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A DESCRIPTIVE CATALOGUE

OF THE

Grasses of the United States,

INCLUDING ESPECIALLY THE

GRASS COLLECTIONS AT THE NEW ORLEANS EXPOSITION

MADE BY THE U. S. DEPARTMENT OF AGRICULTURE, AND
THE STATE EXHIBITS OF GRASSES, WITH NOTES ON
SUCH SPECIES AS ARE MORE OR LESS EMPLOY-
ED IN AGRICULTURE, OR DESERVING
OF TRIAL FOR CULTIVATION.

BY

DR. GEORGE VASEY,

Botanist of the Department of Agriculture, Washington, D. C.



WASHINGTON:

GIBSON BROS., PRINTERS AND BOOKBINDERS.

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WASHINGTON, *March*, 1885.

SIR: It is interesting to notice at the New Orleans Exposition that many of the State exhibits, and particularly those of the Southern and Western States, contain a prominent display of their grasses, not only baled in the form of hay, but in many instances in well-prepared botanical specimens. The State of Texas makes a display of 200 species of grasses indigenous to that State. California and Arizona are jointly represented by an unequalled botanical display which is especially rich in the variety of grasses. Arkansas and Alabama have also collections of large extent and prepared with great care. From Florida we find an exceedingly interesting collection of grasses, made by Mr. O. H. Kelley, of Carrabelle, containing some species quite new. Many other States, also, have not neglected to present exhibits of their resources in the line of grasses. There is in fact throughout a large portion of our country an intense interest manifested in the subject of grasses for the use of stock. In the South and West particularly the question is an absorbing one. What grasses shall we use to give a good amount of pasturage, which shall be able to withstand the long dry season of our summers? What grasses can we depend on for winter pasturage, and what to furnish a supply of hay? These questions are being continually asked, and although something has been done toward a satisfactory reply very much yet remains to be determined. A faithful and continued series of experiments for the purpose of testing the value of the different kinds which have been proposed, and of others which give promise of utility, is perhaps the first great necessity, and the next, especially among the agricultural population, is the diffusion of popular and scientific information respecting our native grasses, so that observing men may be able to recognize the species which come under their notice, and to make intelligent selections for cultivation.

With this thought in view I have prepared the accompanying Catalogue of the Grasses of the United States, with notes and observations on such species as are more or less employed for the

purpose of pasturage or feeding stock, many of which are deserving of trial for cultivation.

GEORGE VASEY,

Botanist of Department of Agriculture.

WILLIAM SAUNDERS, Esq.,

*Representative of Department of Agriculture at the
World's Industrial and Cotton Exhibition.*

GRASSES OF THE UNITED STATES.

REIMARIA, *Flugge*.

Spikelets acuminate, in unilateral sessile spikes, with one perfect terminal flower and one exterior empty glume, which is membranaceous, three to five nerved, acute, about equalling 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 the base.

1. *R. oligostachya*, *Munro*. Florida.

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 two outer ones membranous, 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, which is 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.

This genus has its range principally in the Southern and South-western States. The species are very numerous, are mostly perennials, and vary much in form and habit. Some are tall and erect, some decumbent or spreading, and others have the habit of sending out runners which take root at short intervals, and thus spread and form dense patches. They are all relished by cattle, and some of them are considered of great value as pasture grasses.

1. *P. cæspitosum*, *Flugge*. Florida.
2. *P. ciliatifolium*, *Michx*. Southern States.
3. *P. conjugatum*, *Berg*. Florida to Texas.

4. *P. debile*, *Michx.* New Jersey to Florida.
5. *P. dilatatum*, *Poir.* (*P. ovatum*, *Trin.*) Virginia to Texas.

A tall stout species 3 to 5 feet high. It has been cultivated in the South, and is highly recommended.

P. dilatatum, var. *virgatum*, *Vasey.* Louisiana to Texas.

This variety has more numerous, erect, and close spikes.

6. *P. distichum*, *L.* Southern States to Arizona.
7. *P. digitaria*, *Chapman.* Southern States.
8. *P. elatum*, *Richard.* Florida to Texas.
9. *P. Floridanum*, *Michx.* Virginia to Texas and Arkansas.
P. Floridanum, var. *glabratum*, *Engelm.* Virginia to Texas
 and Arkansas.

This species and its variety are tall, strong, and vigorous growing plants, and would probably be of agricultural value.

10. *P. fluitans*, *Kth.* (*Ceresia fluitans*, *Ell.*) South.
11. *P. giganteum*, *Baldw.* Florida.
12. *P. læve*, *Michx.* Massachusetts to Texas.

Professor Phares, of Mississippi, says he has a neighbor who has been feeding this grass for twenty-five years, and for many years has had a meadow of it from which, without ever having been seeded, he annually mows about two tons of hay per acre.

