{1}{2}$ to $2\frac{1}{2}$ feet high, erect, simple; leaves chiefly radical, linear, half as long as the culm, about 2 lines wide, upper ones shorter; panicle 6 to 12 inches long, of eight to twelve remote, slender, erect spikes, the upper ones short and few- (3- to 6-) flowered, sessile, one-half inch long, the lower longer, sometimes subdivided, and with long, sheathed peduncles; rachis flexuous, bristle-like at the apex; spikelets about one line long, ovate; lower glume one-half as long as the spikelet, obtuse; upper glume 9-nerved.—Florida (*Chapman, Curtiss, Garber*).

13. *P. Reverchonii* Vasey. (Dept. Agr. Bot. Div. Bull. No. 8, p. 25.) Culms filiform from a thick, strong rootstock, erect, 10 to 18 inches high, simple; leaves chiefly radical, long and narrow, half as long as the culm; panicle 3 to 6 inches long, slender, an interrupted spike, at least above, below with short, 3- to 5-flowered, remote, fasciculate branches; spikelets $1\frac{1}{2}$ lines long, plano-convex, obtusish; lower glume one-half as long as the spikelet, 3-nerved, second and third 7-nerved; rachis terminated by a short bristle, sometimes also a bristle below the spikelets.—Texas (*Reverchon*). Distributed by Reverchon as *Setaria uniseta*.

14. *P. subspicatum* Vasey. (Dept. Agr. Bot. Div. Bull. No. 8, p. 25.) Culms 10 to 18 inches high, leafy; upper leaves longer than the lower (lowest 1 inch, highest 5 inches), 1 to 3 lines wide, rather rigid, light green, acute; panicle spicate at apex,

lets oblong, about 1 line long, obtusish; empty glumes, mostly two (the lower one often wanting), pubescent, both equaling the flower.—In cultivated and waste grounds, less common than the following. **Var. MISSISSIPPIENSIS** Gattinger. Taller (6 to 20 inches high), spikes longer ($1\frac{1}{2}$ to $3\frac{1}{2}$ inches), spikelets acutish.—Vicinity of Nashville, Tenn. (*Dr. Gattinger*).

2. **P. sanguinale** Linn. (CRAB-GRASS). (*Gray's Manual*, 6th ed., p. 630.) Culm erect or decumbent, usually rooting at the lower joints, leaves and sheaths smooth or hairy, variable in length and breadth; spikes 3 to 10 or 15, spreading, digitate or approximate, 3 to 6 inches long; spikelets oblong-lanceolate, about $1\frac{1}{2}$ lines long, acute, smoothish, pubescent; first glume minute, second half to two-thirds as long as the spikelet, third equaling the spikelet.—Naturalized everywhere.

Var. CILIARE Vasey *Proc. Am. Acad.* xxiv. p. 80, (*P. ciliare* Retz). Glumes ciliate-fringed.

Var. SIMPSONI Vasey n. var. With the general habit of *P. sanguinale*, but perennial; culms 2 to 3 feet long, from long-rooting rhizomes; spikes about 8, each 5 to 6 inches long; spikelets about $1\frac{1}{2}$ lines long; empty glumes two, equal, smooth, 7-nerved, acuminate.—Manatee, Fla. (*J. H. Simpson*), and Mississippi (*S. M. Tracy*).

3. **P. filiforme** Linn. (*Gray's Manual*, 6th ed., p. 630), (*Digitaria filiformis* Muhl.) Culms very slender, 1 to 3 feet high, erect, simple, or sparingly branched; leaves narrowly linear, 3 to 10 inches long, erect, somewhat pubescent, and with sheaths hairy; spikes 2 to 8, erect or somewhat spreading, 2 to 6 inches long; spikelets 1 line long or less, oblong, acute; empty glumes two, the lower slightly shorter and the upper equalling the flower.—Sandy or gravelly ground; Maine to Florida and westward.

4. **P. serotinum** Trin. (*Chapm. Fl. S. States, Suppl.*, p. 666), (*Digitaria serotina* Michx.; *D. villosa* Ell.) Perennial, extensively creeping, much branched, making a thick carpet; flowering culms 6 to 10 inches; leaves short, erect, hairy, 1 to $2\frac{1}{2}$ inches long, sheaths villous; spikes 3 to 5, about 2 inches long, narrow; spikelets less than 1 line long, acute; two empty glumes, the first one-quarter to one-third as long, and the second nearly as long, as the spikelet.—North Carolina to Florida and westward.

§ 2. TRICHACHNE Benth.

5. **P. leucophæum** H. B. K. *Nov. Gen.* I. p. 97. Culms stout, 2 to 4 feet high, erect; leaves broadly linear, 1 foot long, scabrous above, ligule ciliate; panicle racemose, contracted, dense, 6 to 10 inches long; the simple branches numerous, erect, fasciculate, 2 to 4 inches long; spikelets linear-lanceolate, acuminate, about 2 lines long; lower glume minute, second nearly as long as, and the third equalling, the perfect flower, which is linear-lanceolate and mucronate-pointed.—Low, rich ground, South Florida (*Chapman, Curtiss, etc.*).

6. **P. lachnanthum** Torr. Culms rather slender, 2 to 3 feet high; leaves much narrower and shorter, panicle shorter, more slender, with fewer and shorter spikes; spikelets smaller, 1 to $1\frac{1}{2}$ lines long, ovate-lanceolate, the perfect flower ovate-lanceolate, acute and mucronate-pointed—mostly on dry hills, Texas, Arizona and New Mexico.

§ 3. SUBSPICATA Vasey.

7. **P. paspaloides** Pers. (*Chapm. Fl. S. States, Suppl.*, p. 666.) Culms 2 to 3 feet high, decumbent and rooting below, smooth, stout, leafy; leaves narrow, 6 to 10 inches long, becoming somewhat involute, and with the sheaths smooth; panicle 5 to 10 inches long, strict, of 10 to 20 appressed, sessile, simple branches, the lower ones 1 to $1\frac{1}{2}$ inches long, upper gradually shorter; spikelets ovate-oblong, obtusish, smooth, 1 to $1\frac{1}{2}$ lines long, imbricate in two rows on the narrow axis; the lower glume truncate-obtuse, one-third as long, and second glume two-thirds as long as the spikelets (also thin and obtuse).—In ditches or water, Florida to Texas and Mexico.

8. **P. Curtisii** Chapm. *Fl. S. States*, p. 573. Culms 3 to 4 feet high, often

often pubescent on the lower sheaths; leaves short, 1 to 2 inches long, narrow, racemose, the branches short and 2-flowered; empty glumes very unequal, the lower 4 to 5, the upper 6 to 7 lines long, floral glume 3 lines to the articulation, including the very slender sharp stipe; awn slender, capillary 6 to 9 lines long and twisted to the division of the equal $1\frac{1}{2}$ to 2 inches long awns.—Southern California to Arizona and Mexico. Said to be known to the Mexicans as "Hare's grass."

Var. FUGITIVA, differs from the type chiefly in the lower and more condensed habit, and in the longer empty glumes. Late in the season it is loosened from the sand and blown about by the wind.—Colorado Desert (*C. R. Orcutt*).

STIPA Linn.

Spikelets 1-flowered, terete, spicate or paniculate. Outer glumes membranaceous, keeled; flowering glume narrow, coriaceous, rigid, involute, with a simple, twisted awn from the apex; palea usually small and inclosed by the flowering glume. Stamens generally 3. The flowering glume has a hardened, often sharp-pointed and bearded pedicel or stipe at its base.

A. Panicle narrow, branches short.

1. *S. Kingii* Thurb.
2. *S. tenuissima* Trin.
3. *S. viridula* Trin.
4. *S. occidentalis* Thurb.
5. *S. stricta* Vasey.

B. Panicle more open, branches erect.

6. *S. Stillmani* Bolander.
7. *S. coronata* Thurb.
8. *S. speciosa* Trin. & Rupr.
9. *S. Parishii* Vasey.
10. *S. Scribneri* Vasey.

C. Panicle open, lower branches spreading.

11. *S. comata* Trin. & Rupr.
12. *S. spartea* Trin.
13. *S. pennata* Linn.
14. *S. leucotricha* Trin.
15. *S. setigera* Presl.
16. *S. eminens* Cav.
17. *S. avenacea* Linn.
18. *S. flexuosa* Vasey.
19. *S. Bloomeri* Boland.
20. *S. caduca* Scribn.
21. *S. Pringlei* Scribn.
22. *S. Richardsoni* Link.
23. *S. Mongolica* Turcz.

A. Panicle narrow, branches short.

1. *S. Kingii* Thurb. Bot. Cal. II, p. 287. Culms tufted, 6 to 20 inches high, covered below by the remains of numerous sheaths, slender, smooth, with but two nodes near the base; radical leaves half to two-thirds as long as the culms, setaceous.

ously involute, minutely scabrous; culm leaves two, the upper short; ligule 1 line long, acute, often cleft; panicle narrow, 2 or 3 inches long, the branches in twos or threes, the lower 1 inch or more long, erect, few-flowered; spikelets 2 lines long; empty glumes hyaline, purple-tinged, the upper about 2 lines long, the lower a little shorter; flowering glume less than 2 lines long, sparsely pubescent, and with a short, hairy callus; awn 6 lines long, bent below the middle, scabrous and persistent; palea equaling the flowering glume, hairy at the apex.—California (*Bolander's* distrib., No. 6097).

2. *S. tenuissima* Trin. Act. Petrop. 1836, p. 36. Culms densely tufted, 2 to 2½ feet high, filiform, with 2 to 3 distant nodes; leaves filiform, scabrous, the radical tufts equaling the culm, the cauline leaves similar, the uppermost sheathing the base of the panicle; the panicle narrow, 6 to 9 inches long, slender, the branches rather distant, the lower ones in two or threes, 1¼ to 2 inches long, flowering nearly to the base; empty glumes unequal, about 3-nerved, the lower 5 to 6 lines long, the upper 3 lines, including, in both, the long fine point; flowering glume about 1 line long, minutely punctate, enlarged above, with the apex constricted and crowned with a few hairs; near the base and on the very short stipe, sparsely white-hairy; the slender, flexuous awn, 2 to 3 inches long.—Texas, New Mexico, Mexico and probably Arizona.

3. *S. viridula* Trin. (Gray's Manual, 6th ed., p. 642.) (*S. parviflora* Nutt.: *S. spartea* Hook). Culms 1½ to sometimes 5 feet high, leaves all involute-setaceous at the apex; in the large forms the blade is flat and 1 or 2 feet long; in smaller forms often involute throughout, smooth, pubescent or scabrous; ligule very short; sheaths half the length of the internodes or less; panicle 4 to 18 inches long, narrow, loose, the short, erect rays in twos or threes, or even in fives; spikelets 4 to 5 lines long (excluding the awns) on shorter pedicels; empty glumes nearly equal, 3 to 5 lines long, ovate to lanceolate, bristle-pointed, the lower 5-, the upper 3-nerved, sometimes purple-tinged; flowering glume fusiform to linear-oblong, one-fourth shorter than the empty glumes, pubescent with short scattered hairs which at the apex form a thin crown, and with 2 very minute teeth, the callus short; awn from less than 1 inch to 1½ inches long, slender, flexuous, pubescent to plumose below, and scabrous above, usually twice bent, at length deciduous; palea more than half as long as its glume; anthers naked.

The above description is somewhat modified from Dr. Thurber's description in Botany of California. The species, as he says, is "very variable in the size of the culm and character of the panicle, which is usually slender and loosely flowered, sometimes reduced to a mere raceme of a few 1-flowered rays, and at the other extreme crowded and spikelike."

The principal varieties which I have indicated are:

Var. **ROBUSTA**, a large form 4 to 6 feet high, growing in dense clumps in mountain valleys, with panicle 1 foot to 18 inches long. This variety in parts of Texas and Mexico is known as sleepy grass, from an intoxicating or narcotic effect which it produces upon horses or cattle which feed upon it.

Var. **PUBESCENS**. A variety, or perhaps a species, of Nevada, Oregon, and Washington, 2 to 3 feet high, with pubescent leaves and sheaths, the awns also strongly pubescent below.

Var. **MINOR**. Smaller throughout, occurs at higher altitudes, the awns usually shorter.

Var. **LETTERMANI** Vasey. Slender, small-flowered, and short-awned.

There are many intermediate forms, probably including *S. Columbiana* Macoun.

4. *S. occidentalis* Thurb. Bot. Cal. II. p. 285. Culms slender, 1 to 2 feet high, somewhat scabrous, more or less pubescent at the nodes; radical leaves 2 to 4 inches long, those of the culm shorter, all involute, rigid and rough; sheaths shorter than the internodes; ligule conspicuous, 2 to 3 lines long, lacerate; panicle 3 to 6 inches long, the base often included, contracted; rays mostly erect, the lower in twos or threes and few-flowered, the upper solitary and 1-flowered; lower glume 5 lines long,

3- or indistinctly 5-nerved, somewhat exceeding the 3-nerved upper one; floral glume 3 to 3½ lines long, brownish when ripe, pubescent with appressed hairs, especially below; callus short, acute, the apex with a short, distinct crown of hairs; awn 1½ inches long, twice bent and plumose to the upper geniculation, with rather coarse hairs, less than a line long below and shorter above; palet one-fourth shorter than floral glume; anthers naked.

The above is essentially Prof. Thurber's description, and answers well to a portion of the specimens in the Nat. Herb., under that name; others so named have short inconspicuous ligules, and belong to the next species.

5. *S. stricta* Vasey. Bull. Torr. Club, x. p. 42. Culms tufted, 1 to 1½ feet high, erect; lower leaves 6 inches long, narrow, with long setaceous points, the upper shorter, the uppermost sheathing the base of the panicle; ligule very short and indistinct; panicle 4 to 8 inches long, strict, erect, the lower branches in twos or threes, 1 to 2 inches long, appressed, flowering to the base; outer glumes narrowly lanceolate, acuminate, 3-nerved, thin, 5 lines long; flowering glume about 3 lines long, including the acute stipe, sparsely pubescent all over; awn 1 to 1½ inches long, twice bent, the lower half strongly pubescent or nearly plumose.—Oregon and Washington.

Var. *SPARSIFLORA*. Leaves involute-filiform, shorter than in the type, the panicle thinner and fewer-flowered, the awn less pubescent.—California (*Bolander*, No. 5038 and 5020), Oregon (*Cusick*) and Washington (*Suksdorf*).

B. Panicle more open; branches erect.

6. *S. Stillmani* Bolander. (Bot. Cal. II. p. 287.) Culms tufted, stout, 3 to 5 feet high, geniculate below, smooth, except the pubescent nodes; radical leaves 12 to 18 inches long, those of the culm (4 or 5) much shorter, all glaucous, involute, at least at the long-attenuated apex, the lower 3 to 4 lines wide at the base, mostly smooth below, scabrous above and on the margins; ligule minute; sheaths loose, shorter than the internodes, striate, smooth, slightly bearded at the throat; panicle 5 to 10 inches long, narrow and spike-like, interrupted below, nearly white and lustrous, the axis puberulent with an incomplete pilose ring at the nodes; rays crowded and fasciculate, more or less united below, 1- to few-flowered; glumes nearly equal, about 9 lines long, acuminate, bristle-pointed, membranaceous-hyaline, the lower 3, the upper more or less 5-nerved at base; floret 5 lines long, with a short, one-sided, white, hairy callus; lower palet herbaceous-chartaceous, distinctly 3-nerved, sparsely pubescent throughout, the divisions of the two-cleft tip nearly a line long; upper palet similar; awn inserted below the tip of the palet, 12 to 15 lines long, tortuous, slightly bent above the middle, scabrous; stamens 3; anthers long, mucronulate.—Southern California.

7. *S. coronata* Thurb. Bot. Cal. II. p. 287. Culm 4 to 6 feet high, 3 or 4 lines thick at base, where it is clothed with the remains of old sheaths; lower culm leaves about 3 feet long, 4 to 6 lines wide at base, gradually attenuated to a long involute point, the uppermost about 6 inches long, almost filiform and rigid, all slightly scabrous on both surfaces and margins; ligule very short, lacerate-fringed; sheaths somewhat loose, the uppermost much dilated, striate, smooth, except the margins, these mostly ciliate, especially at the throat; panicle 12 to 16 inches long, at first spike-like and included for one-third or one-half its length, at length exerted and loose, but narrow, with erect branches; lower rays in pairs or threes, long and flower-bearing above, the upper in fasciated clusters and flower-bearing to the base; spikelets short-pedicelled, pale-greenish becoming purplish; glumes unequal, the 3-nerved lower about 8 lines, and the 5-nerved upper, 6 lines long, both acuminate and somewhat bristle pointed, slightly scabrous on the nerves; floret, including the brief curved callus and long hairy crown, 5 lines long; lower palet scarcely chartaceous, bifid, with delicate hyaline teeth less than a line long, clothed with silky, shining hairs, those below about a line long, the upper more numerous, forming a dense tufted

corona 2 lines long; awn about an inch long, slender, bent mostly below the middle and minutely scabrous; upper palet about half the length of the lower; stamens 3; anthers naked.—Southern California.

8. *S. speciosa* Trin. & Rupr. (Bot. Cal. II. p. 284.) "Culm 1 to 2 feet high; radical leaves half as long as the culm, the others much shorter, and with the sheaths minutely puberulent; upper sheath inflated, its leaf about 4 inches long, its ligule less than a line long, that of the lower sheaths minute and fringed; panicle 6 to 8 inches long, included below, contracted, its appressed rays mostly in pairs and 6 to 8 flowered; glumes 8 or 9 lines long, nearly equal, long-acuminate and often lacerately 2-toothed at the apex, hyaline, the lower 3- and the upper 5- or indistinctly 7-nerved; floret 5 or 6 lines long, with a short callus; lower palet one-third longer than the upper, silky pubescent throughout, slightly but distinctly 2-toothed; awn $1\frac{1}{2}$ to 2 inches long, geniculate below the middle, plumose from the base nearly to the bend, with conspicuous white silky hairs 3 lines long, smooth above; anthers 3, beardless."—California, Arizona and Nevada.

Var. MINOR. Smaller than the type, sometimes with the foliage yellowish. *S. chrysophylla* Desv. ?

9. *S. Parishii* Vasey. Bot. Gaz. VII. p. 32. Culms 1 to $1\frac{1}{2}$ feet high, leafy, especially below; leaves conduplicate or involute, smooth, rigid and divergent; lower ones 6 inches, upper ones about 3 inches long; throat of sheath fringed with a few soft white hairs; ligule very short, upper sheath long, somewhat inflated and inclosing the base of the panicle; panicle about 6 inches long, open and somewhat spreading, except at the included base; lower branches in threes, upper in pairs or single, rather few-flowered at the ends of the branches and branchlets; longest rays about 2 inches; outer glumes linear-lanceolate, acute, 3-nerved, smooth, the lower one 6 to 7 lines long, the upper 5 to 6 lines, nearly twice as long as the flowering glume with the stipe (3 to 4 lines long), densely clothed with silky hairs longer toward the apex, bidentate, the teeth less than a line long; awn 9 lines long, smooth below, scabrous above.—Collected in the San Bernardino Mountains of California by *S. B. Parish*, for whom it was named.

9. *S. Scribneri* Vasey. Bull. Torr. Club, XI. p. 125. Culms 2 to 3 feet high, stout, erect; lower leaves as long as the culm, smooth, flat below, becoming involute at the long acuminate point; upper sheath inclosing the base of the panicle, which is narrow, erect, and 6 to 8 inches long, the branches in twos or threes and appressed; outer glumes unequal, lower one 6 to 7 lines, upper about 5 lines long, both 3-nerved, acuminate; flowering glume 3 to 5 lines long, hairy; hairs longer above, and at the apex forming a white crown a line or more long; awn rather slender, 8 to 9 lines long, not hairy; stipe short, very acute, pubescent; palet less than a line long, obtuse and adherent to the grain.

Differs from *S. viridula* particularly in the unequal glumes, the hairy-crowned flowering glumes, the more slender awn, and the very short palet.—Collected on dry hillsides at Santa Fé, New Mexico.

C. Panicle open, the lower branches spreading.

11. *S. comata* Trin. & Rupr. (Bot. Cal. II. p. 285.) "Culms 1 to 4 feet high, stout, mostly scabrous; leaves involute, roughened, the radical one-fourth to one-third the length of the culm, the leaves of which are much shorter, the uppermost very small or reduced to a mere sheath; ligule conspicuous, acute, 2 to 3 lines long; sheaths loose, the uppermost somewhat inflated, smooth, at length shorter than the internodes; panicle included at base by the upper sheath, open, 8 to 12 inches long; rays ternate or in pairs, distant, few-flowered; glumes about an inch long, nearly equal, 5-nerved, with a long subulate point; floret (including callus of 2 lines) 6 lines long, readily deciduous; lower palet rather sparsely pubescent with coarse hairs, but with no distinct corona; awn 4 to 6 inches long, seldom distinctly geniculate, scabrous, especially above, shining, variously curled and twisted, soon deciduous; upper palet

equaling the lower; stamens 3; anthers mucronulate at apex (but not barbate as described by Trin. & Rupr.). Stipaceae 76; Watson, Bot. King Exped., 380; *S. juncea* Nutt. Gen., 1, 58, not Linn.; *S. capillata* Hook. Flor. Bor. Amer. II. 237, not Linn. *S. occidentalis* Bolander, Proc. Calif. Acad. IV. 169, in part.—Rocky Mountains to British America.

12. *S. spartea* Trin. (PORCUPINE GRASS). (Gray's Manual, 6th ed., p. 641.) Culms rather stout, 1½ to 3 feet high, simple, erect; sheaths longer than internode, ligule very short, obtuse; radical leaves 1 to 2 feet long, involute, pointed, those of the culm complanate or involute, 6 inches long; panicle contracted, 4 to 6 inches long, lower branches in twos, erect, rather few-flowered; spikelets large, on pedicels as long or shorter; empty glumes 12 to 18 lines long, lanceolate, subulate-pointed; flowering glume 8 to 10 lines long, including the 3 lines long, obconic, sharp-pointed stipe, brown when mature, sparsely pubescent, with a few short hairs at the crown; awn stiff, twisted, twice bent above, 3 to 6 inches long.—Plains and prairies, Missouri, Iowa, Kansas and northward.

13. *S. pennata* Linn. Var. NEO-MEXICANA Thurb. (Coulter, Rocky Mt. Fl., p. 408.) Culms tufted, 2 to 3 feet high; radical leaves half to two-thirds as long as the culm, filiform-convolute, smooth, those of the culm short, sheaths striate, equaling or longer than the internodes; panicle about 6 inches long, close, nodding, the branches erect, the lower in twos, with few large spikelets; empty glumes 1½ inches long, equal, with long, setaceous points, 7- to 9-nerved; flowering glume 7 to 8 lines long, including the obconic, brown, sharp-pointed, 3 lines long, stipe; sparsely hairy in lines, contracted below the cup-like apex; awn about 6 inches long, flexuous, twice bent, pubescent or plumose to the apex, with white hairs.—Texas, New Mexico and Arizona.

14. *S. leucotricha* Trin. & Rupr. Gram. Agrost. p. 54. Culms 1 to 2 feet high, nodes downwardly barbed with white hairs, sheaths commonly shorter than the internodes; leaves about 6 inches long, linear-convolute, filiform; panicle 3 to 4 inches long, generally included at base by the upper sheath, becoming exerted, sparsely-flowered; the lower branches in twos, unequal, erect; outer glumes acuminate, subequal, 6 to 7 lines long, 3-nerved, pale-green or colored, awn-pointed; flowering glume 4 to 5 lines long, including the stipe (white-hairy), as also the lower part of the glume, the upper part papillose-scabrous, somewhat contracted below the apex or corona, with a fringe of white hairs; awn 2½ to 3 inches long, twisted and geniculate.—Texas and New Mexico.

This is quite distinct from *S. setigera*.

15. *S. setigera* Presl. (Bot. Cal. II. p. 286.) "Culm 1 to 3 feet high, pubescent at the nodes, with radical leaves about one-third as high; culm leaves flat, 2 or 3 lines wide below, long-attenuated above, rough-pubescent and sometimes ciliate on the margins, the uppermost nearly equaling the panicle; ligule about 1 line long, truncate and split; sheaths two, pilose at throat, the lower shorter than the internode, the upper loose; panicle about 6 (sometimes 12) inches long, mostly included below, loose, flexuous, more or less secund when young, the slender rays in pairs; pedicels shorter than the spikelets; glumes 6 to 9 lines long, long-acuminate, the upper rather shorter, usually purplish, strongly 3-nerved; floret (including a callus of 1 line) 5 lines long, constricted below a distinct corona; lower palea tubercular-roughened, silky-hairy especially on the nerves; upper palea hyaline, scarcely a third as long; awn 2 to 3 inches long, slender, flexuous, more or less distinctly bent above the middle, strongly pubescent below, minutely so above, persistent; anthers bearded at the apex."—California.

16. *S. eminens* Cav. (Bot. Cal. II. p. 286.) "Culms 1 to 3 feet high, slender, pubescent at the nodes; leaves convolute-setaceous, somewhat rigid, slightly scabrous, those of the radical tufts about half as long as the culm; lower culm leaves 6 to 8, the uppermost 2 inches long; ligule very minute; sheaths striate, smooth; panicle 4 to 6 inches long, soon exerted, somewhat secund, the very slender

rays short, in pairs, few-flowered; lower glume about 5 lines long, the upper 4 lines, acuminate, 3-nerved, purplish; floret a little more than half the length of the lower glume; callus a little less than one-half line long; corona short, but distinct; lower palea hairy throughout, the upper about one-third as long and hyaline; awn about 1 inch long, very slender, bent near the middle, minutely and evenly scabrous, readily falling away; stamen 1, small, oval."—California.

Var. **ANDERSONII**. Culms and leaves more slender, panicle thinner, empty glumes 3 to 4 lines long, 3-nerved, flowering glume 2 lines long, nearly cylindrical, tapering slightly above, sparsely hairy, corona very short; awn 10 to 12 lines long.—Lower California (*Dr. Anderson, Dr. Hasse, Allen, and others*).

17. **S. avenacea** Linn. (BLACK OAT GRASS). (Gray's Manual, 6th ed., p. 641.) Culms slender, $1\frac{1}{2}$ to 3 feet high, about 3 nodes; radical leaves 1 to $1\frac{1}{2}$ feet long, filiform, those of culm short, ligule $1\frac{1}{2}$ lines long, acute; panicle 3 to 5 inches long, narrow, branches mostly single or the lower in twos, 1 to 2 inches long, erect-spreading, few-flowered; empty glumes about 5 lines long, the lower 3-nerved, upper 5-nerved, acute; flowering glume 4 lines long, including the sharp, brown hairy stipe, the body brown, smooth below, punctate, scabrous above, much constricted at apex, the crown with a few short hairs, awn about 2 inches long, bent above, twisted below; palea a little exceeding its glume.—New England to Florida, west to Wisconsin and Texas.

18. **S. flexuosa** Vasey. Torr. Bull. xv. p. 49. Culms slender, 2 to $2\frac{1}{2}$ feet high; radical leaves 1 to $1\frac{1}{2}$ feet long, narrow; panicle 5 to 8 inches long, slender and flexuous; branches distant, the lower in fives, upper in twos, capillary, 2 to $2\frac{1}{2}$ inches long, rather few-flowered, naked below; empty glumes unequal, linear, acute, the lower 5 lines long, faintly 3-nerved below, the upper about 4 lines long, distinctly 3-nerved; flowering glume 3 to $3\frac{1}{2}$ lines long, including the acute stipe, tapering above, sparsely pubescent; awn slender, sparsely pubescent below, about 2 inches long.

Distinguished from *S. avenacea* by its long panicle, longer and more capillary branches, and small spikelets.—Texas, New Mexico and Arizona.

19. **S. Bloomeri** Boland. (*S. Sibirica* Thurb., non Lam., Bot. Cal. II. p. 287.) "Culms $1\frac{1}{2}$ to 3 feet high, clothed at the base by the remains of old sheaths; leaves very narrow and involute, smooth or slightly roughened, the radical about half equaling the culm; ligule short; sheaths shorter than the internodes, the upper somewhat inflated, its blade about half as long as the panicle, pale-green throughout; panicle 6 to 12 inches long, erect, narrow; rays distant, the lower in threes or fives, the upper in pairs, branching and few-flowered; spikelets 4 lines long; glumes nearly equal, acuminate in a slender point, 3-nerved, minutely scabrous and one-fourth longer than the fusiform short-callused floret; lower palea about $2\frac{1}{2}$ lines long, minutely 2-toothed at the apex, brownish at maturity, with long, rather coarse hairs; upper palea nearly equal; awn 6 to 9 lines long, flexuously geniculate near the middle, below which it is strongly pubescent (almost plumose), scabrous above; anthers conspicuously bearded."—California (*Bolander*).

20. **S. caduca** Scribn. (*Oryzopsis caduca* Beal.) Culms tufted, about 2 feet high; leaves narrow, becoming involute, the lower 10 to 12 inches long, the uppermost one setaceous, equaling or exceeding the panicle; panicle 6 to 7 inches long, loose, the lower rays in pairs, unequal, erect-spreading, the longer 2 to 3 inches long, subdivided and flowering above the middle; spikelets mostly on pedicels as long as themselves; empty glumes $3\frac{1}{2}$ to 4 lines long, ovate-lanceolate, acuminate, 3-nerved; floral glume oblong tapering at each end, $2\frac{1}{2}$ lines long, covered with long, white hairs, not constricted at the neck, stipe short, acute; palea about half as long as its glume, obtuse; awn 9 to 10 lines long, smooth, nearly straight, very deciduous.—Montana (*Scribner*).

21. **S. Pringlei** Scribn. Culms stout, 3 feet high; radical leaves narrow, $1\frac{1}{2}$ to 2 feet long, scabrous; cauline ones shorter, rigid, ligule short; panicle 8 to 10 inches long, narrow, the branches long and slender, in twos to fives, naked below, few-flowered above; empty glumes 5 lines long, abruptly acuminate, 5- to 7-nerved;

flowering glumes oblong, obconic, 4 lines long, sparsely pubescent, constricted at the apex, the crown short-hairy, awn about 1 inch long, smooth, bent above.—Mexico (*Pringle*) and Arizona (*Pringle, Lemmon, Tracy*). Spikelets larger than in *S. Bloomeri*.

Var. **LEMMONI**. Flowering glume brown, hairy, rather thicker than in the type, less tapering at the apex, and with a more decided constriction of the neck.—Mountains of Plumas County, Cal. (*J. G. Lemmon*).

22. **S. Richardsonsii** Link. (Gray's Manual, 6th ed., p. 641.) Culm slender above, $1\frac{1}{2}$ to 2 feet high, radical leaves slender, one-half to two-thirds as long as the culm; panicle loose and spreading, the branches in twos, the lower one 3 to 5 inches long, slender, naked below, few-flowered near the apex; empty glumes unequal, the lower about 5 lines long, the upper one-fourth shorter, both 3-nerved; flowering glumes 3 lines long including the short stipe, sparsely hairy, narrowed above, brown; awn 10 to 12 lines long.—British Columbia, Montana to the Yellowstone Park.

This is a large form which Prof. Macoun calls var. *major*, and is larger, and perhaps specifically distinct from the form which is found on Lake Superior and eastward.

23. **S. Mongolica** Turcz. Act. Petrop. 1836, p. 42. Annual, culm slender, simple, 10 to 15 lines high; radical leaves filiform, erect, the lower 3 to 5 lines long, the cauline ones about 1 inch long; panicle 3 to 4 inches long, open, spreading, the lower branches in twos, filiform, $1\frac{1}{2}$ inches long, sparsely-flowered mostly above the middle, purplish; empty glumes equal, $2\frac{1}{4}$ lines long, obtuse, smooth; flowering glume 2 lines long, including the very short, obtuse callus, sparsely-hairy below, and at apex; awn plumose, twisted below, bent above, 6 to 8 lines long.—Mountains of Colorado.

ORYZOPSIS Michx.

This genus differs from *Stipa* in having a usually broader floral glume, the callus of which is shorter and blunt, and in having a very short and deciduous awn, which is sometimes slightly eccentric, or to one side.

1. **O. asperifolia** Michx. (Gray's Manual, 6th ed., p. 642.) Culms 12 to 18 inches high, overtopped by the long and rigid persistent leaf from the base; the upper sheaths with very short or rudimentary blade; panicle linear, 2 to 3 inches long, nearly simple, few-flowered; empty glumes 3 lines or more in length, the flowering glume as long, sparsely hairy, with a blunt hairy callus, awn 5 or 6 lines long; palet about as long as its glume and with 2 narrow lodicules nearly as long as the palet; styles united below, slender.—New England to Minnesota and northward to Alaska; also Colorado to Texas.

2. **O. Canadensis** Torr. (Gray's Manual, 6th ed., p. 642.) Culms slender, 6 to 15 inches high; leaves becoming involute, filiform, 6 to 10 inches long, or much reduced; panicle narrow, 1 to 2 inches long; the branches usually in pairs, compound, erect; spikelets less than 2 lines long; empty glumes broad, 1-nerved; flowering glume, rather shorter, very pubescent, whitish; awn short (one-third to one-half line) and very deciduous, or wanting.—Maine to Colorado and northward.

3. **O. exigua** Thurb. U. S. Exp. Wilkes, p. 481. Culms slender, tufted, 6 to 15 inches high; leaves 4 to 5 inches, the upper 1 to 2 inches long, rigid, ligule conspicuous, 1 line long; panicle 1 to $2\frac{1}{4}$ inches long, linear; the branches mostly simple, the lower sometimes in twos, erect and appressed; empty glumes 2 to $2\frac{1}{4}$ lines long, the lower 1-nerved, the upper 3-nerved at base, obtuse and mucronate, pubescent, a little longer than the flowering glume, the latter sparsely pubescent; awn twisted below, about 2 lines long; palet equaling its glume; stamens 3, styles 3; lodicules 2, as long as the ovary.—Oregon and Washington.

This species is closely allied to *O. Canadensis*, from which it differs in its more simple panicle, less pubescent flowering glume, and longer and less deciduous awns.

4. **O. Webberi** Vasey. (Bot. Cal. II. p. 283.) Culms densely tufted, 4 to 7 inches high; leaves convolute, rigid, pungent, scabrous, the radical 3 to 4 inches long, the

cauline 1 or 2 inches; lower sheaths crowded and dilated; panicle 1 to 4 inches long, narrow, the lower branches short and erect, or fascicled and long; empty glumes, 4 lines long, acuminate; flowering glumes, about 3 lines long, with a short callus, 5-nerved, apex minutely 2-lobed, covered with copious silky white hairs, a line long, awn 2 lines long, very deciduous.—Sierra Valley (*Lemmon*) and Reno, Nevada, (*S. M. Tracy*.)

5. *O. melanocarpa* Muhl. (Gray's Manual, 6th ed., p. 642.) Culms erect, 2 to 3 feet high, leafy; leaves broad and flat, taper-pointed, 6 to 8 inches long; panicle 6 to 9 inches long, lower branches in pairs, 2 inches long, erect, finally spreading, naked below the middle, few-flowered above; empty glumes 4 to 5 lines long, acute, about 7-nerved; flowering glume slightly shorter, acuminate, coriaceous, sparsely pubescent; awn about an inch long; styles short and distinct.—New England to Missouri and Minnesota.

6. *O. micrantha* Thurb. (Coulter Rocky Mt. Fl., p. 408) (*Urachne micrantha* Trin. & Rupr.) Culms tufted, slender, 2 feet high; leaves linear, setaceous, involute-pointed, scabrous margined, the radical 10 to 12 inches long; panicle 4 to 6 inches long, the lower branches in pairs, 1 to 2 inches long, rather distant, becoming spreading, flowering beyond the middle; spikelets $1\frac{1}{2}$ lines long; empty glumes thin, nerved, acute; flowering glume one line long, smooth; awn 3 lines long.—New Mexico, Colorado and northward.

7. *O. fimbriata* Hemsl. (*Stipa fimbriata* H. B. K.) (Kunth Gram. I. p. 263.) Culms tufted, slender, 2 to $2\frac{1}{2}$ feet high; leaves filiform, setaceous, the radical a foot long or more, the cauline shorter; panicle 3 to 5 inches long, the lower branches in twos or threes, capillary, few-flowered toward the extremity; spikelets or empty glumes about 3 lines long, acute; flowering glume 2 lines long, very pubescent; awn 6 to 8 lines long, smooth.—Western Texas, New Mexico, Arizona and Mexico.

8. *O. membranacea* Vasey. Grasses of the Southwest, Pt. 2, p. 10. (*Stipa membranacea* Pursh.; *Eriocoma cuspidata* Nutt.; *Stipa hymenoides* R. & S.; *Milium cuspidatum* Spreng; *Urachne lanata* Trin.; *Pendlerai rhynchelytroides* Steud.) Culms tufted, 1 to 2 feet high, mostly simple, sometimes geniculate, rather slender; leaves setaceously-convolute, rigid, scabrous, the lower often equaling the culm, scabrous, pungent; upper sheaths dilated; the blade overtopping the panicle or reduced to a filiform point, ligule a line long; panicle 4 to 6 inches long, widely spreading when mature, the capillary, flexuous branches mostly in pairs, the lower dichotomously branched, the branches 1-flowered; spikelets 3 or 4 lines long, on long filiform pedicels; empty glumes ventricose below, attenuate above, pubescent, 3- to 5-nerved below; flowering glume broadly oval, about 2 lines long, densely long hairy, in age losing the hairs and becoming black, hard and shiny, the apex bifid; awn deciduous 2 lines long; palet narrow, entire, about equal to the glume.—British America to California and Mexico.

Said to be a valuable and nutritious grass. Grows in gravelly or sandy ground.

The difference between *Stipa* and *Oryzopsis* appears arbitrary, and botanists disagree as to the species included in each.

MILIUM Linn.

Spikelets 1-flowered, consisting of 2 equal, membranaceous, convex, awnless persistent glumes, with a coriaceous awnless flowering glume, and narrow palet, resembling a *Panicum*, but not jointed below the flowering glumes; panicle diffusely spreading. Grain inclosed in its glume and palet, all deciduous together.

1. *M. effusum* Linn. (WILD MILLET-GRASS.) (Gray's Manual, 6th ed., p. 642.) Perennial, culms smooth, 3 to 6 feet high; leaves broad, flat, thin, 6 to 10 inches long; panicle, 6 to 9 inches long, spreading, the branches 2 to 5 together, naked below; empty glumes about $1\frac{1}{2}$ lines long, equal, 3-nerved; flowering glume about equal, oblong-ovoid, the edges overlapping the palet, about the same length.—Northern United States and Canada.

CINNA Linn.

Spikelets 1-flowered, much flattened, in an open, spreading panicle; outer glumes lanceolate, acute, strongly keeled, hispid on the keel, the upper somewhat longer than the lower; flowering glume manifestly stalked above the outer glumes, about the same length, 3-nerved, short-awned on the back near the apex; palea nearly as long as its glume, only 1-nerved ("probably by the consolidation of 2," *Bentham*); Stamen 1. A sterile pedicel sometimes present.

1. *Cinna arundinacea* Linn. (Gray's Manual, 6th ed., p. 649.) (*Muhlenbergia pendula* Bong.; *Blyttia suaveolens* Fries.; *Cinna latifolia* Griseb.) Culms 3 to 6 feet high, stout; leaves 4 to 6 lines wide, 1 foot long; ligule elongated, conspicuous; panicle 6 to 12 inches long, rather dense, spreading in flower, afterward close, lower branches 4 or 5 together, about 2 inches long; spikelets $2\frac{1}{2}$ to 3 lines long, flattened; empty glumes linear-lanceolate, roughish, acute, mostly 3-nerved, the upper nearly as long as the spikelet, the lower rather shorter; flowering glumes oblong-lanceolate, 3-nerved, usually with a minute awn near the apex; palea 1-nerved.—Moist woods and swamps, Canada to Texas, and northern Rocky Mountains to Oregon and Washington.

2. *C. pendula* Trin. (Gray's Manual, 6th ed., p. 649.) Usually more slender than the preceding species, with a looser, drooping panicle, more capillary branches, and smaller spikelets (about 2 lines). Same range as the preceding.

Var. MUTICA. Spikelets less than 2 lines long, flowering glumes awnless—Oregon.

Var. BOLANDERI. (*Cinna Bolanderi* Scribn). Tall and stout; leaves broad; panicle lax, thin; spikelets 2 to $2\frac{1}{2}$ lines long; flowering glumes shorter than the outer ones.—California (*Dr. Bolander*).

POLYPOGON Desf.

Panicle dense and spike-like or somewhat branched or lobed; spikelets 1-flowered, very small, rarely exceeding a line in length. Glumes nearly equal, compressed, 1-nerved, and bearing a long awn at or below the apex; floret much shorter than the glumes, without manifest callosity, and naked at base; lower palea hyaline, broad, 1-nerved (or obscurely 5-nerved), truncate, toothed, awned at the apex; scales 2, falcate, entire, as long as the ovary. Stamens 3. Anthers small. Styles short, with long feathery stigmas.

1. *Polygomon monspeliensis* Desf. (ANNUAL BEARD-GRASS.) (Bot. Cal. II. p. 270.) "Culms 5 inches to $2\frac{1}{2}$ feet high, procumbent and geniculate at base, rarely erect, often branching from the lower nodes; leaves broad, flat, somewhat scabrous; sheaths smooth; ligule 2 or 3 lines long, obtuse; panicle 2 to 6 inches long, cylindrical or somewhat interrupted, yellowish, dense, and soft; spikelets about a line long; glumes notched at the apex and emitting an awn two or three times their length; lower palea with an awn equaling or slightly exceeding the glumes."—California and Arizona to Texas.

2. *P. littoralis* Smith. (Bot. Cal. II. p. 270.) "Culms from a perennial root, forming large tufts, 1 to 2 feet long or more; leaves rather narrow, scabrous on both sides; ligule 1 to 3 lines long, acute; panicle narrow, much lobed its whole length, and sometimes completely interrupted below, usually purplish; glumes more or less pubescent and distinctly aculeate on the keel, tapering into an awn of about their own length; awn of lower palea slightly exerted beyond the glumes."—Same range as the preceding.

3. *P. maritimus* Willd. (Chapm. Fl. S. States, p. 552.) Culms simple, 6 to 8 inches high; glumes pubescent, hispid on the keel, one-third as long as the slender awns; flowering glumes 4-toothed, unawned.—Seashore of North and South Carolina (Dr. Chapman). Introduced.

Agrostis microphylla var. MAJOR of California, seems properly to belong in this genus, and is perhaps *P. elongatus* H. B. K.

THURBERIA Benth.