13. *P. lentiferum*, *Lam.* (*P. præcox*, *Walt.*) Southern States.
14. *P. lentiginosum*, *Presl.* Alabama to Texas.

This species spreads by runners and makes a dense close turf.

15. *P. lividum*, *Trin.* Texas to Mexico.
16. *P. monostachyum*, *Vasey.* (*P. rectum*, *Nees.*?) Southern Florida.
17. *P. notatum*, *Flugge.* Near the Gulf coast.
18. *P. platycaule*, *Poir.* (*P. compressum*, *Nees.*) South Carolina
 to Texas.

A low running species which makes a close matted surface, and has been recommended as a valuable pasture grass.

19. *P. plicatulum*, *Michx.* Florida to Texas.
20. *P. purpurascens*, *Ell.* North Carolina to Texas.

This species is very leafy, and spreads by its rooting lower joints. It is very succulent, and deserves trial in cultivation.

21. *P. racemulosum*, *Nutt.* Florida to Louisiana.

22. *P. remotum*, *Remy*. (*P. pubiflorum*, *Rupt.*) Alabama to Texas.
23. *P. setaceum*, *Michx.* Massachusetts to Texas.
24. *P. vaginatum*, *Swz.* (*P. reimarioides*, *Chapm.*) Florida to Texas.
25. *P. virgatum*, var. *platyoxon*, *Doell.* Texas.
26. *P. Walterianum*, *Schult.* Southern States.

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. rufa*, *Benth.* (*Panicum rufum*, *Kth.*) Southern States.
2. *A. villosa*, *Beauv.* (*Panicum ignoratum*, *Kth.*) Southern States.

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 are one 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 have thickened many-nerved outer glumes, with the flowering glume and palet indurated.

1. *A. Floridanum*, *Chap.* Florida.
2. *A. Purshii*, *Kth.* New Jersey to 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 a simple 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; 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. Lemmoni*, *Vasey and Scribner*. (*E. grandiflora*, *Vasey*.)
Arizona.
2. *E. mollis*, *Kth.* Florida.
E. mollis, var. *longifolia*, *Vasey*. Florida.
3. *E. punctata*, *Hamil.* (*Millium punctatum*, *L.*) Texas and New
Mexico.
4. *E. sericea*, *Munro*. Texas and New Mexico.

BECKMANNIA, *Host*.

Spikelets subsessile, crowded in two rows upon the short simple or compound branches of the long, narrow panicle; consisting of two perfect flowers, the terminal one only fertile, (or in American specimens the lower flower is suppressed,) and two subcoriaceous, obovate or boat-shaped, compressed and inflated empty glumes. The glume of the perfect flower or flowers is lanceolate, acute or acuminate, and of rather thinner texture than the empty glumes.

1. *B. erucaeformis*, *Host*, var. *uniflorus*, *Scrib.* Mountain regions west of the Mississippi.

PANICUM, *Linu.*

Spikelets with one perfect terminal flower, and usually a second one which is male only or rudimentary. Outer empty glumes two, one of which is smaller than the other, often very small, or rarely wanting, membranaceous. The glume of the perfect flower with its palet are usually of a coriaceous texture, and obtuse or obtusish. The second flower when present is membranaceous. Inflorescence spicate or paniculate.

The name is probably derived from the Latin word *panis*, bread, because some species were used, and are still used, for bread-making. The species of this genus are very numerous, (300 or more on the globe,) and of widely different appearance. We have about 50 native species, most of which have little practical value except as adding more or less to the wild forage of our woods and fields. But some species, both native and foreign, are of very high agricultural value.

1. *P. agrostoides*, *Muhl.* Massachusetts to Texas.

A perennial grass commonly growing in large clumps in wet

meadows, or on the muddy margins of streams. It grows 4 to 6 feet high, with a flattened smooth stem, and develops its reddish panicles from several of the joints as well as at the top. It produces a large amount of foliage, which makes good hay if cut before flowering time; if left later the stalks become hard and wiry. Often cut for hay on low grounds.

2. *P. amarum*, *Ell.* South Carolina to Florida.

Grows among the sand hills near the sea coast. The leaves are very bitter.

P. amarum, var. *minor*, *V. & S.* North Carolina to Connecticut, a smaller form growing northward.

3. *P. anceps*, *Michx.* Massachusetts to Texas.

A perennial grass, when well developed resembling the *P. agrostoides*, but smaller, generally found in moist clay soil. Not a valuable grass, but it frequently occurs in poor lands in sufficient quantity to afford considerable grazing.

4. *P. augustifolium*, *Chapm.*, (not Elliott.) Florida to Texas.

5. *P. autumnale*, *Bosc.* Illinois and southward.

P. autumnale, var. *pubiflorum*, *Vasey.* Texas and Arizona.

6. *P. bulbosum*, *H. B. K.* New Mexico, Arizona, and Mexico.