Panicle rather long and loose; spikelets narrow, 1-flowered, and with an awn-like pedicel; outer glumes equal and coriaceous, the flowering glume nearly as long, chartaceous, compressed, the apex obliquely truncate and terminating in a long twisted awn; palea somewhat shorter and narrower, membranaceous. Stamens 3. Styles distinct.

1. *Thurberia Arkansana* Benth. (Benth. in Gen. Plant. III. p. 1118.) (*Streptachne* Torr.; *Greenia Arkansana* Nutt; *Limnas Arkansana* Trin.; *Limnas pilosa* Trin.) Apparently annual; culms 1 to 2 feet high; leaves linear-lanceolate, 2 to 4 inches long, somewhat scabrous, and the sheaths more or less pubescent; panicle narrow, loose, 3 to 5 inches long, branches scattered or semiverticillate, the lower 1 to 2 inches long, loosely flowering to the base; spikelets $1\frac{1}{2}$ lines long, on rather short pedicels; empty glumes equal, linear-lanceolate, coriaceous, hispid, abruptly acute or acuminate; flowering glumes nearly as long, chartaceous, smooth, faintly 3-nerved, shortly 2-toothed at apex, and terminating with a twisted awn 4 or 5 lines long; palea narrow, shorter than the flowering glume; a minute rudiment or pedicel at the base of the flowering glume.—Florida to Texas, Arkansas and Indian Territory.

EPICAMPES Presl.

Spikelets much as in *Sporobolus*, but contracted in a long, narrow, and dense panicle; outer glumes somewhat unequal, membranaceous, convex on the back, scarcely keeled, obtuse, 3-nerved. Flowering glume mostly equaling the outer ones, sometimes 3- to 5-nerved, entire or sometimes awned from the apex; palea hyaline, about equaling the flowering glume, 2-nerved or 2-keeled.

1. *Epicampes rigens* Benth. (Bot. Cal. II. p. 267, as *Cinna macroura*.) "Culms 3 or 4 feet high, erect and rigid, smooth or slightly pubescent below the nodes, clothed below with broken and withered sheaths; leaves narrow, convolute, and attenuate at apex, rough pubescent, the lower 3 to 4 and the uppermost 1 to 2 inches long, all very rigid; ligule 2 to 3 lines long; sheaths much longer than the internodes, loose, rough; panicle 1 to 2 feet long, erect, very narrow, dense, and tapering above, loose and interrupted below, the base sometimes included; rays fasciated, very unequal, the longer (1 to 4 inches long) flower-bearing above, the shorter for their whole length; all, with the common axis, more or less roughened; spikelets $1\frac{1}{2}$ to 2 lines long, scarcely compressed, minutely scabrous-pubescent, and on rough pedicels about their own length; glumes acute at apex or blunt with a minute point, the lower somewhat longer and indistinctly 3-nerved; floret usually somewhat exceeding the glumes, with a brief and minutely hairy callus; paleas very delicate in texture, the lower minutely pubescent, more or less acute, 3-nerved, broad, and involving the very thin distinctly 2-nerved upper one, which is about the same length; stamens 3 with linear anthers."—Texas to California.

1. *Epicampes ligulata* Scribn. Culms $2\frac{1}{2}$ to 3 feet high, erect, smooth, 5 nodes; lower leaves 1 to $1\frac{1}{2}$ feet long, 2 to 3 lines wide, rigid; ligule conspicuous, 6 to 9 lines long; panicle 8 to 12 inches long, narrow (8 to 12 lines wide), loose, branches erect, scattered, approximate, narrow, flowering to the base; spikelets little more than 1 line long;

empty glumes about equaling the flowering glume, barely pointed; flowering glume oblong, obtuse, or apiculate, 3-nerved, smooth; palet equaling the glume.—Texas to Arizona and Mexico.

ARCTAGROSTIS Griseb.

Spikelets one-flowered, in a contracted, mostly spike-like panicle; pedicels of the spikelets rather clavate and usually articulated below the glumes; outer glumes nearly equal and long-awned from the apex; flowering glume smaller, thinner, generally hyaline, and generally prolonged at the apex into a slender awn; palet thin, sometimes considerably shorter than its glume.

1. *Arctagrostis latifolia* Griseb. Flora Rossica iv. p. 434. (*Colpodium latifolium* R. Br.) Culms strict, smooth, 6 to 12 inches high; leaves broadly linear; ligule short-oblong, truncate, lacerate; panicle lanceolate-linear, contracted; spikelets large; empty glumes ovate-oblong, acutish, the upper one-third longer than the lower; flowering glumes herbaceo-membranaceous, sparsely scabrous-pubescent, about 2 lines long, $\frac{1}{2}$ to $\frac{1}{3}$ longer than the upper glume, obscurely 3-nerved; palet nearly equal to its glume.—Point Arrow, Fort Conger and Arctic coast.

Var. *ARUNDINACEA* Griseb. in Flora Rossica (var. *Alaskensis* Vasey; *Sporobolus arundinaceus* Vasey; *Vilfa arundinacea* Trin. Icones Gramin. i. pl. 55). Culms taller (2 to 3 feet), panicle laxer and larger, floral glume obscurely 5-nerved.—Alaska.

SPOROBOLUS R. Br.

Spikelets 1, or rarely 2-flowered, in a contracted or open panicle. Outer glumes unequal, the lower one shorter, often acute, unawned, 1- to 3-nerved, membranaceous; flowering glume mostly longer, unawned; palet about equaling the flowering glume, and of the same texture, prominently 2-nerved. Seed mostly loose in a hyaline or rarely coriaceous pericarp.

§ 1. *Panicle contracted, spike-like, or becoming somewhat spreading. Culms erect or spreading, scarcely branched.*

1. *Sporobolus Indicus* R. Br. (Gray's Manual, 6th ed., p. 646.) Culms tufted, erect, 1 to 3 feet high, smooth, lower leaves half as long as the culm, terminating in a long, fine point; the upper similar; ligule obsolete; panicle narrow, 4 to 12 inches long, tapering at the point, often interrupted at the base; branches one-half to $1\frac{1}{2}$ inches long, erect, flowering to the base; spikelets sessile, crowded on the branches, about 1 line long; empty glumes obtuse, the lower one-half, the upper two-thirds as long as the floral glume; floral glume acutish, 1-nerved; palet about as long as its glume, faintly 2-nerved.—Introduced, but widely dispersed.

2. *S. Virginicus* Kth. (Gray's Manual, 6th ed., p. 646.) (*Vilfa Virginica* Beauv.; *Podosæmum Virginicum* Link.) Culms much branched at base, from a running root-stock, erect or decumbent 6 to 12 inches high; leaves short and convolute, distichous, rigid, often spreading and recurved; panicle 2 to 4 inches long, densely flowered, or sometimes lax; spikelets about $1\frac{1}{2}$ lines long, the empty glumes nearly erect, perennial.—Seacoast, Virginia to Florida and Texas.

3. *S. asper* Kth. (Gray's Manual, 6th ed., p. 645.) (*Vilfa Hookeri* Trin.; *Agrostis longifolia* Torr.) Culms tufted, 2 to 3 feet high, rather stout; lower leaves 1 foot long, tapering to an involute point, the culm leaves shorter than the internodes, the upper one inflated, partly or wholly inclosing the 4 to 6 inch long panicle; spikelet 2 to $2\frac{1}{2}$ lines long, empty glumes broad, obtuse, the lower one-half and the upper two-thirds as long as the spikelet, flowering glume and palet nearly equal, smooth or pubescent below, obtusish at apex.—Maine to Texas.

Var. **DRUMMONDII** (*Vilfa Drummondii* Trin.) Culms stout, 2 to 3 feet high, smooth, firm, sometimes with a few lateral branches, lower leaves flat, 6 to 10 inches long, the upper becoming involute and setaceously pointed, panicle exserted or looser than in the preceding, 5 to 8 inches long; spikelets about 3 lines long; empty glumes nearly equal, obtuse, about one-half as long as the spikelet; flowering glume attenuated above and one-fourth longer than the palet.—New York to Texas.

4. **S. pilosus** Vasey. Bot. Gaz. xvi. p. 26. Perennial, from thick roots; whole plant pale-green; culms cespitose, rigid, erect, about 1½ feet high, leafy, particularly at the base, mostly simple; sheaths smooth, the uppermost sheathing the base of the panicle, the lower crowded and flattened; ligule inconspicuous; the throat, margin, and both sides of the lower blades pilose, the upper ones involute and attenuated to a long point, shorter than the culm; panicle terminal, spike-like, 2 to 3 inches long, close, the lower part included in the sheath; spikelets 2½ lines long, smooth, the lower empty glume one-fourth shorter than the upper, which equals the flowering glume and palet, all obtuse.—Kansas (*B. B. Smythe*).

Resembles *S. aspera*, which has the leaves longer than the culm, both empty glumes shorter than the flower, and the leaves smooth or not pilose.

5. **S. minor** Vasey. (Gray's Manual, 6th ed., p. 646.) "Culms tufted, perennial very slender, erect or ascending, 10 to 18 inches high, leaves short and narrow; panicle at first sheathed, becoming exserted, 1 to 3 inches long; glumes and palet nearly equal, acute or somewhat acuminate."—Virginia, Illinois, Missouri, South Carolina to Texas.

6. **S. vaginæflorus** Vasey. (Gray's Manual, 6th ed., p. 645.) (*Vilfa*, Torr.) Annual; culms slender, 6 to 12 inches high, ascending or erect; leaves involute, awl-shaped, 1 to 4 inches long; panicles lateral and terminal, concealed in the sheaths; spikelets little more than a line long, glumes and petals nearly equal, acute; grain more than half as long as the palet.—Maine to Texas.

7. **S. cuspidatus** Torr. (Gray's Manual, 6th ed., p. 646.) (*Vilfa cuspidata* Torr.) Culms tufted, strongly rooted, erect, slender and wiry, 12 to 15 inches high; leaves 1 to 4 inches long, very narrow, linear, the branches single, the lower ones 1 inch long, appressed; spikelets 1 to 1½ lines long; the empty glumes acuminate and little shorter than the cuspidate flowering glume.—Maine to Minnesota and in the Rocky Mountain region.

8. **S. gracillimus** Thurb. (*Vilfa gracillima* Thurb.) (Bot. Cal. II. p. 268.) "Culms annual, capillary, smooth, much branched at base, forming small, dense tufts, 3 to 12, but usually about 6 inches high; the leafy portion about 2 inches high; leaves 6 to 9 lines long and less than a line broad, flat, involute at apex, very minutely scabrous on the upper side and margins; ligule about 1 line long, obtuse and lacerate, decurrent; sheaths equaling the internodes, loose, striate, smooth with hyaline margins; panicle long-exserted, narrowly linear, few-flowered, interrupted below; rays in pairs or threes, erect, appressed, 1- to 3-flowered; spikelets about a line long on shorter pedicels; glumes subequal, or the upper larger, membranaceous, colorless, very obtuse, distinctly 1-nerved, mucro or erose-toothed at apex, about half as long as the oblong-lanceolate floret, which has a small callus; petals about equal, blackish, the lower 3-nerved, with a few very minute hairs on the nerves below, mucronate or tipped with a small seta.—In the Sierra Nevada, in wet soil at 11,000 feet altitude, Brewer; Yosemite Valley (*Bolander*); Santa Barbara (*Mrs. Cooper*) and Oregon (*E. Hall*)."

The habit and annual root abundantly distinguish it from any of the forms of *S. depauperatus*.

9. **S. Wolfii** Vasey. Bull. Torr. Club, x. p. 52. (*Vilfa minima* Vasey.) A dwarf annual grass, 1 to 2 inches high, the culms capillary, with a simple, terminal, few-flowered panicle, and one or two similar ones from the axil of the leaves; leaves short, strongly nerved; sheaths inflated, striate; spikelets one-half line long; empty glumes scarcely half as long as the flower; floral glume ovate; palet equaling the glume.—On the shores of Twin Lakes, Colorado (*J. Wolf* and *C. W. Derry*).

§ 2. *Panicle contracted, culms much branched, decumbent and often rooting below.*

10. *S. depauperatus* Vasey (Gray's Manual, 6th ed., p. 646.) (*Vilfa depauperata* Torr.; *Vilfa utilis* Torr.) Culms perennial, tufted, slender, 3 inches to 2 feet long, decumbent and geniculate, many jointed, often much branched. Leaves commonly 1 to 3 inches long, often involute, ligule conspicuous, acutish; sheaths rather shorter than the internodes; panicle $\frac{1}{2}$ to 3 inches long, very narrow, branches solitary, appressed, the lower sometimes $\frac{1}{2}$ to 1 inch long, flowering to the base; spikelets about 1 line long, on short pedicels; empty glumes nearly equal, ovate, obtuse, one-third to one-half shorter than the flowering glume, the later obscurely 3-nerved, smooth, often blackish, and pointed with a minute mucro; palet about equal to its glume.—Throughout the Rocky Mountain region from Mexico to Montana and British Columbia.

A very variable species, with several distinct forms, one of which with tangled matted culms, used by the Mexicans for stuffing pack saddles, was called by Dr. Torrey *Vilfa utilis*.

11. *S. repens*. Presl. Rel. Hænkeanæ i. p. 241. Culm decumbent from creeping rhizomas 6 to 12 inches long, much branched, nodes many, often geniculate, lateral branches flower-bearing; leaves 1 to $1\frac{1}{2}$ inches long, very narrow; ligule rather long, panicle narrow, the terminal 1 to $1\frac{1}{2}$ inches long, the lateral shorter, few-flowered; spikelets grayish, $1\frac{1}{2}$ lines long; empty glumes nearly equal, one-half as long as spikelet, acutish; flowering glume cuspidate, palet nearly as long, acute.—Texas to Arizona. Much like *S. depauperatus*, of which it is perhaps a form.

12. *S. Sacatilla* Griseb. (Gram. Mexicanum Fourn. p. 101.) Differs from the preceding in the longer culms, more involute and recurved leaves, with shorter ligules, panicles rather more exserted, spikelets shorter (about 1 line long), glumes shorter (hardly $\frac{1}{2}$ line long), flowering glume shorter and acute.—Texas (*Nealley* and No. 746 *Wright*).

§ 3. *Panicle mostly open and spreading; culms erect.*

13. *S. interruptus* Vasey. Bull. Torr. Club, xv. p. 8. Culms $1\frac{1}{2}$ to 2 feet high, rather stout, with few leaves, erect, from a strong creeping rhizoma; leaves mostly at the base, flat, rather rigid, 3 to 6 inches long, 1 to 2 lines wide, the lower sheaths and leaves more or less soft—hairy, ligule almost obsolete, upper sheaths very long, smooth; panicle 4 to 6 inches long, narrow and close, with the branches short and interrupted, or panicle loose, with branches alternate, the lower 2 inches long, distant, and the lower third naked; spikelets large ($2\frac{1}{2}$ lines long), the pedicels mostly short; empty glumes unequal, lanceolate, acute, the lower one-third shorter, the upper 3-nerved and equaling the spikelet; flowering glume thicker in texture, 1-nerved, acute, smooth; palet nearly equal, 2-nerved; stamens 3, very long.—Arizona.

14. *S. Nealleyi* Vasey. Bot. Gaz. xvi. p. 48. Small; culms from strong rhizoma, erect, slender, about 6 inches high, naked above; leaves few, about 1 inch long, rigid, divaricate, involute, pungently pointed; ligule villous; panicle 1 to 2 inches long, of few (6 or more) short, erect-spreading, few-flowered branches; spikelets less than 1 line long, the lower one-half as long as the second, which equals the palet.—Texas (*G. C. Nealley*).

15. *S. argutus* Kth. Enum. Plant. i. p. 215. (*S. Arkansana* Nutt.; *S. Sabeanus* Buck.) Culms tufted, 6 to 12 inches high, leafy below, leaves 2 to 6 inches long, sheaths ciliate above and at the throat, blade flat, tapering to a fine point, upper sheath long, reaching to or at first inclosing the panicle, $1\frac{1}{2}$ to 4 inches long, narrow at first or becoming pyramidal, spreading, the lower branches in fives, 1 inch long, linear, naked near the base; spikelets less than 1 line long; the longer empty glume one-fourth to one-third as long, the upper as long as the spikelet, acutish.—Mexico to Texas and Colorado.

16. *S. Domingensis* Kth. (Chapm. Fl. S. States Suppl., p. 661.) Culms erect, 10 to 20 inches high, compressed at base; leaves linear-acuminate, flat or convolute rigid;

sheaths conduplicate, compressed, ciliate above and at the ligule; panicle erect-spreading, at length contracted; empty glumes acuminate, the upper equaling the 1-line long spikelet, the lower half as long; flowering glume acute.—Florida (A. H. Curtiss, Dr. Chapman).

17. *S. Wrightii* Munro in MS. Culms stout, erect, 3 to 4 feet high, from a stout creeping rhizoma, leafy; sheaths long, smooth; ligule nearly obsolete or sparsely hairy; lower blades 1 foot or more long, narrow, smooth without, scabrous within, tapering into a long filiform point; panicle lanceolate, 12 to 15 inches long, open, the branches very numerous, racemose, narrow, scattered on the smooth axis, 2 to 4 inches long, approximate, erect-spreading at an angle of about 45 degrees, flower-bearing nearly to the base; spikelets nearly a line long, on very short pedicels; empty glumes unequal, the lower $\frac{1}{2}$ and the upper two-thirds as long as the flowering glume, thin; flowering glume obtusish, smooth, little thicker than the empty glumes.—New Mexico, Texas and Arizona.

18. *S. airoides* Torr. (Bot. Cal., II. p. 269.) (*Agrostis airoides* Torr.; *Vilfa airoides* Steud.) Perennial; culms tufted, often stout, from strong-rooting rhizomas, 1 to 3 feet high; leaves rather rigid, strongly revolute and attenuate; panicle broadly pyramidal, soon exerted, 6 to 12 inches long, open and diffuse; rays solitary or in pairs, slender, spreading, rather distantly subbranched, naked below; spikelets a line long, on slender pedicels; empty glumes obtusish, somewhat unequal, the lower one-third to one-half as long as the glume, the upper a little shorter than the flowering glume.—In the Rocky Mountain region; Great Plains; Texas to Montana; California to Oregon.

19. *S. cryptandrus* Gray. (Gray's Manual, 6th ed., p. 646.) Perennial strongly rooted; culms erect or decumbent below, 2 or 3 feet high, sometimes with a few lateral branches, upper nodes distant; leaves flat, 3 to 6 inches long, commonly partially inclosed in the upper sheath, and sometimes permanently and wholly inclosed, the lower branches 2 inches long, flowering nearly to the base; spikelets nearly 1 line long, nearly sessile; empty glumes lanceolate, acute, the lower $\frac{1}{2}$ as long and the upper as long as the spikelet.—New England, westward and southward to New Mexico.

Var. STRICTUS Scribn. Panicle 6 to 12 inches long, the branches permanently strict.—Western Plains.

Var. ROBUSTUS Vasey. Culms remarkably robust, erect, 3 feet high; leaves wider and longer, rigid; panicle partially expanding, 10 to 12 inches long, dense, the branches closely approximate.—Texas (Nealley).

Var. FLEXUOSUS Thurb. Panicle 6 to 15 inches long, expanded, and becoming reflexed, longer and more slender, the lower ones sometimes 6 inches long; spikelets rather shorter and more acute, and on pedicels equal to or longer than the spikelets.—Dry Western plains, Colorado, New Mexico, Arizona to Texas.

20. *S. heterolepis*. (Gray's Manual, 6th ed., p. 646.) Culms erect, 2 to 3 feet high, slender, naked above; leaves involute, thread form, the lowest nearly as long as the culm, panicle 4 to 6 or even 10 inches long, open, loose, the branches alternate or several together, at first erect, becoming widely spreading, naked below; spikelets $2\frac{1}{2}$ lines long; empty glumes very unequal, the lower narrow or setaceous, about half as long as the upper, the latter taper-pointed and longer than the floral glume.—Connecticut and New York to Illinois and Wisconsin, Minnesota, and all the prairie region, Texas to British America.

21. *S. tricholepis* Torr. (*Vilfa tricholepis* Torr.) (U. S. Geol. Surv., Wheeler, VI. p. 282.) Perennial, tufted, culms erect, simple; leaves mostly radical short (3 to 6 inches), erect or curved, rigid, involute; the lower sheaths inflated, ligule short, auriculate; panicle oblong, open, 4 to 6 inches long, the branches more or less spreading, scattered, the lower 1 to 2 inches long, loosely flowered; the spikelets on slender pedicels, $1\frac{1}{2}$ to $1\frac{1}{2}$ lines long; empty glumes thickish, oblong, obtuse or obtusish, nearly equal, a little shorter than the spikelet; flowering glume and palea nearly

equal, both woolly-pubescent on the nerves and margins.—From Texas westward and southward into Mexico.

This species is peculiar in its thickish, persistent glumes and very pubescent flowers.

22. *S. Jonesii* Vasey. Bot. Gaz. vi. p. 296. Culms densely tufted, erect, 1 to 1½ feet high, wiry; radical leaves numerous, short, rigid, and involute, except the lowest; culm with 1 or 2 leaves below, the blade about 1 inch long, setaceous, sheath four times as long, scabrous; panicle erect, thin, 1½ to 3 inches long, rays solitary, appressed, the lower 1 to 1½ inches long, subdivided from the lower third; spikelets mostly very short pedicelled, about 1½ lines long; glumes about one-third as long as the flower, broad, obtuse or truncate, and the apex erosely toothed, thin, and purplish; flower with a distinct pedicel or callus; the flowering glume and palet much alike in texture, firmly membranaceous, 1-nerved, finely scabrous and pubescent below, 1 to 1½ lines long; the palet narrower and but little shorter, after flowering becoming more elongated, cylindrical, and pointed.—Soda Springs, Cal. (*M. E. Jones*).

23. *S. junceus* Kth. (Gray's Manual, 6th ed., p. 646.) Culms caespitose, 1½ to 2 feet high, simple, smooth, naked above; leaves slender, involute, the lower elongated, narrow; panicle narrow; lanceolate or almost linear, open, the branches in threes or fives below, 1 inch or less long, few-flowered; spikelets 1½ lines long, purplish, empty glumes lance-ovate, acute or acutish, the lower, half to two-thirds as long as the upper, the latter as long as the flowering glume.—Rare in Texas, common eastward.

24. *S. compressus* Kth. (*Vilfa compressa* Triu.; *Agrostis compressa* Torr.; *Agrostis Torreyana*, K. & S.) (Gray's Manual, 6th ed., p. 647.) "Very smooth, leafy to the top; culms tufted, stout, very flat; sheaths flattened, much longer than the internodes; leaves erect, narrow, conduplicate-channeled; empty glumes acutish, about one-third shorter than the obtuse flowering one; panicle 8 to 12 inches long; spikelets 1 line long, purplish. Forming strong tussocks, 1 to 12 feet high.—Bogs on Long Island and in the pine barrens of New Jersey."

25. *S. serotinus* Gray. (Gray's Manual, 6th ed., p. 647.) "Smooth; culms very slender, flattish (8 to 15 inches high), few-flowered; leaves very slender, channeled; panicle soon much exserted, the diffuse capillary branches scattered; glumes ovate, obtuse, about half the length of the flower. A very delicate grass; the spikelets half a line long.—Sandy wet places, Maine, to New Jersey and Michigan."

26. *S. Texanus* Vasey. Contr. Nat. Herb. i. p. 57. Perennial; culms 1 foot high, rigid below, rarely branching below, the upper half occupied by the capillary panicle; leaves linear-lanceolate, rigid, 2 to 3 inches long, acuminate, rough above; the lower sheaths and ligule covered with scattered white hairs; panicle half the length of the plant, sheathed at the base, becoming diffuse, the branches capillary, mostly single and few-flowered, the lower 2 to 3 inches long; spikelets about 1 line long, on capillary pedicels; empty glumes unequal, the lower one acute, less than half as long as the upper, the latter as long as the spikelet.—Presidio County, Texas (*G. C. Nealley*).

Resembles *S. asperifolius*, but with simple, erect culms and more rigid.

27. *S. Buckleyi* Vasey. Bull. Torr. Club, x. p. 128. Culms 2½ to 3 feet high, leafy, erect; leaves 1 to 2 feet long, narrow, terminating in a long, slender point; sheaths shorter than internodes; panicle 1 to 1½ feet long, diffuse, thin, branches mostly single, sometimes the lower verticillate, 3 to 5 inches long, flowering above the middle, the branchlets short and curved; spikelets very short, glume pedicelled, lanceolate acute, the lower one-half and the second two-thirds as long as the third, the last a little shorter than the palet.—Texas (*Nealley*) to Mexico (*Pringle*).

28. *S. Bolanderi* Vasey. Bot. Gaz. xi. p. 337. Culms slender, about a foot high, decumbent below, smooth; leaves narrowly linear, flaccid; radical ones about 6 inches long; cauline ones similar, 1 to 2 inches long; ligule short and obtuse; upper half of stem naked; panicle 2 to 3 inches long, sparsely-flowered, open, lax, lower

branches in twos or threes, filiform, 1 to 1½ inches long, flowering above the middle; spikelets about 2 lines long; empty glumes unequal, 1-nerved, upper one, ovate-lanceolate, 1 line or more long, lower one one-fourth shorter; flowering glume nearly 2 lines long, oblong-lanceolate, 5-nerved, softly pubescent on the nerves below; palet equaling its glume, finely ciliate on the nerves; sterile pedicel prominent, one-third to one-half as long as the flower.—Collected at Multnomah Falls, Oregon (*Dr. H. N. Bolander*).

29. *S. confusus* Vasey. Bull. Torr. Club, xv. p. 293. (*S. ramulosus* of authors not of *Kth.*) Annual; culms 6 to 12 inches high, erect, slender, branched below; leaves mostly near the base, about 1 inch long, acute; panicle nearly as long as the plant, 4 to 10 inches long, 1 to 2 inches wide, the branches approximate, mostly single, capillary, 1 inch or less in length, erect-spreading, each with few long capillary, clavate pedicels; spikelets one-half line long; empty glumes one-half to two-thirds as long as the spikelet, mostly ciliate fringed on the margin.—Texas and Mexico and northward to Montana.

§ 4. *Culms decumbent and often rooting below; branched panicle open and spreading, perennials.*

30. *S. asperifolius* Thurb. Bot. Cal. II. p. 269. Culms 6 to 15 inches long, decumbent at base and forming extensive plats; leaves short (1 to 2 inches long), narrow, fine pointed, flat or folded; sheaths smooth, leaves sometimes rough on the margins and upper surface; ligule short and obtuse, lower sheaths inflated; panicle included at base, expanded and capillary, 3 to 5 inches long, oblong or ovoid in outline, branches fine, 1 to 2 inches long, mostly single; spikelets few, about one-half line long, on long capillary pedicels (often an inch long); empty glumes nearly equal, acute, minutely scabrous, as long as the flowering glume and palet.—Texas, northward and westward.

Var. MAJOR. Much longer, runners often 2 feet long, leaves, especially the upper ones, 3 to 4 inches long, culms longer; spikelets nearly a line long; empty glumes equal, acute, one half to one quarter shorter than the flowering glume and palet; the glumes sometimes tipped with a short point.

31. *S. auriculatus* Vasey. (*S. asperifolius* var. *brevifolius*, Contr. Nat. Herb. I. p. 56.) In habit like the preceding species, the leaves more crowded and rather shorter, the panicle longer stalked, and not so large; ligule lacerated and the outer segments acute and auriculate; panicle roundish; spikelets 1 line long, empty glumes about half as long as the spikelet, the flowering glume obtusish and mucronate tipped; the second glume often denticulate.—Texas (*C. Wright*, No. 737), also Sandy plains in Crockett County (*Reverchon*), and at Pena (*Nealley*).

MÜHLENBERGIA Schreb.

Spikelets 1-flowered, small, paniculate, articulated above the outer glumes; flowering glume with a very short, usually hairy callus. Outer glumes variable in size, from small or minute to nearly as large as the flowering glume, sometimes bristle-pointed, keeled, persistent, thin; flowering glume 3- to 5-nerved, rigid or thinnish, mucronate or awned, sometimes with a long capillary awn from the apex between the short teeth, frequently pubescent below; palet about as long as the flowering glume and of similar texture.

A. *Culms generally tall, unbranched.*

1. *Panicle loose and spreading, the pedicels capillary.*

1. *M. capillaris* Kth.
2. *M. affinis* Trin.
3. *M. Reverchoni* Vasey.

2. *Panicle contracted.*

4. *M. distichophylla* Kth.
5. *M. Emersleyi* Vasey.
6. *M. setifolia* Vasey.
7. *M. Berlandieri* Trin.

3. *Panicle linear, or much contracted.*

8. *M. acuminata* Vasey.
9. *M. virescens* Trin.
10. *M. gracilis* Trin.

B. Culms mostly low and slender, and with a decumbent base, panicle spreading.

11. *M. arenicola* Buckl.
12. *M. gracillima* Torr.
13. *M. pungens* Thurb.

C. Culms erect, simple or branching, panicle close or spike-like.

14. *M. comata* Thurb.
15. *M. glomerata* Trin.
16. *Wrightii* Vasey.

D. Culms weakly erect or decumbent, simple or branched.

17. *M. Willdenovii* Trin.
18. *M. diffusa* Schreb.

E. Culms ascending, panicle contracted, from scanty rootstocks.

19. *M. sobolifera* Trin.
20. *M. Mexicana* Trin.
21. *M. Californica* Vasey.
22. *M. Parishii* Vasey.
23. *M. Huachucana* Vasey.
24. *M. sylvatica* T. & G.
25. *M. ambigua* Torr.

F. Low plants, culms erect, branching, panicle spreading.

26. *M. Buckleyana* Scribn.
27. *M. Arizonica* Scribn.
28. *M. debilis* Trin.
29. *M. Texana* Thurb.

H. culms branching, wiry, panicle contracted.

30. *M. Neo-Mexicana* Vasey.
31. *M. pauciflora* Buckl.
32. *M. Lemmoni* Scribn.
33. *M. Pringlei* Scribn.
34. *M. monticola* Buckl.
35. *M. parviglumis* Vasey.

Anomalous:

36. *M. dumosa* Scribn.
37. *M. depauperata* Scribn.

1. *Muhlenbergia capillaris* Kth. (*Stipa diffusa* Walt.; *Stipa sericea* Michx.; *Stipa capillaris* Lam.; *Agrostis setosa* Willd.; *Agrostis sericea* Ell.; *Podosæmum capillare* Desv.; *Trichochloa capillaris* DC.) (Gray's Manual, 6th ed., p. 644.) Culms 2 to 4 feet high,

leaves long, nearly equaling the culm, erect, narrow, and becoming involute; panicle 1 to 2 feet long, open and spreading, the branches capillary, 6 to 10 inches long, distantly subdivided, pedicels $\frac{1}{2}$ to $1\frac{1}{2}$ inches long; empty glumes one-fourth to one-half as long as flowering glumes, obtusish or acute, with or without an awned point; flowering glume about 2 lines long, narrow, with an awn two to four times as long as itself.—New England to Missouri, south to Florida and Texas.

Var. **FILIPES** Chapm. (*Muhlenbergia filipes*). Curtis; both glumes long-awned; flowers light-colored.—Florida.

Var. **TRICHOPEDES** (*Agrostis trichopodes* Ell.; *Muhlenbergia trichopodes* Ell.; *Muhlenbergia expansa* Trin.), empty glumes not awn-pointed, awn of flowering glume short.

2. **M. affinis** Trin. Agrost. II. p. 55. Culms simple, very slender, naked above the middle; sheaths longer than the internodes, scabrous downward; ligule 2 to $2\frac{1}{2}$ lines long; leaves linear, compressed, 5 inches long, pale glaucous; panicle 8 inches long, spreading, shining, branches solitary, or in threes or fives, capillary, lower ones about 3 inches long, naked below for 6 to 9 lines, above open-branched, pedicels sometimes shorter, sometimes 2 or 3 times longer than the spikelets, the latter 2 lines long; empty glumes one-third as long as the flowering glume, the latter glabrous, with a short, hairy callus and an awn 4 to 5 lines long.

This is Trinius's description, and seems to answer to specimens from Texas, collected by *G. C. Nealley*. We have the same also from Arizona (*J. D. Emersley*).

3. **M. Reverchoni** Vasey & Scribn. Culms $1\frac{1}{2}$ to 2 feet high, slender, erect, upper half naked; radical leaves 3 to 5 inches long, flat, involute toward the apex, scabrous on the upper surface, ligule 1 to 2 lines long, cauline leaves about two; panicle pyramidal, 5 to 8 inches long, thinly flowered, the lower branches about 3 inches long, mostly solitary, subdivided nearly to the base, capillary, pedicels as long as, or 2 to 3 lines longer than the spikelets; empty glumes one-third or one-half as long as flowering glume, acute; flowering glumes $2\frac{1}{2}$ lines long, the awn rather shorter. Distinguished by the short, flat leaves.—Texas (*Mr. J. Reverchon*).

4. **M. distichophylla** Kth. Enum. Plant, I. p. 202. Perennial, culms firm, 3 to $3\frac{1}{2}$ feet long, including panicle, leafy; leaves distichous, the lower two-thirds as long as the culm; conduplicate, rigid, scabrous, sheaths compressed, smooth, ligule 5 or 6 lines long, acute; panicle contracted, 6 to 15 inches long, rather dense, about an inch wide, branches scattered or verticillate, erect, 1 to 3 inches long, about the lower third naked, above with short, erect subdivisions; spikelets $1\frac{1}{2}$ lines long; empty glumes as long as the flowering glumes, or slightly longer or shorter, linear-oblong, thin, obtuse; flowering glume slender, smooth or nearly so, awn 3 to 6 lines long, or absent.—Western Texas to Arizona (?).

The awnless form has shorter empty glumes. The awned one has the long glumes of an *Epicampes*. There is some doubt whether our plant is the one described by Kunth.

5. **M. Emersleyi** Vasey n. sp. Culms 3 to 5 feet high, stout; leaves long, scabrous, 1 to 2 feet long, rigid, 1 to 2 lines wide; sheaths scabrous, ligule 4 to 5 lines long, lacerate; panicle ample, 1 foot long, loose, purplish, branches scattered, the lower ones verticillate, 4 to 5 inches long, naked near the base, pedicels mostly shorter than the flowers; empty glumes about $1\frac{1}{2}$ lines long, one-fifth longer than the flowering glumes; acutish, thin, 1-nerved, not keeled; flowering glumes 1 to $1\frac{1}{2}$ lines long, silky pubescent, especially on the margins below, 3-nerved, the middle nerve excurrent near the apex in a slender awn 6 to 8 lines long; pale equaling its glume, pubescent on its back between the two nerves.—Southern Arizona (*J. D. Emersley*).

This has a heavier, looser panicle than *M. distichophylla*.

6. **M. setifolia** Vasey. Bot. Gaz. VI. p. 296. Culms caespitose, 1 to $2\frac{1}{2}$ feet high, smooth, radical tufts fascicled, sometimes 1 foot long, involute-filiform, awl-pointed, scabrous on the margins, culm leaves similar, gradually shorter, the upper usually sheathing the base of the panicle; panicle narrow, 6 to 8 inches long, linear and little subdivided, panicle appressed, shorter than to twice as long as the spikelets; spikelets 2 lines long, empty glumes one-third as long and erose, obtuse, thin,

about equal, the upper sometimes with a short, setaceous point; flowering glume smooth, with an awn 8 to 9 lines long, palet one-fourth shorter than its glume. The specimens described above are No. 221, of *G. C. Nealley*.

This description includes the small form collected by Dr. Havard in the Guadalupe Mountains in 1881, which is smaller, and with short-curved leaves. It is near what I supposed to be *M. Berlandieri* Trin., of which we have no authentic specimens.

7. *M. Berlandieri* Trin. Agrost. p. 53. Culms erect, about 3 feet, smooth, simple; sheaths much longer than internodes, scabrous, ligule 2 to 3 lines long, leaves linear, firm, lower ones 6 inches long, plain or convolute, pale glaucous; panicle lanceolate, 10 inches long, shining; common axis scabrous downwards, branches single or in twos or threes, scattered, rough, soon subdivided above the base; pedicels short or twice as long as spikelet; spikelet about two lines long, linear-lanceolate very narrow; empty glumes subequal, one-sixth as long as the flowering glume 3-nerved, very rough, hairs of the callus a little shorter than the glumes; awn about 6 lines long.—Texas. No. 1992, C. Wright, has been referred to this species.

8. *M. acuminata* Vasey. Bot. Gaz. xi. p. 337. Culms 3 to 4 feet high, slender, smooth; radical leaves involute, 6 to 12 inches long, cauline ones 3 or 4, distant, narrow, becoming involute, acuminate, scabrous, the lower 6 to 8 inches long, the upper 1 to 2 inches, ligule 3 to 4 lines long, lacerate; panicle linear, 6 to 10 inches long, interrupted, the branches sessile, verticillate, or in twos or threes, closely appressed, the lower 1 to 2 inches long, flowering to the base; pedicels and rachis scabrous, spikelets 2 lines long; empty glumes half as long, nearly equal, obtuse and denticulate at apex, membranaceous; flowering glume 2 lines long, rigid, 3-nerved, acuminate, and terminating in a minute awn, about a line long; palet as long as its glume, acute.—New Mexico (No. 1993, C. Wright.)

9. *M. virescens* Trin. Agrost., p. 57. Perennial; culms 1 to 2 feet high, simple, erect, rather rigid, without nodes except at the base; leaves at base 6 to 10 inches long, flat, scabrous on the margins, or some of them involute setaceous; sheaths very long, ligule narrow, 4 lines long, acute; panicle 5 to 8 inches long, contracted, not dense, erect or drooping, somewhat one-sided, branches single (in twos or threes, Trin.), erect, flowering to the base, 1 to 2 inches long, pedicels very short; spikelets about two lines long; empty glumes lanceolate, acute, the lower one-fourth shorter than upper and 1-nerved; upper as long as or a little exceeding the flowering glume and 3-nerved; flowering glume sparsely soft-pubescent below, awn flexuous, 5 to 8 lines long; callus short-pubescent; palet about equaling its glume.—New Mexico, Arizona and Mexico.

The culms are without nodes, except at the growing-point of the rhizoma.

10. *M. gracilis* Trin. Agrost. II. p. 56. Perennial; culms 1 to 2 feet high, slender, the nodes crowded at the base, scabrous; covered at the base with dry, open sheaths; leaves convolute, rigid, 4 to 6 inches long; panicle 3 to 6 inches long, flexuous, linear, narrow; branches single or in twos below, 1 to 2 inches long, flowering at the base; pedicels scabrous, very short; spikelets $1\frac{1}{2}$ to 2 lines long; empty glumes unequal, the lower about one-half as long as the flowering glume, 1-nerved, acute or erose; upper glume one-third shorter than the flowering glume, 3-nerved, acute or 3-toothed, with the teeth short-awned; flowering glume, 3-nerved, pubescent or scabrous on the back, ciliate on the margins; awn 4 to 8 lines long; palet equaling its glume.—Texas, New Mexico, California and northward to British America.

Var. *BREVIARISTATA* (*Muhlenbergia subalpina* Vasey) much reduced, 7 to 12 inches high; panicle about 2 inches long; awn 1 to 2 lines long.—At high altitudes, Colorado and Wyoming.

11. *M. arenicola* Buckl. Proc. Acad. Phil. 1862. Culms $1\frac{1}{2}$ to 2 feet high; leaves mostly short, 4 to 6 inches, linear, erect, attenuated to a fine point, folded; panicle 6 to 8 inches long, open, spreading, branches singly and in twos or threes, the lower 3 inches long, sparsely flowered, the lower fourth naked; pedicels one to three times as long as the spikelet; spikelets about 2 lines long, empty glumes half as long, obtuse or obtusely tridentate, awn of floral glume scarcely 1 line long.—From western Texas to Arizona. This has been considered by some a variety of the next species.

12. *M. gracillima* Torr. (Coul. Rocky Mt. Fl. p. 410.) Culms 6 to 12 inches high, tufted and much branched at the ground, radical leaves numerous and crowded, short (1 inch), filiform and curved; cauline about 2; panicle purplish, more than half the length of the culm; branches erect-spreading, sparsely flowered, mostly single, branched above the middle; spikelets $1\frac{1}{2}$ to $1\frac{1}{2}$ lines long; empty glumes one-half to two-thirds as long, lanceolate, acuminate, or the upper 3-toothed; awn of the flowering glume about as long as the glume.—New Mexico and Texas to Nebraska.

13. *M. pungens* Thurb. (Bot. Cal. II. p. 227.) In habit like the preceding but large and coarser; culms 10 to 18 inches high; leaves 1 to 2 inches long, involute, rigid, pungently-pointed; panicle 4 to 6 inches long, pyramidal, the branches single, somewhat fasciculated, divided from the base into long-pediceled, diverging, 1-flowered rays; spikelets 2 to $2\frac{1}{2}$ lines long, empty glumes about half as long, bristle-pointed, or the lower 3-toothed; awn of the flowering glume about 1 line long; palea with two setose teeth.—Texas and New Mexico to Nebraska.

14. *M. comata* Benth. (*Vaseya comata* Thurb. Bot. Cal. II. p. 278.) Culms 2 to 3 feet high; nodes slightly pubescent, not branched; leaves 5 or 6 on the culm, flat, 4 to 6 inches long, 1 to 3 lines wide, erect; ligule a short lacerate fringe; sheaths equaling or the upper shorter than the internodes; panicle 3 to 4 inches long, silvery, narrow, sometimes interrupted below, the branches sessile, $\frac{1}{2}$ to 1 inch long, densely flowered; spikelets sessile or very short pediceled, $1\frac{1}{2}$ lines long; empty glumes narrowly lanceolate, acute, $1\frac{1}{2}$ lines long; flowering glume, nearly as long, obtuse, somewhat 2-toothed at apex, surrounded at base with copious white hairs two-thirds as long as the flowering glume; awn 2 to 3 lines long, flexuous.—Rocky Mountains, Colorado to Montana, Oregon and California.

15. *M. glomerata* Trin. (Gray's Manual, 6th ed., p. 643.) Culms 2 to 3 feet high, rather stiff, usually very leafy and often much branched; panicle 2 to 3 inches long, oblong-linear, contracted into an interrupted glomerate false spike, the branches sessile; leaves often 10 to 12, 3 to 4 inches long, narrow, rather rigid; empty glumes about 2 lines long, including the bristle-like point, hispid on the keel; palea one-half to three-fourths as long as its glume, narrow, very acute, mucronate or short-pointed.—Common.

Var. *RAMOSA*, stout, much branched below, very leafy.—Prairie regions.

16. *M. Wrightii* Vasey. Bull. Torr. Club, XIII. p. 53. Culms erect, or rarely somewhat decumbent below, simple or branching below, 1 to $2\frac{1}{2}$ feet high, rather wiry; leaves 3 to 6 inches long, narrow, appressed; sheaths shorter than the internodes; ligules short; panicle spike-like, cylindrical, densely flowered, more or less interrupted, the lower branches of thrifty specimens $\frac{1}{4}$ to 1 inch long, appressed, floriferous to the base; spikelets 1 to $\frac{1}{2}$ lines long, sometimes 2-flowered; empty glumes nearly equal, about 1 line long, with a thin ovate base, contracted into a narrow, acuminate point; flowering glume a little longer and thicker, tipped with a very short, stiff awn, $\frac{1}{2}$ to $\frac{1}{2}$ line long, 3-nerved below, slightly pubescent; palea about as long as its glume.—Rocky Mountains, New Mexico, Arizona, Colorado and Mexico.

17. *M. Willdenovii* Trin. (Gray's Manual, 6th ed., p. 643.) Culms upright, 3 feet high, frequently much branched, slender; panicle contracted, linear, elongated, 4 to 10 inches long, loosely flowered; leaves spreading, 3 to 4 lines long; spikelets 2 lines long; empty glumes slightly unequal, about 1 line long, ovate; flowering glume 2 lines long, scabrous or pubescent; awn 4 to 5 lines long.—New England to Missouri.

18. *M. diffusa* Willd. (Gray's Manual, 6th ed., p. 644.) Culms diffusely much branched (8 to 18 inches); contracted panicles slender, rather loosely many-flowered, terminal and lateral; empty glumes extremely minute, the lower obsolete, the upper truncate; awn once or twice longer than the flowering glume.—Dry hills and woods, from New England to Michigan, Iowa and southward to Texas.

19. *M. sobolifera* Trin. (Gray's Manual, 6th ed., p. 643.) Culms 1 to 2 feet high, often much branched, slender; leaves rather short, 3 to 6 inches; panicle linear,

sometimes interrupted, the lower branches 1 inch long, appressed; spikelets 1 line long or less; empty glumes nearly equal, one-third shorter than the flowering glumes, the latter abruptly short mucronate, pubescent below, rough above.—New England to Minnesota and southward.

20. **M. Mexicana** Trin. (Gray's Manual, 6th ed., p. 643.) Culms ascending, much branched, 2 to 3 feet high; panicles lateral and terminal, often included at base, contracted, the branches densely spiked-clustered, or linear-contracted, or loose and open, 2 to 6 inches long; empty glumes slightly unequal, lanceolate, long acuminate, about the length of the very acute flowering glume, the latter about $1\frac{1}{2}$ lines long, sparsely pubescent below.—New England to Colorado and Minnesota.

21. **M. Parishii** Vasey. Bull. Torr. Club, XIII. p. 53. (*M. sylvatica* var. *Californica*.) This grass has the spreading, diffusely branched habit of *M. sylvatica*, and should perhaps be ranked as a marked variety of that species. The narrow panicles terminating the long, leafy, terminal and lateral branches are 4 to 6 inches long, the rays mostly alternate, the lower ones distant and subspicate, some of them 1 inch long, the spikelets sessile and crowded on the branches; the outer glumes membranaceous, except the hispid green keel, equal, lanceolate, acuminate, scarcely 2 lines long, rather exceeding the flowering glume without its awn; flowering glume about $1\frac{1}{2}$ lines long, firm, finely scabrous, acute, and terminating in a straight awn about its own length, sparingly villose at the base; palea about as long as its glume, acute.—San Bernardino Mountains, California (*S. B. Parish*).

22. **M. Californica** Vasey. Bull. Torr. Club, XIII. p. 53. (*M. glomerata* var. *brevifolia*.) Culms $1\frac{1}{2}$ to 2 feet high, erect and leafy; leaves (5 to 8 on each culm) rigid, short and wide (2 to 4 inches long, 2 to 3 lines wide), somewhat scabrous; panicle spike-like, interrupted and with longer branches below; glumes and palea about equal in length (1 line), glumes acuminate, scabrous puberulent; flowering glume acuminate and tipped with an awn half its length or less, 3-nerved, pubescent below; palea acute, about equaling the flowering glume.—Southeast California (*S. B. Parish*).

23. **M. Huachucana** Vasey n. sp. Culms tufted, much branched at base, 12 to 18 inches high, leafy; leaves 4 to 6 inches long, 2 lines wide, erect, rather rigid, scabrous; panicle 2 to 4 inches long, narrow, the lower branches sometimes in twos, all densely flowered, erect, contiguous; spikelets 2 lines long, sessile; empty glumes about equal $1\frac{1}{2}$ to 2 lines long, ovate, acuminate-pointed, the long point scabrous; flowering glume about 2 lines long, 3-nerved, with a short awn; palea about as long as its glume. Both flowering glume and palea villous pubescent below.—Huachuca Mountains, Arizona (*J. G. Lemmon*).

24. **M. sylvatica** T. & G. (Gray's Manual, 6th ed., p. 643.) Culms ascending, much branched and diffusely spreading (2 to 4 feet long); contracted panicles densely many-flowered; lower glumes almost equal, bristle-pointed, nearly as long as the flowering one, the latter with an awn twice or thrice the length of the spikelet.—Low or rocky woods; common.

25. **M. ambigua** Torr. (Gray's Manual, 6th ed., p. 643.) "Culms ascending, clustering and branching, 1 foot high; panicles contracted, densely many-flowered; spikelet 2-flowered, the upper flower like the lower and perfect, or more frequently reduced to a mere awn at the base of the lower flower; lower glumes nearly equal, long pointed; flowering glume villous, as long as the flower and equaling the palea, its awn nearly twice longer.—Shore of Elysian Lake, Waseca County, Minnesota (*Geyer*)."

A remarkable species, approaching *Brachyelytrum* in the structure of the spikelet, but with wholly the habit of *Muhlenbergia*.

26. **M. Buckleyana** Scribn. (*M. Texana* Buckl.) Culms 9 to 12 inches high, much branched at the base; leaves few and near the base, linear, 1 to 2 inches long; panicle oblong-lanceolate, constituting three-fourths the height of the plant, slender, the capillary branches scattered, mostly single, erect-spreading, 1 to 2 inches long, sparsely subdivided above the middle; spikelets three-fourths of a line long, on very short pedicels; empty glumes somewhat unequal, about half a line long, 1-nerved, ovate,

acuminate, ciliate on the margins, translucent; flowering glume thin, 3-nerved, bidentate, three-fourths line long, with an awn about as long as itself; palet about equaling its glume.—Western Texas and Mexico. It has much the appearance of *Sporobolus confusus*.

* * * Culms erect or decumbent or creeping, much branched.

27. **M. Arizona**, Scribn. Bull. Torr. Club, xv. p. 8. Culms closely tufted, mostly decumbent or creeping at the base with flowering culm rising successively from the same, 10 to 15 inches high; leaves one-half to 2 inches long, narrow; panicles oblong, thin, 3 to 5 inches long, capillary, the branches scattered, the lower 1 or 2 inches long, subdivided nearly to the base, the pedicels capillary, 2 to 6 lines long; spikelets about $1\frac{1}{2}$ lines long, purple; empty glumes $\frac{1}{2}$ line long, ovate, acute; flowering glume 3-nerved, pubescent on nerves below, bidentate at apex, the awn straight, and half line long; palet as long as its glume.—Texas and Mexico. Resembles in habit *Sporobolus asperifolius*.

28. **M. debilis** Trin. Agrost. p. 49. Culms tufted, decumbent and much branched, purplish throughout, geniculate and sending up flowering culms which are 5 to 15 inches long; leaves 1 to 2 inches long, puberulent; sheaths somewhat inflated, ligules half line long, lacerate; panicles 2 to 5 inches long, somewhat contracted, or spreading, the branches short ($1\frac{1}{2}$ to 1 inch long), mostly single, sessile; spikelets 1 to $1\frac{1}{2}$ lines long, on very short pedicels; empty glumes nearly equal, one fourth to one-fifth as long as the floret, mostly obtuse or eroded, hyaline; flowering glume slender, tapering, scabrous throughout, terminated by a slender awn 1 to $1\frac{1}{2}$ inches long; palet about equal to the flowering glume. The flowering glume and its awn are very early deciduous.—Arizona, South California and Mexico.

29. **M. Texana** Thurb. (Coul. Rocky Mt. Fl. p. 410.) Culms diffusely much branched and spreading, decumbent and geniculate; leaves about 1 to 3 inches long; panicle 2 to 4 inches long, naked below, sparsely flowered, spikelets $1\frac{1}{2}$ lines long, on long capillary pedicels; empty glumes 1 line long, lanceolate, setaceous-acuminate; 1-nerved; flowering glume $1\frac{1}{2}$ lines long, 3-nerved, sparsely pubescent; awn 3 to 4 lines long, palet equaling its glume, bidentate at apex.—Texas, Arizona, New Mexico to Colorado, Southern California and Mexico.

30. **M. Neo-Mexicana** Vasey. Bot. Gaz. xi. p. 337. Perennial; culms mostly branched near the base from thickened nodes, wiry, erect, 1 to 2 feet high, scabrous; cauline leaves about 5, setaceous, erect, about 3 inches long, the upper one near the panicle; ligule short, lacerate; panicle narrow, linear to lanceolate, 4 to 6 inches long, the branches unequal, mostly in twos, appressed, the longer 1 to 2 inches long, flowering to the base, the branchlets sessile and closely flowered; spikelets sessile or nearly so, about 2 lines long without the awn; empty glumes equal, more than half as long as the spikelet, lanceolate, acuminate, or awl-pointed, 1-nerved; flowering glume short-stalked, 3-nerved, narrow, acuminate, and terminating in a straight, slender awn 4 to 6 lines long.—Rocky hills and mountain sides New Mexico and Arizona.

31. **M. pauciflora** Buckl. Proc. Acad. Phil. 1862. Culm and leaves as in the preceding; panicle 3 to 4 inches long, narrow, interrupted; spikelets 2 lines long, sessile or nearly so; empty glumes half as long as spikelet, ovate below, above short, awned; flowering glume 2 lines long, with a short, blunt stipe, smooth, 3-nerved-acute, and with an awn 3 to 4 lines long.—Western Texas (No. 732, C. Wright.)

This closely resembles the preceding and may perhaps be a variety of it.

32. **M. Lemmoni** Scribn. Culms much branched at the base, $1\frac{1}{2}$ to 2 feet high, wiry, leafy; leaves 1 to 2 inches long, 1 line wide, erect; panicles 3 to 4 inches long, linear, somewhat interrupted, branches short, erect; spikelets about 2 lines long; empty glumes lanceolate-acuminate, 1 line or more long; flowering glumes about $1\frac{1}{2}$ lines long, or with the awn 2 lines; very pubescent below—Huachuca Mountains, Arizona (J. G. Lemmon) and Texas (G. C. Nealley).

Closely related to *M. Huachuacna*, of which possibly it is a small variety.

33. *M. Pringlei* Scribn. Hardly distinguishable from the preceding except by the 8 to 10 lines long awn.—Santa Rita Mountains, Arizona (*Pringle*, No. 480).

34. *M. mcinticola* Buckl. Proc. Acad. Phila. 1862. Culms tufted, slender, wiry, often geniculate and branched below; leaves narrow, 2 to 3 inches long; sheaths rather shorter than the internodes, ligule white, short, lacerated; panicles terminating the branches, 2 to 4 inches long, loose, branches sessile or nearly so, single, one-half to 1½ inches long; spikelets sessile, about 2 lines long; empty glumes unequal, linear-lanceolate, not awned nor pointed, the upper 1½ lines long, the lower a little shorter, both 1-nerved; flowering glume 1½ to 2 lines long, pubescent on the nerves below, awn about 8 lines long; palet equaling its glume, awl-pointed.—Texas (*S. Buckley*, *Harvard*, *G. C. Nealley*), Arizona (*J. G. Lemmon and Pringle*), New Mexico (*Jones*) and Mexico (*Pringle*).

35. *M. parviglumis* Vasey. Culms 1 to 2 feet high, rarely unbranched except at the base, commonly sparsely long-branched above the base; leaves 1 to 4 lines long, involute, rather rigid, narrow; ligule short, fimbriate; panicles 4 to 7 inches long, narrow, branches single or the lower in twos and sometimes 1½ inches long, appressed, flowering to the base; pedicels very short to 2 lines long, thickened upward; empty glumes minute, nearly equal, obtuse or obtusely crenate, one-fourth to one-fifth as long as the flowering glume, the latter 1½ lines long, with 2 sharp teeth at apex, and between the teeth an awn 6 to 10 lines long.—Texas (*G. C. Nealley*).

36. *M. dumosa* Scribn. Culms suffrutescent, 3 to 6 feet high, smooth, from a thick woody rhizoma, very much branched; leaves filiform, 2 inches long, very numerous; panicles numerous on the branches, oblong-lanceolate, about 1 inch long, loosely flowered, intermingled with the leaves; spikelets about 1½ lines long; empty glumes nearly equal, about one-half line long; flowering glume narrow, terete, prominently 3-nerved, pubescent below, tipped with an awn 2 lines long; palet rather longer than the glume.—Arizona (*Pringle and Lemmon*), Mexico (*Pringle*) and southern California (*Orcutt*).

37. *M. Schaffneri* Fourn. Gram. Mexicanum, p. 85. Tufted, dwarf, 1 to 4 inches high, much branched, the branches linear, leafy below; leaves ¼ to 1 inch long, sheaths loose; the upper part of each branch bears short, linear, 8 to 10-jointed panicles, each joint having a branch with 3 to 5 sessile spikelets; empty glumes unequal, the larger 2 lines long, 3-nerved, toothed or lacerated at apex, the smaller mostly shorter and 1-nerved; flowering glume 1½ lines long, with an awn as long; palet equaling its glume.—Arizona (*Lemmon and Pringle*) and Mexico (*Pringle*).

Var. *LONGISETA* Scribn. differs principally in having longer awns of the flowering glumes.—Same localities.

BRACHYELYTRUM Beauv.

Spikelets 1-flowered and with a sterile rudiment, appressed, in a simple racemose panicle; outer glumes minute, unequal, the upper and larger about half a line long, persistent; flowering glume chartaceous, rigid, produced at the apex into an awn 8 to 10 lines long; palet hyaline, 2-keeled, bifid at apex. The pedicel (continuation of the rachilla) is bristle-like, half as long as the palet, and partly lodged in the groove on its back.

1. *B. aristatum* Beauv. Culms slender, 2 to 3 feet high, from creeping root-stocks; sheaths downy, leaves broad, lanceolate, 4 to 6 inches long; spikelets 5 to 6 lines long, without the slender 8 to 10-line long awn; sterile pedicel bristle-like, one-half as long as the flowering glume.—Rocky woods, common from Maine to Minnesota.

Var. *ENGELMANNI* Gray. A western form with the second empty glume awn-pointed, nearly half the length of the floral one.

AGROSTIS Linn.

Spikelets 1-flowered in a contracted or open panicle; outer glumes nearly equal or the lower rather longer, and longer than the flowering glume, 1-nerved, acute, unawned; flowering glume shorter and wider, hyaline, 3- to 5-nerved, awnless, or sometimes awned on the back; palet shorter than the flowering glume, frequently reduced to a small scale or entirely wanting. Stamens usually 3. Grain free.

1. *Palet wanting or very minute.**A. Panicle spike-like or close and short-rayed.*

1. *Agrostis densiflora* (*A. mucronata* Thurb. not Presl.) Culms in tufts from an annual fibrous root, 3 to 12 inches high, rather stout; leaves mostly radical or near the base, rather rigid, erect, the uppermost 1 to 2 inches long, rough on the margins; ligule conspicuous, obtuse, decurrent; sheaths longer than the internodes, striate, rather loose, crowded at the base; panicle dense and spike-like, 1 to 3 inches long, 2 to 6 lines thick, the rays verticillate or glomerate, densely flowered, scabrous; spikelets over a line long; empty glumes equal, ovate-lanceolate, very acute or somewhat mucronate, the lower hispid on the back, and scabrous throughout; flowering glumes a quarter shorter than the empty ones, minutely toothed at apex, not awned, palet wanting or minute.—Santa Cruz, Cal. (*Dr. C. L. Anderson*). This has been distributed as *A. mucronata* Presl.

Var. *ARENARIA* (*Agrostis arenaria* Scribn.) Culms tufted, low (6 to 12 inches), mostly decumbent and geniculate at base, leaves 2 to 3 inches long, 1 or 2 lines or less wide; panicle varying from dense to loose and sometimes interrupted, 1 to 2½ inches long; empty glumes nearly equal, ovate-lanceolate, acute, 1 line long, scabrous throughout, hispid on the midnerve; flowering glume nearly as long as the empty ones, broadly ovate, obtusish, minutely toothed at apex, sometimes with a rudimentary awn on the back; palet minute or wanting.—Seashore, Mendocino County (*C. G. Pringle*, 1882).

This differs chiefly in being decumbent below, and with panicles less dense. In the scabrous glumes it resembles *A. verticillate*.

Var. *LITTORALE* (*Agrostis exarata* var. *littorale* Vasey Bull. Torr. Club, XIII. p. 54). Culms tufted, low, decumbent below, and sending out long (1 to 2 feet) short-jointed runners, leaves about 2 inches long, narrow, long-acuminate; panicle looser and more thinly flowered, the short rays sometimes spreading; empty glumes more acute, longer, and smoother; floral glume one-half to two-thirds as long as the empty glumes; palet minute, and with the 2 lodicules as long as the ovary.—Bottom lands, Washington (*W. M. Suksdorf*).

Very similar to some forms of *A. stolonifera*, which, however, has the palet as in *A. vulgaris*. It is only connected with *A. densiflora* through the var. *arenaria*.

2. *A. microphylla* Steudel. Steudel Syn. Pl., p. 164. (*Deyeuxia alopecuroides* Nutt.) Roots annual, culm erect, slender, often branched at the base; leaves short, erect, narrow; sheaths shorter than their internodes, ligule acute, decurrent; panicle lanceolate, erect, more or less dense, the very short rays verticillate or glomerate and much subdivided; empty glumes 1½ to 2 lines long, linear-lanceolate, attenuated to an awn-like point, whitish; floral glume half as long as the empty ones, narrow, minutely 4-toothed at apex with a dorsal awn about the middle, the latter 2 to 3 lines long, palet wanting.—Throughout California to Oregon and Washington.

It is difficult to determine without the original specimens whether this and the preceding are correctly named. Prof. Hackel thinks this must be the *A. mucronata* Presl., while Gen. Munroe referred it as above.

Var. *MAJOR* (*Agrostis exarata* var. *microphylla* Watson). Culms slender or stout, 1½

to 2½ feet high, leaves much larger, panicle 3 to 6 inches long, varying from dense and glomerate to loosely subspicate, the awned point of the empty glumes sometimes larger than the body, resembling a *Polypogon*. It is surely not *A. exarata*.—With the same range as the typical form.

3. *A. exarata* Trin. (Bot. Cal. II. p. 273.) (*Agrostis albicans* Buckl.) Culms erect, 1 or 2 feet high or more, from an annual (or perennial?) root, at length naked for some distance below the panicle; leaves mostly erect and flat, 1 to 3 lines broad, 2 to 6 or 8 inches long, the lower generally shorter, smoothish to very rough, ligule obtuse; sheaths mostly shorter than the internodes, smooth; panicle erect or nodding, narrow and dense, to open and thin, often somewhat lobed, rays verticillate and very numerous to few, of unequal length, mostly flower-bearing to the base; spikelets 1 to 2 lines long; glumes nearly equal, acute, rough on the keel; floral glume one-third to one-half shorter than the empty ones, usually 4- or 5-nerved, usually unawned, sometimes the midnerve does not extend to the apex and terminates with a short awn; palea usually shorter than the ovary or wanting; stamens 3.—Extending in some form throughout the Rocky Mountain region to the Pacific, and eastward to Wisconsin.

One of the most variable species. Different forms have received several names, including *Agrostis grandis* Trin., *A. asperifolia* Trin., and *A. pallens* Trin. *Agrostis microphylla* Steudel has also been referred to it as a variety, but I think it is a good species.

B. Panicle loose, rather narrow, rays erect.

4. *A. varians* Trin. (Bot. Cal. II. p. 273.) Culms slender, erect, from a perennial root, smooth, 6 to 12 inches high; leaves very narrow; one-half to 1 line wide, 1 to 3 inches long; sheaths mostly longer than internodes; panicle 1 to 3 inches long, purplish, the rays erect, the lower numerous, about an inch long, flowering above the middle or lower; spikelets a line long or less; empty glumes nearly equal, acute, smooth, or nearly so; palea minute or wanting.—Rocky Mountains to the Sierras. Probably this includes 2 or 3 species.

5. *A. tenuis* Vasey. Bull. Torr. Club, x. p. 21. Perennial, loosely tufted; culms 6 to 12 inches high, slender leaves numerous at the base, 1 to 2 inches long, narrow (½ line), with 2 to 3 on the culm; ligule short, obtuse, lower sheaths about equal to the ligule; panicle pyramidal, open, 2 to 3 inches long, the rays in three or fives below, above in twos or single; capillary, the longest 1 inch or more in length, becoming spreading, naked below the middle, above subdivided and few flowered; spikelets very small (less than a line), purplish, empty glumes rather unequal, acute, smoothish; floral glume thin, a little shorter than the outer, obtusish, 3-nerved above, unawned; palea very minute or wanting.—From southern California to Oregon, on mountains.

C. Panicle larger, rays longer, but still erect.

6. *A. Scouleri* Trin.? (Bot. Cal. II. p. 272.) (*A. repens* Scribn.) Culms perennial from running root-stocks, 1½ to 2½ feet high, erect 4 or 5 nodes above the base; leaves 4 to 6 inches long, flat or becoming involute; sheaths about as long as the internodes; ligule 1 to 2 lines long, acute; panicle 3 to 5 inches long, lanceolate or linear-lanceolate; rays mostly in fives, unequal, the longer 1 inch or more long, naked below, the shorter ones flowering to the base; empty glumes somewhat unequal, 1½ to 1½ lines long, acute, smooth except the midrib; floral glumes nearly as long, oblong, acute or acutish, with 5 prominent nerves, the midrib sometimes ending above the middle in a slender awn; no palea.—California to Alaska.

This is conspicuously distinguished by its running rootstocks, which are not mentioned in the original description, whereas Trinius describes *A. pallens* as being sub-repent and stoloniferous. There is great uncertainty about the names of western species of *Agrostis*.

7. **A. Diegoensis** Vasey, Torr. Bull. Club, XIII. p. 55. Culms 3 to 9 from a running root-stock 2 to 3 feet high; leaves plane, 3 to 8 inches long, narrow; ligule 2 lines long; acute; sheaths shorter than the internodes; panicle 4 to 7 inches long, lanceolate, narrow; rays erect, below numerous (5 to 7), unequal, the longer $1\frac{1}{2}$ to 3 inches long, flowering above the middle, equaling or exceeding the internode; empty glumes somewhat unequal, $1\frac{1}{2}$ to $1\frac{1}{2}$ lines long, acute; floral glume nearly as long, 4-toothed at apex, 2 lateral nerves on each side of the midnerve, which often terminates above the middle with or without a short awn; no palet.—Santa Cruz, (Dr. Anderson) and San Diego County, Cal. (C. R. Orcutt).

This is nearly related to the preceding.

Var. **FOLIOSA** (*Agrostis foliosa* Vasey). (Bot. Gaz. XI. p. 337). Culms stoloniferous, $1\frac{1}{2}$ to 2 feet high, very leafy, otherwise like the preceding.—Oregon (Dr. Bolander and Mr. Howell).

8. **A. Hallii** Vasey. Culms erect, stout, 2 to 3 feet high, smooth, not stoloniferous; lower leaves narrow, inclined to be involute, the upper ones flat, 3 to 6 inches long, 1 to 2 lines wide, scabrous; ligules 2 to 3 lines long, acute; panicle 6 to 9 inches long, the rays erect, spreading, the lower in clusters of 5 to many, unequal, the longer ones 2 to 3 inches, branching above the middle; spikelets $1\frac{1}{2}$ lines long, somewhat appressed and crowded; empty glumes acute, $1\frac{1}{2}$ to 2 lines long, scabrous on the keel; the floral glume nearly as long, with 2 tufts of hairs at the base; palet wanting.—Oregon, Washington and California.

Var. **CALIFORNIA** (*A. elata* Thurb. in Bot. Cal.). Culms rather stout, erect, from a perennial root, 2 to $3\frac{1}{2}$ feet high, smooth; radical leaves 4 to 6 inches long, very narrow, the lower becoming involute, the upper ones flat, 3 to 6 inches long, 1 or 2 lines wide, scabrous especially below; ligules 2 to 3 lines long, acuminate; panicle open, erect, spreading, rather narrow and elongated, 6 to 10 inches long; rays unequal, on clusters of 5 to 7 below, and in pairs above, at intervals of $1\frac{1}{2}$ to 2 inches, branching above the middle, the longer 2 to 3 inches long; spikelets $1\frac{1}{2}$ lines long, somewhat crowded on the branches, on pedicels shorter than or twice their own length; glumes very acute, rough on the keel, floral glume nearly as long as the empty ones, with a few very minute hairs at base, obtuse; palet wanting.—California.

9. **A. virescens** H. B. K. (Bot. Cal. II. p. 274.) Culm 1 to 2 feet high or more, perennial; leaves erect, flat, about 6 inches long and 4 lines broad, rough on both sides; ligule over a line long, truncate; sheaths much shorter than the internodes, mostly smooth; panicle pale-greenish and tinged with purple, about 6 inches long and $1\frac{1}{2}$ broad, the rays in clusters about an inch distant on the common axis, two or three flower-bearing above the middle, the others for their whole length; spikelets 2 lines long; glumes very acute, the lower somewhat longer, and terminated by a distinct seta exceeding $\frac{1}{2}$ line in length, rough on the keel and pubescent all over; floral glume about one-third shorter than the outer ones, bearded at the base with a few short white hairs, truncate, 5-nerved, the lateral nerves projecting as distinct teeth, the central excurrent at or below the middle as a strong bent awn about 2 lines long; palet wanting or present as a very minute rudimentary scale.—California (Nos. 34, 4801, and 6079 Bolander's), Oregon (Suksdorf).

This is the description given by Dr. Thurber of a California species collected by Bolander, which has been confused with *A. exarata*.

D. panicle open, rays longer and usually spreading.

10. **A. canina** Linn. (Gray's Manual, 6th ed., p. 648.) Culms 8 to 18 inches high, with fibrous roots, radical leaves numerous, involute-setaceous, those of the culm a little broader; ligule acute; sheaths about equaling the internodes; panicle 3 to 6 inches long, erect-spreading, rays of the larger plants mostly in fives below, of the smaller ones in twos or threes, unequal, the longer an inch or more, branching above the middle; spikelets purple or brownish, mostly on short pedicels; empty glumes acute, smooth, 1 to $1\frac{1}{2}$ lines long; floral glume one-fourth shorter; awned below the middle;

awn bent and exserted beyond the spikelet; palet wanting.—Mountains of New England and southward; also of California, Oregon and Washington.

Var. *STOLONIFERA*. Culms densely tufted and stoloniferous; leaves flat, 1 to 2 lines wide; lingule decurrent; panicle sometimes denser or less open, sometimes pale green and thinner; empty glumes more unequal, very acute; floral glumes nearly equal to the spikelets; awn straight, little exserted beyond the longer glume.—Oregon (*Henderson, Howell*).

11. *A. Oregonensis* Vasey. Bull. Torr. Club, XIII. p. 55. Culms caespitose, not stoloniferous, about 2 feet high, somewhat slender; leaves mostly near the base, short and narrow, those of the culm shorter than the internodes, distant, narrow, 3 to 4 inches long, slender pointed; panicle 4 to 5 inches long, purple, somewhat nodding; lower rays in threes to fives, $1\frac{1}{2}$ to 2 inches long, erect-spreading, naked below and rather numerous flowered at the extremities; spikelets on roughish pedicels one to three times as long, $1\frac{1}{2}$ lines long, narrowly lanceolate, acute; floral glume nearly as long as the outer, acutish, 5-nerved; palet wanting.—Oregon (*Howell*) and Washington (*Suksdorf*). Resembles *A. scabra*, but has shorter panicle and rays, and usually a stouter culm.

12. *A. rupestris* All. (*Agrostis canina* var. *alpina* Oakes.) (Gray's Manual, 6th ed., p. 648.) Culms 6 to 10 inches high, roots fibrous, caespitose, not stoloniferous; leaves all convolute-setaceous; panicle oval, purple or greenish; branches capillary, smooth; mostly in twos or threes; spikelets mostly near the extremity, less glomerate than in *A. alpina*; empty glumes a little unequal, lanceolate, sharply acute; floral glume little shorter than the empty ones, rather obtuse, with 2 small teeth at the summit, and awned a little below the middle; palet wanting.—Mountains of New England and North Carolina. Var. *RUBRA*. A small form occurring in Labrador and British Columbia is perhaps *A. rubra* Linn.

E. Panicle open, rays longer, spreading.

13. *A. geminata* Trin. Icones Gram. 1. Pl. 28. Culms caespitose, about 8 inches high, erect or geniculate-ascending, thin filiform, smooth, the radical ones involute-filiform, 2 to 3 inches long, those of the culm plane, about 1 inch long; panicles 2 to 3 inches long, diffuse, the axis filiform and flexuous, with 4 or 5 nodes, the rays mostly in pairs or the lower in threes or fours, dividing above the middle into several parts with divergent pedicels; empty glumes lanceolate, very acute, the lower a little the longer, floral glume one-fourth shorter, ovate-oblong, obtusish, indistinctly 5-nerved, with an awn from about the middle which is a little longer than its glume; palet shorter than the ovary (or wanting).—Alaska, probably also in an awnless form in British America and in the Rocky Mountains.

14. *A. arachnoides* Ell. (Chapm. Flora S. States, p. 522.) Culms very weak and slender, 6 to 12 inches high; leaves very narrow to 1 or 2 lines wide; panicle very long for the size of the plant (one-half to two-thirds), at first contracted, becoming diffuse, the rays capillary, mostly in twos or threes, 1 to 3 inches long; empty glumes nearly equal, lanceolate, rough on the keel; floral glume nearly equaling its empty ones, apex obtuse, with 2 minute setaceous teeth, and emitting near the apex a very fine long awn, 5 or 6 times its own length, or the awn sometimes wanting; palet minute or wanting.—South Carolina, Tennessee, to Louisiana and Texas.

15. *A. scabra* Willd. (HAIR GRASS) (Gray's Manual, 6th ed. p. 648.) (*A. oreophila* Trin.) Culms very slender, erect, 1 to 2 feet high; leaves short and narrow, mostly involute or sometimes plane, the upper ones 1 to 3 inches long; panicle purplish, 6 to 10 inches long, at first contracted, becoming very loose and spreading; rays capillary, often 3 or 4 inches long, the lower in clusters of 6 or more, branched above the middle, the subdivisions flowering near the summit; spikelets a line or more long, somewhat unequal, very acute, scabrous on the keel; floral glume shorter than the empty ones, very thin, sometimes short-awned; palet minute or wanting.—Very variable and widely diffused from the Atlantic to the Pacific.

16. *A. attenuata* Vasey. Bot. Gaz. xi. 337. Culms slender, erect, attenuated, 2 to 3 feet long, smooth; radical leaves narrowly linear, 2 to 4 inches long, those of the culm about 3, distant; sheaths shorter than the internodes, smooth; ligule conspicuous, 2 to 3 lines long; blade 2 to 4 inches long, narrow, acuminate; panicle oblong or pyramidal, 3 to 4 inches long (remarkably short for the length of the culm); lower rays in threes or fives, somewhat unequal, 1 to 2 inches long, erect-spreading, capillary, few-flowered; pedicels mostly longer than the spikelets; empty glumes equal, about $1\frac{1}{2}$ lines long, oblong-lanceolate, acute, scabrous on the keel; flowering glume nearly as long, not awned; palea wanting.—In swampy ground, Mount Hood, Oregon (Thomas Howell).

17. *A. perennans* Tuck. (*Trichodium perennans* Ell.; *T. decumbens* Michx.) Culms more or less slender, often decumbent at base, 1 to $2\frac{1}{2}$ feet high, simple or branching below; leaves flat, 1 to 3 lines wide, 2 to 6 inches long; panicle 4 to 8 inches long, diffuse, the rays 2 to 4 inches long, variable as to number, the lower often numerous and verticillate, branched below the middle; spikelets at the extremity of rather long pedicels; empty glumes rather unequal, acute or acuminate, hispid on the keel; floral glume one-fourth shorter, not awned; palea wanting.—Widely dispersed; flowers in autumn.

Var. *ÆSTIVALIS*. More slender, less tall; panicle longer, often occupying one-half to two-thirds of the culm, the rays more capillary and shorter, flowering much earlier (June to August).—Illinois, Tennessee, and southward.

18. *A. elata* Trin. (Gray's Manual, 6th ed., p. 648.) Culms firm or stout, 2 to 3 feet high; leaves flat, 1 to 2 lines wide; upper ligule elongated (2 to 3 lines long); panicle open, 5 to 9 inches long, lower branches in fives or more, unequal, the longer 3 to 4 inches long, flowering above the middle; spikelets somewhat crowded near the extremities of the branchlets, $1\frac{1}{2}$ lines long, acute; floral glume about as long as the empty ones, acutely 2-toothed at the apex; palea wanting.—Sandy swamps, New Jersey and southward.

19. *A. Novæ-Angliæ*. (*A. scabra* var. *montana* Tuck.) Culms perennial, rather firm, somewhat geniculate below, 1 to 2 feet high, smooth; leaves of radical tufts, 4 to 6 inches long; those of the culm 3 to 4 inches long, 1 to 2 lines wide, flat, soft, smooth; ligule 1 line long, obtuse; upper sheaths very long (3 to 5 inches); panicle pyramidal or oblong, purplish, 4 to 5 inches long; lower rays mostly in fives, somewhat unequal, the longer ones 2 to 3 inches long, the upper ones in twos or threes and gradually shorter, rather few-flowered near the ends; empty glumes oblong-lanceolate, acute; floral glume nearly as long, awned near the apex.—Mountains of New England.

20. *A. Howellii* Scribn. Culms about 2 feet high, weak, geniculate and decumbent below, 3- to 5-leaved; leaves flat, 6 to 10 inches long, 3 lines wide, the upper ones equaling the panicle, rather scabrous; ligule 1 to 2 lines long, decurrent; sheaths about equal to the internodes, smooth; panicle 8 to 10 inches long, flexuous, pale or whitish, very open and thin, the lower rays in threes to fives, the upper in pairs, the longer 3 to 4 inches long, capillary, sparingly branched below the middle, distant; spikelets $1\frac{1}{2}$ lines long, on rather long pedicels; empty glumes rather unequal, acute, slightly scabrous on the keel, otherwise smooth; floral glume equaling the shorter empty one, narrow, the 4 lateral nerves projecting as setaceous teeth, the stout awn near the base bent and about 2 lines long, a few minute hairs at the base; palea wanting.—Near Hood River, Oregon (No. 198, Howell).

F. Panicle short and dense; rays crowded.

21. *A. Rossæ* n. sp. Apparently caespitose; culms about 6 inches high, smooth; leaves mostly near the base, 1 inch long or less, erect, or appressed; sheaths rather loose, striate, the upper reaching to the middle of the culm; panicle oblong, 1 to $1\frac{1}{2}$ inches long, the comparatively long rays verticillate, erect, and appressed, $\frac{1}{2}$ to $\frac{2}{3}$ inch long, subdivided above, and the few spikelets crowded at the extremities; empty glumes

1 line long, ovate-lanceolate, acute; floral glume little shorter, oblong, obtuse, minutely toothed at the apex; palet wanting.—A small species with the aspect of *Aira*, collected in the Yellowstone Park, Wyoming, by *Miss Edith A. Ross*.

22. *A. exigua* Thurb. Bot. Cal. II. p. 275. A dwarfish annual grass; the culms 1 to 4 inches high, erect, flattened, sometimes branching near the base; leaves from an inch to 2 lines long or less, mostly convolute; ligule about a line long, acute; sheaths very loose, striate; panicle half the length of the plant, included and at first narrow, at length open; lower rays about five, the others in pairs, the longer about an inch in length, bearing one to five flowers above the middle; spikelets $\frac{1}{2}$ of a line long, the pedicels much enlarged just below; empty glumes not pointed, aculeolate on the keel, and with minute scattered hairs all over; floral glume equaling the empty ones, 5-nerved, scabrous, with few very minute hairs, very acute at apex, the midnerve prolonged into a roughish awn four times longer than itself, inserted about one-fifth below the tip, which is split down to that point, forming two setæ; palet wanting; stamens 1 (?)—Foothills of the Sierras (*Dr. Bolander*). This species I have not seen.

2. Palet at least one-third as long as its glume.

A. Small species.

23. *A. humilis* Vasey. Bull. Torr. Club, x. p. 21. Perennial, tufted; culms 4 to 8 inches high, naked above, 1 to 2 leaves below the middle; radical leaves numerous, 1 to 3 inches long, very narrow, not rigid, erect; ligule short; panicle 1 to $1\frac{1}{2}$ inches long, linear, narrow, and few-flowered, the rays short, mostly two or three below, above in twos or single, appressed, the longer rays subdivided and with two to five spikelets each; spikelets purple, less than a line long, empty glumes ovate-lanceolate, acute, smooth; floral glumes nearly as long as the outer ones, 5-nerved, minutely toothed at apex, unawned or minutely awned; palet hyaline, two-thirds as long as its glume.—Oregon (*Cusick*), Washington (*Howell and Suksdorf*).

24. *A. æquivalvis* Trin. (Bot. Cal. p. 271.) (*Deyeuxia æquivalvis* Benth.) Probably perennial; culm 10 to 18 inches high, slender, erect, smooth; leaves flat, the lower 4 to 6 inches long, 1 to 2 lines wide, the upper 2 to 3 inches long, smooth, pale green; upper ligules 1 line long; sheaths smooth, shorter than the internodes; panicle narrow, 2 to 3 inches long, loose, smooth, green or purple; rays mostly in fives below, somewhat distant, unequal, the larger 1 to $1\frac{1}{2}$ inches long, flower bearing from about the middle; spikelets about 1 line long, on pedicels mostly as long as themselves; empty glumes nearly equal, acute; floral glume acute, nearly as long as the empty ones; palet as long or nearly as long as its glumes, with a minute hairy rudiment about one-fourth as long ("two-thirds as long," *Trinius*), as the floral glume.—Alaska, British Columbia, Washington, Oregon, Montana and California.

B. Larger plants.

25. *A. alba* Linn. (Gray's Manual, 6th ed. p. 647.) (*A. stolonifera* Linn.; *A. vulgaris* With.) Rootstocks creeping or stoloniferous; culm 1 to $2\frac{1}{2}$ feet high (sometimes less than 1 foot), often decumbent at base; leaves flat, 2 to 6 inches long, ligule long and acute or short and obtuse; panicle 3 to 8 inches long, open, spreading in flower, more or less contracted afterward, the rays usually numerous and unequal, the longer, 1 to 3 inches long, subdivided and flowering above the middle; spikelets about 1 line long; the empty glumes nearly equal; floral glume a little shorter than the empty ones, thin, 3- to 5-nerved, awnless or rarely short awned; palet one-third to two-thirds as long as its glume.—Cultivated from Europe, but apparently also native in mountainous regions.

Var. MINOR. A shorter, densely tufted form, 1 foot high; culms geniculate below, with shorter, more slender, erect leaves; short truncate ligules, and sheaths shorter than the internodes. Probably introduced, but growing spontaneously in dry fields and waste places.

26. **A. verticillata** Vill. (Bot. Cal. II. p. 272.) Culms 1 to 2 feet high, decumbent and rooting below, the lower joints geniculate; leaves short, flat, 1 to 3 lines wide, rough; ligule 1 or 2 lines long, truncate; sheaths loose, shorter than the internodes; panicle 2 to 6 lines long, dense, lobed and interrupted; rays crowded, short, branched and flowering from the base; spikelets less than a line long; empty glumes about equal, acute, roughened with a minute pubescence; floral glume about half as long as the empty ones, 5-nerved, minutely 5-toothed at the obtuse apex; palet nearly as long as its glume.—Widely dispersed in the southwest, from Texas to California.

NOTE.—A dwarf form growing in crevices of rocks, Anticosti Island, at the mouth of the St. Lawrence River, collected by Mr. J. Macoun, is probably a new species, of which more specimens are needed.

APERA Adans.

Characters as in *Agrostis*, except that the upper empty glume is much larger than the floral glume, which is long-awned from the apex, the toothed palet nearly as long as its glume, and there is a minute, naked pedicel or rudiment of a second flower.

1. **A. spica-venti** Beauv. (Gray's Manual, 6th ed., p. 649.) (*Agrostis* Beauv. in part.) Annual, culms 1 to 2 feet high; panicle spreading or somewhat contracted; rays numerous, filiform, numerously divided; spikelets small (about 1 line long), the floral glume roughened toward the apex.—Sparingly naturalized on ballast ground.

GASTRIDIDIUM Beauv.

Spikelets 1-flowered in a loose, tapering, spike-like panicle; outer glumes extended into long, acute points, and with an enlarged ventricose base, obscurely keeled, the lower longer than the upper; flowering glume very thin, about one-fourth as long as the outer ones, hairy on the back, truncate and dentate at the apex, usually emitting from near the apex a slender awn as long as or longer than the glumes; palet thin, as long as its glume. A sterile pedicel at the base of the flower.

1. **G. australe** Beauv. (Bot., Cal. II. p. 275.) (*G. lendigerum* Gaudin.) Culm 6 inches to 2 feet high, smooth, branching at the lower nodes, geniculate; leaves flat, 2 to 5 inches long, about 2 lines wide; sheaths rather shorter than the internodes; ligule 2 lines long, lacerate-fringed; panicle 3 to 6 inches long, about $\frac{1}{2}$ inch wide, sometimes lobed, shining, pale green; spikelets about 2 lines long, very acute; empty glumes slightly scabrous above, shining below; floral glume hairy; palet equaling the glume.—Introduced and very common in Australia.

CALAMAGROSTIS Roth.

Spikelets in a contracted, spike-like, or open panicle, with or without a bristle-like or hairy rudiment opposite the palet; empty glumes about equal, awnless, membranaceous or chartaceous; flowering glume usually with a ring of hairs surrounding its base, or a tuft on each side, and usually bearing an awn on the back; palet 2-nerved, 2-keeled. The spikelets usually larger than in *Agrostis*.

§ 1. DEYEUXIA Hack.

Hairs of the callus seldom exceeding the glumes, sometimes very short; the sterile pedicel also very hairy.

A. Panicle small, loose, and spreading, with few rays.

1. **Calamagrostis deschampsoides** Trin. (Bot. Cal. II. p. 250.) Culms tufted from a decumbent base, 6 to 10 inches high, smooth; leaves flat or somewhat convolute, smooth, the lower 4 to 6 inches long, the upper about 1 inch; panicle small ovate or pyramidal; rays mostly in pairs or threes, divided above the middle, and bearing about 5 flowers; spikelets 2 lines or more, purple tinged; empty glumes equal, broadly lanceolate, acute; floral glume about as long as the empty ones; acuminate 2-toothed, bearing above the middle a stout awn, which slightly, or one-third, exceeds its glume; hairs of the callus and of the rudiment one-half as long as the glume or less; palea equaling the floral glume.—Alaska and Arctic America.

2. **C. Breweri** Thurb. (Bot. Cal. II. p. 250.) Culms densely tufted, 6 to 15 inches high, erect, very slender; radical leaves 2 to 3 inches long, setaceous-involute, minutely scabrous above, the upper very short; upper ligule acute, 2 lines long; sheaths close, striate; panicle loose, 1 to 3 inches long, purple rays solitary or in twos or threes, spreading, short, 1- to 3-flowered at the extremities; spikelets $1\frac{1}{2}$ to 2 lines long, lanceolate, acute; floral glume equal to empty ones, with acute or lacerate teeth at the apex, with a short, minute tuft of hairs at the base, awned from near the base, exerted nearly a line beyond the apex; palea nearly equaling its glume, 2-toothed at apex.—Sierras of California (*Bolander, Brewer and Lemmon*).

B. Panicle larger with long spreading or somewhat contracted rays.

3. **C. Howellii** Vasey Bot. Gaz. VI. p. 271. Culms densely tufted, 10 to 20 inches high, erect, or somewhat geniculate below, smooth; radical leaves loosely setaceous involute, firm but not rigid, in length nearly equaling or even exceeding the culm, ligule conspicuous, about $1\frac{1}{2}$ lines long, scarious, culm leaves about 3, narrow or filiform, 4 to 8 inches long, the upper one equaling the culm; panicle pyramidal, 2 to 4 inches long, loose and spreading, rays mostly in fives, lower ones 1 to $1\frac{1}{2}$ inches long, numerous-flowered above the middle; spikelets pale-green or purple-tinged; outer glumes lanceolate, acute, $2\frac{1}{2}$ to 3 lines long, nearly equal, membranaceous, 1-nerved or the upper distinctly 3-nerved, flowering glume slightly shorter than the outer ones, ovate-lanceolate, acute, 4-nerved above, the apex with 2 mucronate pointed teeth, the conspicuous strong awn inserted about the lower third, half an inch long, palea rather shorter than its glume, bidentate at the apex, basal hairs about half as long as the flower, those of the rudiment rather longer.—Oregon and Washington.

A well marked and handsome species, remarkable for the long setaceous leaves, both radical and cauline, and for the open panicle and conspicuous awns. It was named for the discoverer, *T. J. Howell*, Oregon.

4. **C. pallida** Vasey & Scribn. Culms 4 feet high, with 6 or 7 nodes; leaves 2 to 4 lines wide, 6 to 9 inches long; sheaths striate, shorter than the internodes; ligule about 2 lines long, lacerate at apex; panicles 6 or 7 inches long; loose and spreading, whitish or very pale, the rays capillary, mostly in fives, the longer 2 inches long, flowering near the extremity of the branchlets; spikelets 1 to $1\frac{1}{2}$ lines long, somewhat unequal, long acuminate-pointed, pedicels, branches and midnerve of glumes scabrous; floral glume one-fourth shorter than the empty ones, very thin, acutely toothed at apex; hairs of the callus and rudiment about equaling the glume, very fine; awn slender and short, attached near the apex and extending half a line beyond.—Washington (*Suksdorf*.)

5. **C. Bolanderi** Thurb. Bot. Cal. II. p. 280. Culms 2 to 3 feet high, geniculate below, more or less scabrous throughout; leaves, 4 or 5, flat, 6 to 10

inches long, 2 to 4 lines wide, pale, yellowish-green; ligule 2 lines long, truncate, erose or lacerate; sheaths mostly shorter than the internodes, loose; panicle 3 to 8 inches long, loose, dark purple becoming brownish; rays in threes and fives; the lower 2 to 4 inches long, very slender, rather erect, at length spreading or even deflexed, the branches sparsely flowered above the middle; spikelets $1\frac{1}{2}$ lines long on slender pedicels; empty glumes equal, oblong-lanceolate, acutish or rather obtuse, rough on the keel; floral glume little shorter, sometimes roughish-tuberculate, the lateral nerves projecting at the apex as teeth; hairs of the callus few and unequal, about one-third as long, and those of the rudiment more than half as long as the glume, awn attached near the base, stout, extending a line beyond its glume; palea slightly shorter, broad, 2-nerved, 2-toothed.—Swamps, Mendocino County, Cal. (No. 6471 *Bolander*).

C. Panicle ample, loose and open, with short, erect, or drooping rays. (Exception in var. of C. Aleutica.)

6. *C. Canadensis* Beauv. (BLUE JOINT). (Gray's Manual, 6th ed., p. 650.) Culms erect, smooth, 3 to 5 feet high, rarely branching below; leaves about a foot long, 2 to 4 lines wide, flat; ligule short, lacerate; sheaths appressed, shorter than the internodes; panicle 3 to 6 inches long, the axis and rays scabrous; spikelets from $1\frac{1}{4}$ to $1\frac{3}{4}$ lines long; empty glume somewhat unequal, lanceolate, acute; floral glume nearly as long, acute or obtusish, 2-toothed at apex, hairs of callus and rudiment about equaling the glume, awn very slender, arising from about the middle, equaling or little exceeding its glumes; palea a little shorter; quite variable in the size and looseness of the panicle. Widely spread throughout most of the United States and British America to Alaska.

Var. DUBIA (*Calamagrostis dubia* Scribn.). Culms more slender, panicle narrower and closer, hairs of the floret one-half as long as the floral glume, awn stouter and usually longer than in *C. Canadensis*.—Montana (*Scribner*) to Washington (*Suksdorf*).

7. *C. dubia* Scribn. Bot. Gaz. xi. p. 174. Culms 2 to 3 feet high, rather slender; leaves much as in *C. Canadensis*; panicle contracted 5 to 6 inches long, the branches less spreading and more densely flowered than in *C. Canadensis*, unequal and flower-bearing mostly to the base; spikelets about two lines long, brown or purplish; empty glumes lanceolate to oblong-lanceolate, acute or acuminate, minutely scabrous on the back; floral glume $\frac{1}{2}$ shorter, irregularly 4-toothed at apex, the straight rather stoutish awn attached below the middle, longer than its glume and equaling the outer glumes; palea nearly as long as its glume, irregularly two-toothed; hairs of the callus and rudiment one-half to two-thirds as long as the floral glume.—Montana to Oregon and Washington.

8. *C. Langsdorffii* Trin. (Gray's Manual, 6th ed., p. 650.) "Culm, leaves, and panicle as in *C. Canadensis*; spikelets 2 to 3 lines long; glumes lanceolate or oblong-lanceolate, attenuate-acuminate, often cinereously strigose-pubescent; awn stouter than in the preceding, and often slightly exceeding the floral glume."—Labrador, White Mountains, New Hampshire, Oregon to Alaska.

9. *C. Aleutica* Trin. (Bot. Cal. II. p. 282.) Culms stout, densely tufted, 2 to 5 feet high, erect, smooth; leaves erect, rather rigid, those of the culm flat, long-attenuate, a foot (or two) long, and 4 or 5 lines wide, rough; ligule ovate or truncate; sheaths loose, mostly shorter than the internodes; panicle 6 to 10 inches long, 1 to 2 inches wide, loose, or sometimes rather close; rays in crowded clusters, the longer 1 to 3 inches long, erect or erect-spreading, mostly flower-bearing to the base; spikelets $2\frac{1}{2}$ to 3 lines long, mostly exceeding the pedicels, pale or brownish; empty glumes nearly equal, lanceolate, acuminate, membranaceous, roughish; floral glumes like the outer in texture, and but slightly shorter, obtuse or acutish, 4-toothed and lacerate, nearly smooth, its awn inserted just below the middle or near the base and barely as long; hairs of the callus and minute rudiment scarcely half as long as the glume; palea nearly as long as its glume, shortly 2-toothed, 2-nerved.—Near the coast, from Santa Cruz, northward to Washington and Alaska.

Var. ANGUSTA. Culms more slender; leaves short and narrow, rigid, and becoming involute; panicle narrow and rather dense; hairs of callus sparse and short, approaching the next section.—Santa Cruz, Cal. (*Dr. Anderson*).

10. *C. Cusickii* Vasey. Bot. Gaz. x. p. 223. Culms 3 to 4 feet high, erect from creeping rhizoma, smooth, nodes about 3, distant; radical tufts, numerous, with flexible curving leaves one-third as long as the culm; sheaths smooth, 4 to 5 inches long, the upper one 7 or 8 inches; ligule conspicuous, 2 to 4 lines long, membranaceous; panicle 6 inches long, erect, rather close, $\frac{3}{4}$ to $1\frac{1}{2}$ inches wide, the branches whorled, numerous, mostly short, and flowering to the base, the longer ones 1 to $1\frac{1}{2}$ inches long, densely flowered, the lower whorls about 1 inch distant; spikelets closely approximated, very short, pediceled; outer glumes about 2 lines long, acute or acuminate, smooth, rather thin; the lower one 1-nerved, the upper 3-nerved and a little shorter; flowering glumes nearly as long as the outer ones, narrowly lanceolate, acuminate, smooth, thinish, 5-nerved, bifid at the apex; awn erect, inserted a little below the middle, slightly exceeding its glumes; palea nearly equaling the glume, membranaceous; hairs scanty, one-half to two-thirds as long as the flower; near *C. Aleutica*, but distinguished by rather smaller and more crowded spikelets and longer awns.—In the Eagle Mountains (*W. C. Cusick*) and eastern Oregon, at an altitude of 5,000 to 6,000 feet, growing in the shade of *Pinus contorta*, very conspicuous, but rarely sending up culms.

11. *C. Pickeringii* Gray. (Gray's Manual, 6th ed., p. 651.) Culms 1 to $1\frac{1}{2}$ feet high; leaves short, erect, rather rigid; panicle lanceolate, or pyramidal, purplish; empty glumes ovate-oblong to ovate-lanceolate, bluntish or abruptly pointed, $1\frac{1}{2}$ to 2 lines long, thickish; floral glume nearly as long, acute, bearing below the middle a short stout awn slightly longer than the glume, hairs of the callus and rudiment very short and scant, $\frac{1}{4}$ or $\frac{1}{2}$ the length of the glume.—White Mountains, New Hampshire, and Vermont (*Pringle*).

12. *C. Porteri* Gray. (Gray's Manual, 6th ed., p. 650.) Culm slender, 2 to 4 feet high; leaves 6 to 10 inches long, scabrous below, tapering to a long slender point, ligule 2 lines long, lacerate; a pubescent or woolly ring at the junction of the sheath and leaf on the back; panicle long and narrow, the rays appressed; empty glumes lanceolate, rather unequal, acute, pale, 2 to $2\frac{1}{2}$ lines long; floral glume as long as the upper empty one, firm, membranaceous, bearing below the middle a stoutish, twisted awn of its own length, hairs of the callus scanty, less than half as long as the glume, those of the rudiment half as long as the glume.—Dry woods, Pennsylvania (*Porter*), to New York (*Dudley*).

13. *C. Macouniana* Vasey. (Bot. Gaz., x. p. 297, as *Deyeuxia*.) Culms 2 to 3 feet high, erect, somewhat branching below, slender, leafy; leaves narrow, flat, 6 to 10 inches, alternate, pointed, ligule short, lacerate; panicle 3 to 4 inches long, lanceolate or pyramidal, open, the rays mostly in fives, approximate, slender, erect, naked below, spikelets somewhat crowded at the upper part of the branches, little more than 1 line long; the empty glumes nearly equal, purplish, ovate-lanceolate, acute, finely scabrous on the back; floral glumes equal to the empty ones, ovate-oblong, somewhat truncate, and 2-lobed at the apex, the lobes finely denticulate, with an awn above the middle, straight, reaching to the apex; palea one-third shorter than its glume, bifid and denticulate at the apex; hairs copious, as long as the flowering glume.—Northwest Territory, British America (*J. Macoun*, for whom it is named). In this species the flowers are smaller than those of any other of our species.

14. *C. strigosa* Wahl. (*Arundo strigosa* Wahl.) has been attributed to Alaska, but the description of Bongard, in the "Vegetation of Sitka" does not agree with Wahlenberg's figure in Flora Lapponica. The plant referred to *C. strigosa* by Dr. Thurber, collected by Mr. Harrington in Alaska, has a large panicle, the empty glumes $2\frac{1}{2}$ to 3 lines long, terminating in a long subulate point, strigosely-pubescent all over, especially so on the keel; the floral glume little shorter, acuminate, with the awn attached considerably below the middle, exerted, and equaling or slightly exceeding the glume; hairs of callus and rudiment copious, and about one-third shorter than the floral glume. In appearance like a large *C. Langsdorffi*.—Alaska.

D. Panicle spike-like, or narrow (sometimes spreading during flowering), the rays short.

15. **C. Nuttalliana** Steudel. (Gray's Manual, 6th ed., p. 650.) Culms stout, 3 to 5 feet high; leaves long, 2 to 4 lines wide, scabrous on the upper surface; panicle contracted, 4 to 6 inches long, rays short, erect, empty glumes lanceolate, tapering into slender, awl-shaped tips, 3 lines long, very scabrous; floral glume a little shorter, acuminate, strongly nerved, awn borne above the middle, stout, slightly exceeding the glume; palea linear-lanceolate, acuminate, nearly equaling its glume; hairs of the callus scanty, half as long, and those of the tuft on the top of the rudiment copious and nearly equaling the glume; grain-bearded at the summit.—New England, New Jersey, Pennsylvania, to Virginia, North Carolina and southward.

16. **C. confinis** Nutt. (Gray's Manual, 6th ed., p. 650.) (*Calamagrostis inexpansa* Gray; *Deyeuxia confinis* Kth.) Culms 2 to 4 feet high, smooth except near the panicle; leaves flat, or becoming more or less involute, scabrous; panicle elongated, 4 to 6 inches long, the scabrous rays spreading at flowering time, afterwards appressed; empty glumes thickish, more or less scabrous, lance-oblong or lance-ovate, acute, about 2 lines long, 3-nerved; floral glume nearly as long, acute, rather thin, awn from below the middle, and about equaling the glume; palea nearly equaling its glume, narrow; hairs of callus and rudiment one-third or little shorter than the floral glume.—Swamps near Lake Erie and westward to Minnesota. Appears to pass into the next species.

17. **C. robusta**. (*C. stricta* Trin.; *Deyeuxia neglecta* Kth. in part.) Culms $1\frac{1}{2}$ to 2 feet high, scabrous above, rigid; leaves scabrous, involute or becoming so, the radical ones numerous, ligule narrow, 1 to $1\frac{1}{2}$ lines long, obtuse; panicle strict, 4 to 6 inches long, the rays very short, sometimes glomerate; empty glumes about $1\frac{1}{2}$ lines long, ovate-oblong, acute, roughish, nearly equal; floral glumes nearly as long, acute, scabrous; awn from below the middle equaling or slightly shorter or longer than its glume; palea one-fourth to one-third shorter than its glume, bifid at apex; hairs of callus and rudiment usually one-third to one-half shorter than the glume, sparse.—Throughout the Rocky Mountain region from British America and Washington to Colorado and Arizona.

18. **C. Montanensis** Scribn. Culms stoloniferous, 9 to 12 inches high, rather rigid, erect; leaves of radical tufts rigid, involute setaceous or becoming so, 6 inches long, culm leaves similar but shorter, scabrous; panicle narrow, linear to oblong, 2 to $2\frac{1}{2}$ inches long, dense; rays very short, fasciculate; empty glumes narrowly lanceolate, acute, 2 lines long or more, with the pedicels scabrous, whitish; floral glume one-fourth shorter (or $1\frac{1}{2}$ lines long), thinnish, finely scabrous, acutely 4-toothed, the stiff awn from the lower third about equaling its glume; palea a little shorter, bifid at apex; hairs of callus one-third as long, and those of the rudiment two-thirds as long as the flowering glume. Rather abundant.—Montana (*F. L. Scribner, R. S. Williams*).

19. **C. stricta** Trin. (*Arundo stricta* Trin.; *Deyeuxia neglecta* Kth.) Culms slender, $1\frac{1}{2}$ to 2 feet high; leaves mostly near the base, slender, almost filiform, 2 to 4 inches long, one above the middle of culm, 2 to 3 inches long, ligule very short, obtuse; panicle narrow, $2\frac{1}{2}$ to 3 inches long, rather sparsely flowered, much less dense than in *C. stricta*; empty glumes about $1\frac{1}{2}$ lines long, linear-lanceolate, acute, thinner than the preceding; floral glume thin, one-fourth shorter than the empty glume, obtuse, minutely 4-toothed, 5-nerved below, the awn about the middle slightly exceeding the glume; palea one-fourth to one-third shorter than its glume, hairs of callus and rudiment about one-half the length of the floral glume.—Labrador (*L. M. Turner*).

Seems exactly like Scandinavian specimens of *Calamagrostis stricta* Hartmann.

20. **C. Saksdorffi** Scribn. Culms tufted, 2 to 3 feet high, smooth; leaves of culm about 3, 6 inches long, 1 to 2 lines wide, with slender acuminate points, upper ligules 1 to 2 inches long, lacinate, decurrent, lower sheaths shorter and upper ones longer than the internodes; panicle erect, 3 to 5 inches long, close or sometimes rather loose, pale or sometimes purplish, the rays glomerate, unequal, the shorter ones crowded with the almost sessile spikelets, the longer ones an inch or two long, flower-bearing

throughout; empty glumes $1\frac{1}{2}$ to 2 lines long, the lower slightly longer, oblong-lanceolate, acute, whitish, translucent, nearly smooth except on midnerve; floral glume thin, one-fourth shorter than the empty ones, oblong, obtuse, the 4 nerves terminating in as many teeth at the apex; a strong awn from near the base to a little beyond the glume; hairs of callus very few and short ($\frac{1}{4}$ line), those of the rudiment twice as long, or half as long as the glume; palea about as long as its glume.—Montana, British America, Washington, Oregon and California.

21. *C. Tweedyi* Scribn. Culms robust, thick, smooth, 3 to $3\frac{1}{2}$ feet high; leaves flat, unusually broad, those at the base 3 to 5 lines wide and 6 to 8 inches long, those of the culm 1 to 3 inches long; ligule 1 or 2 lines long, decurrent; sheaths loose, striate, smooth; panicle spikelike, about 4 inches long, thick, densely flowered; empty glumes 3 lines long, thinnish, lanceolate, acute; floral glume slightly shorter, lanceolate, finely scabrescent, acutely 2-toothed, with a stout, twisted, and bent awn from the lower third to one-third or one-half beyond the glumes; palea as long as its glume, 2-toothed; hairs of callus very short and scanty, those of the rudiment numerous and half as long as the floral glume.—Cascade Mountains, Washington (*Tweedy, G. R. Vasey*).

Remarkable for its robust size, broad leaves, and thick panicle. Near *C. sylvatica*.

22. *C. sylvatica* DC., var. AMERICANA. Culms tufted, erect, rigid, 1 to 2 feet high; leaves rather numerous and crowded near the base, rigid, the radical ones more than half the length of culm, those of the upper culm 3 to 6 inches long, attenuate-pointed, very scabrous, thick, and more or less involute; ligule 1 line long, truncate often lacerate; sheaths rough, striate; panicle spikelike, strict, sometimes loose, 3 to 4 inches long, $\frac{1}{2}$ inch wide or more, dense, generally purplish; rays mostly in fives, an inch long or less, appressed, and like the rachis very rough; spikelets 3 to $3\frac{1}{2}$ lines long, on short roughish pedicels; empty glumes ovate-lanceolate, very acute, scabrous, the upper 3-nerved; floral glume slightly shorter than the empty ones, very acute or acuminate, with 4 setaceous teeth at apex, awn near the base, twisted below, bent at the middle, and exerted one-half or quite as long as the glume; palea hyaline, narrow, 2-toothed; hairs of the callus scanty, short (about $\frac{1}{2}$ as long as the flowering glume), those of the rudiment $\frac{2}{3}$ or $\frac{3}{4}$ as long as the flowering glume.—High plains and mountains, British America to Colorado, also Washington, Oregon and northern California.

This differs considerably from the European form.

Var. LONGIFOLIA. A remarkable form from the Mattole district, California. Culms densely tufted; the radical leaves as long as the culm, almost filiform and setaceously pointed, empty glumes narrow, 4 lines long, acuminate; hairs of the callus more conspicuous, one-third as long as the glume. A well-marked variety. (No. 6470 *Bolander*).

Var. PURPURASCENS Thurb. is a more slender, less rigid form.—Cal. (No. 5071 *Bolander*).

23. *C. purpurascens* R. Br. (Hooker Fl. Bor. Am. II. p. 240.) Culms tufted, firm, not rigid, 2 to $2\frac{1}{2}$ feet high, leafy; leaves flat, 6 to 8 inches long, 2 to 4 lines wide, somewhat scabrous, tapering to an attenuated point; sheaths shorter than the internodes, smooth; ligule 2 lines long, lacerate; panicle spikelike, 3 to $3\frac{1}{2}$ inches long, one-half inch wide, purple; empty glumes 2 to $2\frac{1}{2}$ lines long, equal, broadly lanceolate, smoothish, hardly scabrous, acute; floral glume one-quarter shorter, oblong, obtuse at apex, smooth; awn at lower third and extending scarcely beyond the empty glumes; palea equaling its glume, obtusely 2-toothed; hairs of the callus very short and scanty, those of the rudiment unequal, about half as long as the glume.

This description is from specimens collected in the Cascade Mountains of Washington by G. R. Vasey, which agrees well with European specimens, although differing somewhat from the description in Hooker's Fl. Bor. Am. It occurs also in British America and in Sitka. It is not *C. sylvatica* var. *purpurascens* of Thurber.

24. *C. rubescens* Buck? Prof. Scribner has identified as this species specimens

collected by C. G. Pringle on the plains of Mendocino California, and also No. 1089 of Kellogg & Harford and No. 3 of Bolander. The culms are from strong rhizomas, and about 2 feet high, slender, naked above, radical tufts very leafy, with narrow, rigid, setaceous pointed leaves, about 6 inches long; panicle strict, purplish, 2 to 3½ inches long; empty glumes, oblong-lanceolate, barely acute; floral glumes fully as long, oblong, broadly toothed at apex; awn from below the middle, hardly equaling its glume; hairs of callus scanty and very short, the rudiment short and naked.

25. *C. crassiglumis* Thurb. Bot. Cal. II. p. 281. Culm about a foot high, erect, rigid; radical leaves nearly as long; those of the culm 3 to 4 inches long, divergent, the upper smaller, erect, usually reaching the panicle, all acute, rigid, flat below, becoming involute, strongly striate, rough; sheaths loose, smooth; panicle strict, scabrous, about 2 inches long, dense, purplish, the short, rough rays appressed; empty glumes, about 2 lines long, nearly equal, broadly ovate or ovate-lanceolate, abruptly pointed, minutely scabrous, subcartilaginous, the margins thin; floral glume about equally long, very broad, acute, obscurely toothed at apex, thickish, somewhat scabrous, the rather stout awn attached below the middle, equaling or slightly exceeding its glume; hairs of callus and rudiment about ¾ as long; palet one-fourth shorter than its glume.—Swamps, Mendocino County, Cal. (No. 4766 Bolander).

26. *C. Lapponica* Trin. (Gray's Manual, 6th ed., p. 650.) (*Deyeuxia Lapponica* Kth.) "Culm and rootstocks stouter than in *C. stricta*; the narrow panicle less dense, and purplish spikelets larger; glumes fully 2 lines long, tapering to a point; awn from much below the middle of the (floral) glume, stout.—Isle Royale, Lake Superior, to Labrador, north and westward."

This is the description given in Gray's Manual for a species or supposed species of this country, which I do not fully recognize. I feel sure we have not here the *Calamagrostis Lapponica* of Wahlenberg as illustrated in the Flora Lapponica.

27. *C. densus* Vasey. Bot. Gaz. XVI. p. 144. Culms in large patches, from strong rootstocks, 3 to 4 feet high, robust, leafy, 5 to 6 nodes; the lower sheaths loose and longer than the internodes, the upper including the base of the panicle, leaves often a foot long, rigid, plane, or becoming somewhat involute at the long slender points, somewhat scabrous, as are the sheaths; ligule 1 line long, lacerate; panicle strict lance-oblong, 4 to 6 inches long, rachis slightly scabrous, branches somewhat verticillate, appressed, 1 inch long, and densely flowered; spikelets crowded, 2 to 2½ lines long; outer glumes linear-lanceolate, nearly equal, acute, slightly scabrous, margins slightly scarious; third (or flowering) glume a little shorter, narrow, apex slightly toothed and mucronate, a few short hairs at the base; awn twisted near the base, a little longer than its glumes; palet a little shorter than the glume, thin; sterile tuft slender, ¼ to ½ as long as the glumes, with few hairs.—Near Julian, San Diego County, Cal. (*C. R. Orcutt*).

28. *C. koelerioides* Vasey. (Bot. Gaz. XVI. p. 144.) Culms erect, 2 feet high, rather rigid, smooth; leaves 2 to 6 inches, long, narrow, somewhat scabrous, ligule conspicuous, lacinate, blade rigid, pointed, the upper very short; panicle spikelike, narrow, 3 to 4 inches long, the branches in short, approximate (or at the base rather distant) clusters; spikelets about 2 lines long, linear-lanceolate, rather smaller, but otherwise much as in *Calamagrostis densus*, the panicle having much the appearance of *Koeleria cristata*.—Julian, San Diego County, Cal. (*C. R. Orcutt*).

§ 2. CALAMOVILFA Gray.

Rudiment of second flower wanting; glumes and palet rather characeous, compressed-keeled; flowering glume 1-nerved, entirely awnless; palet strongly 2-keeled; panicle at length open and loose.

29. *C. longifolia* Hook. (Gray's Manual, 6th ed., p. 651.) (*Ammophila longifolia* Benth.) Culms stout, 2 to 6 feet high, often reed-like, from strong, scaly, creeping rootstocks, smooth; leaves rigid, often 1 to 2 feet long and 10 to 12 on a culm, flat, tapering into a long attenuated point; ligule, a narrow, woolly ring, more copious

on the angles; sheaths longer than internodes; panicle at first close, becoming open and pyramidal, or widely spreading, 6 inches to 2 feet long, the rays smooth, 3 to 6 inches long, scattered on the axis, naked below; empty glumes lanceolate, 3 to 4 lines long, the lower $\frac{1}{2}$ to $\frac{1}{3}$ shorter; floral glume equaling or little shorter than the upper glume, the hairs of the callus copious, $\frac{1}{3}$ to $\frac{2}{3}$ as long as the glume.—Lake shores, Illinois, and Michigan westward throughout the plains from British America to Utah and Arizona.

30. *C. brevipilis* Gray. (Gray's Manual, 6th ed., p. 651.) (*Ammophila brevipilis* Benth.) Culms 2 to 4 feet high, from strong, scaly rootstocks, smooth; leaves at base crowded and strongly conduplicate, those of the culm narrow, with long filiform points; panicle purplish, open, spreading, 5 to 8 inches long, flowering above the middle; empty glumes unequal, ovate to oblong, acute, the upper 2 lines long, the lower about half as long, with a few short hairs external of the base; floral glumes equal, 2 lines long, sparsely hairy on the back and keels, hairs of the callus sparse, one-third as long as the glume; palet equaling its glume, sparsely pubescent.—Rare: Sandy swamps, pine barrens of New Jersey.

31. *C. Curtissii* Vasey. (Bull. Torr. Club, xi. p. 7, as *Ammophila Curtissii*.) Culms 3 to 6 feet high, from a stout creeping rhizoma, growing singly or in small tufts, the base clothed with the rigid, imbricated 2-ranked sheaths, the culm above with 3 or 4 distant leaves, involute, setaceous, 4 to 10 inches long; the ligule an obscure ciliate ring; panicle 8 to 10 inches long, narrow and strict, the rays appressed, very numerous, scattering or in twos below, loosely flowered, subdivided nearly to the base; spikelets short-pedicelated, about $2\frac{1}{2}$ lines long; the empty glumes unequal, linear-lanceolate, the lower $\frac{1}{2}$ to $\frac{1}{3}$ shorter than the upper; floral glume equaling the spikelet or longer, linear-lanceolate, sparsely hairy externally, the basal hairs few and very short; palet narrow, one-third shorter than its glume.—Indian River, Florida (No. 3412 *Curtiss*).

Several other species of this genus have been described or indicated by the author, but on insufficient material, and are therefore omitted. Among these are *Deyeuxia breviaristata* Torr. Bull. xv. p. 48, *D. borealis*, Macoun, and *D. Columbiana*, Macoun.

AMMOPHILA Host.

Spikelets 1-flowered, in a contracted spike-like or an open, diffuse panicle, with or without a bristle-like rudiment opposite the palet; outer glumes large, nearly equal, rigid, thick, lanceolate, acute, keeled, 5-nerved; flowering glume similar in texture, about equal in length, sometimes mucronate at the apex; palet as long as its glume, of similar texture, 2-keeled, sulcate between the keels; hairs at the base of the flower usually scanty and short.

1. *A. arundinacea* Host. (Gray's Manual, 6th ed., p. 651.) (*Psamma* Beauv.) Culms densely tufted, from firm-running rootstocks, about 2 to 3 feet high; leaves 10 to 18 inches long, rigid, becoming involute; panicle spike-like, dense, 5 to 10 inches long, cylindrical; spikelets, 5 to 6 lines long; empty glumes lance-linear, scabrous on the keels, floral glume and palet about equaling the empty ones; hairs of callus and rudiment scanty, about $\frac{1}{4}$ as long as the floral glume.—Seacoast New England to Virginia and on the Great Lakes; also San Francisco, Cal. (*J. G. Lemmon*.)

HELEOCHLOA Host.

Spikelets 1-flowered, crowded in a dense spike or spike-like panicle. Lower glumes persistent, membranaceous, acute, ciliate-carinate, awnless; flowering glume similar, a little longer, and a little exceeding the palet. Stamens 3.

Low caespitose annuals; spike often scarcely exerted from the upper sheath.

1. *H. schcenoides* Host. Culms tufted and generally prostrate, 6 to 10 inches long; leaves short, rigid, tapering to a point; spike oblong, thick, $\frac{1}{2}$ to $1\frac{1}{2}$ inches long.—Ballast ground, introduced; New Jersey and Delaware.

PHLEUM Linn.

Spikelets 1-flowered, in small clusters, crowded into a dense spike-like cylindrical panicle; outer glumes 1-nerved, mucronate or short-awned; flowering glume membranaceous, shorter and broader than the outer glumes, in our native species truncate and toothed at the apex; palet hyaline, narrow. In some species there is a small rudiment or bristle below the flower.

1. *Phleum pratense* Linn. (TIMOTHY.) Culms commonly $1\frac{1}{2}$ to 2 feet high (exceptionally 4 to 5 feet); spike long-cylindrical; empty glumes ciliate on the back, tipped with a short bristle. Commonly cultivated; supposed to be introduced from Europe, but apparently native in mountainous districts.

2. *P. alpinum* Linn. (ALPINE TIMOTHY.) Culms 1 to $1\frac{1}{2}$ feet high; spike ovate-oblong; empty glumes strongly ciliate on the back, tipped with a rough awn about their own length.—White Mountains, New Hampshire; Rocky Mountains, Colorado to California and Alaska.

ALOPECURUS Linn.

Flowers crowded in a cylindrical spike. Spikelets 1-flowered. Outer glumes strongly compressed, boat-shaped, keeled, nearly equal, frequently united at the base; third or flowering glume shorter, keeled, with a slender dorsal awn, frequently more or less united below by the opposite margins, and inclosing the stamens and styles; without a palet.

1. *A. pratensis* Linn. (MEADOW FOXTAIL.) Culms erect, smooth, $1\frac{1}{2}$ to 3 feet high; leaves rather broad, the upper one short, sheaths inflated; spike erect, cylindrical, $1\frac{1}{2}$ to $2\frac{1}{2}$ inches long, one-third to one-half inch thick; spikelets 2 to $2\frac{1}{2}$ lines long; empty glumes united for the lower third, lanceolate, acute, softly pubescent and ciliate; floral glume equaling or a little exceeding the empty ones, the margins connate for the lower half, awned near the base and the awn projecting half its length.—Introduced and cultivated.

Var. ALPESTRIS. (Wahl. Flora Lapponica, p. 21.) Culms 6 inches to 3 feet high, stout, more or less glaucous, ascending at the base, stoloniferous, with only 2 or 3 nodes above the base, the portion above the last joint very long (frequently two-thirds the entire length of the culm); leaves rather rigid, erect, 3 lines wide, 3 to 6 inches long, somewhat scabrous, sheaths rather loose, smooth; ligule 1 line long; empty glumes 3-nerved, pubescent, long ciliate on the midnerve, acute, connate to the lower third; floral glume nearly equaling the empty ones, smooth, the margins connate nearly to the middle.—Throughout the Rocky Mountain region from Colorado to Montana and Idaho. Prof. Scribner states that this species is very common in Montana at elevations of from 5,000 to 7,000 feet. I think it is too near to *A. pratensis* to be separated except as a variety.

2. *A. alpinus* Linn. Culms 6 to 15 inches high, rather stout, equally leafy with 3 to 5 nodes; sheaths loose, smooth, shorter than the internodes, sheaths short, obtuse, blade 1 to 4 inches long, erect; spike cylindrical-oblong, or oblong, dense, $\frac{3}{4}$ to nearly an inch long; spikelets nearly 2 lines long; empty glumes covered with rather coarse

hairs, connate at the base, 3-nerved, acutish; floral glume little shorter than the empty ones, sparsely pubescent or nearly smooth, with an awn below the middle and extending one-third beyond the spikelet.—Alaska, Arctic coast and islands, to Hudson's Bay and Greenland.

3. **A. Californicus** Vasey. Bull. Torr. Club, xv. p. 13. Culms 8 to 15 inches high, weak, geniculate, ascending, sheaths inflated, smooth, shorter than the internodes; blades 2 to 6 inches long; spike cylindrical, 1 to $1\frac{1}{2}$ inches long, 2 to 3 lines thick, less dense than in *A. pratensis* or *A. geniculatus*; spikelets $1\frac{1}{2}$ lines long or less; empty glumes only slightly united below, obtusish or barely acute, sparsely pubescent or nearly smooth, except on the ciliate midnerve; awn from near the base, twice or thrice as long as itself; floral glume a little shorter than the empty ones, smooth, obtuse.—Santa Cruz, (*Dr. Anderson*), San Diego, Cal. (*C. R. Orcutt*).

4. **A. geniculatus** Linn. Culm ascending, often bent at the lower joints, 8 to 12 inches long, 4 to many (when prostrate) nodes; leaves 1 to 2 inches long, the upper shorter with more inflated sheath; spike 1 to $1\frac{1}{2}$ inches long, 2 lines thick, cylindrical, dense; spikelets slightly more than 1 line long; empty glumes sparsely ciliate on midnerve, obtuse, connate at the base; floral glume about equal to the empty glumes, smooth, obtuse, awn from near the base, twice as long as its glume.—Introduced from Europe and naturalized in many places.

Var. **ARISTULATUS** Torr. (*A. aristulatus* Michx.). Culms stouter and more erect, 10 to 18 inches high, less geniculate; leaves 2 to 4 inches, attenuated to a fine point, sheaths nearly as long as the internodes; spike $1\frac{1}{2}$ to $2\frac{1}{2}$ inches long, densely flowered; floral glume awnless to awned, twice as long as the glumes.—Extensively distributed from the Atlantic to the Pacific.

Var. **ROBUSTUS** Vasey. Bull. Torr. Club, xv. p. 13. Culms geniculate below, thick, simple, or branching, 1 to $1\frac{1}{2}$ feet long, smooth; culm leaves 4 or 5, nodes black, smooth; sheaths loose and inflated, 3 to 5 inches long, 3 lines wide, ligule 2 lines long, acute; spike 2 to 3 inches long, 3 to 4 lines wide, cylindrical, dense; spikelets little more than 1 line long; empty glumes little united below, the keels and lateral nerves ciliate-pubescent, obtuse and denticulate at the apex; floral glume nearly equal to the empty ones, ovate-oblong, obtuse, smooth, the margins united in the middle, awn from the middle, slender, little exceeding the glume.—Alaska, Vancouver Island and British Columbia (*J. Macoun*).

5. **A. saccatus** Vasey. Bot. Gaz. vi. p. 290. Culms 5 to 10 inches high, erect or slightly geniculate below, simple; the radical leaves short, cauline about 3, the lower sometimes extended into a filiform point, upper ones short, the sheath inflated and generally inclosing the base of the panicle; upper ligules deltoid, acute, about 2 lines long; panicle spike-like, oblong, 1 to $1\frac{1}{2}$ inches long, comparatively loosely flowered; spikelets 2 lines long, the outer glumes narrowly oblong, obtuse, scarious at the apex, slightly united at the base, lateral nerves obscure, the keel and margins fringed with silky hairs, otherwise nearly smooth; flowering glume (lower pale) oblong, obtuse, smooth, equaling the outer glumes, the margins united more than half the length, forming a sack and inclosing the oblong seed, which is one-tenth of an inch long; awn twice or thrice as long as the glume, inserted near the base; spikelets, about 60 on an inch of the panicle.—Eastern Oregon (*T. J. Howell*). This species is remarkable for the large size of the spikelets and for the saccate flowering glume.

6. **A. Howelli** Vasey. Annual, 3 to 6 inches high; culms simple, erect or decumbent at the base, with two or three nodes, culm leaves about 3; sheaths about 1 inch long, striate, the lower shorter than the internodes, the upper one equaling or longer and inclosing the base of the panicle; ligule membranaceous, about $\frac{2}{3}$ line long; blades narrow and elongated or filiform, the lower two exceeding the culm, the upper one short, lower surface strongly-nerved and finely scabrous; spike an inch long or less, cylindrical-oblong, rather densely-flowered; spikelets nearly $1\frac{1}{2}$ lines long; empty glumes slightly united below, strongly ciliate on the keel and lat-

eral nerves, obtuse, a little exceeding the flowering glume, the latter smooth, oblong, obtuse, the sides united to the middle or higher, awn from near the base, about three times as long as the glume, bent at the middle. Growing in wet soil.—Oregon (*T. J. Howell*).

7. *A. Macounii* Vasey. Bull. Torr. Club, xv. p. 12. Culms 4 to 6 inches high, mostly in clusters of two or three, erect or geniculate below; sheaths 2, narrow and not much inflated, the lower one one-half to 1 inch long, shorter than its internode, the upper one 1 to 1½ inches long and much shorter than the culm; ligule membranaceous, about 1 line long, blades very short, the lower 1 inch, the upper ½ to 1 inch long, narrow, and acuminate; spike ½ to ¾ inch long; empty glumes slightly united below, coarsely ciliate on the keels, the side smooth, obtuse, a little exceeding the flowering glume, which is smooth, ovate-oblong, obtuse, the margins united to the middle or above, the awn from near the base, 2 to 3 times as long as its glume, bent at the middle.—Grows on dry rocks, at Oak Bay, Vancouver Island (*John Macoun*).

This species has a close resemblance to the preceding, but seems sufficiently marked by the difference in the leaves and sheaths and in the details of the flowers.

8. *A. cæspitosus* Trin. (Fl. Bor. Am. II. p. 257.) “Dwarf 2 to 3 inches high, spike cylindric-oblong, lax, somewhat interrupted and lobed; empty glumes united only at the very base, acutish, rather glabrous; flowering glume truncate-obtuse, awn scarcely longer than the glume; styles connate below.”

This species which is figured in Trinius Icones Gram. pl. 241 (said to be from North America, and referred to in Hooker's Fl. Bor. Am. as probably of Drummond's collection in the Rocky Mountains) has not since been collected so far as I know.

LYCURUS H. B. K.

Spikelets 1-flowered, in clusters of 2 or 3 on the short branches of the spike or spike-like panicle partly included in the bract-like sheath of the upper leaf. Outer glumes membranaceous, acute, complicate, carinate toothed, not awned; flowering glume similar, keel thickish and herbaceous; palet rather shorter, compressed, 2-nerved or 2-keeled.

1. *L. phleoides* H. B. K. Culms tufted, numerous, usually decumbent at base, 8 to 18 inches high, slender, branching; leaves narrow, long-pointed; spike cylindrical, dense or lax, 1½ to 3 inches long, 3 lines thick; spikelets 2 lines long, empty glumes with a short body and teeth two or three times as long; floral glume 2 lines long, with an awn of equal length.—Western Texas, New Mexico and Arizona.

COLEANTHUS Seid.

Spikelets 1-flowered, very small, perfect, in small umbellate clusters; outer glumes wanting; flowering glume membranaceous, 1-nerved, keeled, acuminate or short aristate; palet shorter and wider than the flowering glume, 2-keeled, acutely 2-toothed. Stamens 2. Stigmas 2, sessile. A minute annual grass.

1. *C. subtilis* Seid. Culms low, 1 to 3 inches high, in loose tufts, decumbent at base, often branched below; leaves about ½ inch long, curved, smooth; ligule elongated; sheaths loose and dilated, the upper inflated; panicle ½ to 1 inch long, sheathed at the base, mostly simple, with 3 or 4 umbellate clusters; pedicels longer than the spikelets, scabrous.—Oregon (*T. J. Howell*).

PHIPPSIA R. Br.

Spikelets 1-flowered, outer glumes minute, unequal, membranaceous; flowering glume thin, three to four times longer than the outer ones, obscurely 3-nerved, keeled, acute; palet a little shorter, 2-keeled, 2- to 4-toothed at the apex.

1. *P. algida* R. Br. Culms densely tufted, ascending, 1 to 4 inches high, smooth; sheaths loose, long, striate, ligule short, obtuse, blade $\frac{1}{2}$ to 2 inches long; panicle oblong to linear-oblong, loose, $\frac{1}{2}$ to 1 inch long, contracted, branches short, approximate; spikelets $\frac{1}{2}$ inch long; empty glumes minute, obtuse; floral glume and palet nearly equal, concave, broad, obtuse, apex minutely denticulate.—Arctic coast, mountains of Colorado, 11,000 feet altitude.