P. bulbosum, var. *minor*, *Vasey.* (*P. maximum*, var. *bulbosum*, *Munro.*) Same regions.

This species grows from strong, bulbous rhizomas. It deserves trial for cultivation.

7. *P. capillare*, *Linn.* Very common.

P. capillare, var. *flexile*, *Gattinger.* Kentucky.

P. capillare, var. *geniculatum*, *Scribner.* Western.

P. capillare, var. *minimum*, *Engelm.* Western.

8. *P. Chapmanii*, *Vasey.* (*P. tenuiculmum*, *Chap.*, not *Meyer.*)

9. *P. ciliatissimum*, *Buckley.* Texas.

10. *P. clandestinum*, *Linn.* Massachusetts to Texas.

A coarse, broad-leaved species growing in wet, marshy ground.

11. *P. colonum*, *Linn.* (*P. Walteri*, *Ell.*) Alabama to Texas.

12. *P. consanguineum*, *Kth.* (*P. augustifolium*, *Ell.*?) South.

13. *P. commutatum*, *Schultz.* (*P. nervosum*, *Muhl.*?) Pennsylvania to Louisiana.

14. *P. crusgalli*, *Linn.* Barn-yard grass. Naturalized from Europe.

P. crusgalli, var. *echinatum*, *Torr.*

P. crusgalli, var. *hispidum*, *Gr.*

This is an annual grass, with thick, stout culms, usually from 2 to 4 feet high. In the Southern States it is often employed and considered a valuable grass. Professor Phares, of Mississippi, says that "in that and some other States it is mowed annually, and is said sometimes to furnish four or five tons of hay per acre. It annually reseeds the ground and requires no cultivation or other care, save protection from stock and the labor of harvesting. In one county in Mississippi hundreds of acres are annually mowed on single farms. Cows and horses are very fond of it, whether green or dry." In the Northern States it is hardly ever employed.

15. *P. Curtisii*, *Chapm.* Florida to Texas.

16. *P. depauperatum*, *Muhl.* New York to Texas.

P. depauperatum, var. *rectum*, *Torr.* New York and New England.

17. *P. dichotomum*, *Linn.* Throughout the United States.

P. dichotomum, var. *barbulatum*, *Gr.*

P. dichotomum, var. *nitidum*, *Gr.*

A wide-spread species of many forms, furnishing much wild forage, but not cultivated.

18. *P. divaricatum*, *Linn.*

A tropical and subtropical species found, in our country, only in Florida and the Gulf States, near the coast. It is a shrubby, cane-like species, the culms being woody and persistent. Only the leaves and young shoots are eaten by cattle.

19. *P. fasciculatum*, *Swz.* (*P. striatum*, *Chapm.*, not *Lam.*)

P. fasciculatum, var. *fuscum*. (*P. fuscum*, *Swz.*)

P. fasciculatum, var. *reticulatum*. (*P. reticulatum*, *Torr.*)

This species extends from South Carolina to Texas.

20. *P. filiforme*, *Linn.* (*Digitaria filiformis*, *Muhl.*) From Massachusetts to Florida.

21. *P. gibbum*, *Ell.* South Carolina to Florida and Texas.

An annual grass of large and vigorous growth, growing in wet soils. It needs trial for cultivation. In the United States Exhibit there are specimens from Florida 6 feet in length, sent by O. H. Kelly, Carrabelle.

22. *P. glabrum*, *Gaud.* (*Digitaria glabra*, *R. & S.*) Introduced.

23. *P. grossarium*, *Linn.* Ballast ground, Philadelphia.
24. *P. gymnocarpum*, *Ell.* South Carolina to Texas.
A tall, stout species, with long and broad leaves.
25. *P. Hallii*, *Vasey.* Texas.
26. *P. hians*, *Ell.* (*P. melicarium*, *Mx.*) South Carolina to Texas.
27. *P. latifolium*, *Muhl.*, non *Linn.* New England to Texas.
P. latifolium, var. *molle*, *Vasey.* New England to Texas.
28. *P. laxiflorum*, *Lam.* (*P. dichotomum*, var. of authors.) Common.
29. *P. leucophæum*, *H. B. K.* (*P. lachnanthum*, *Torr.*) Florida, Texas, and Arizona.
30. *P. maximum*, *Jacq.* (*P. jumentorum*, *Pers.*) Introduced.

This is the proper Guinea grass, a native of Africa, but introduced into many tropical countries, and in the West Indies extensively cultivated for pasturage. It has been introduced in Florida, but is yet very little known in the Southern States. It has been confounded with the Johnson grass, which is very different, and is botanically *Sorghum halepense*. The Guinea grass seldom matures seed in this country and is usually propagated by dividing the roots. It is too tender to be cultivated except in the very warmest portions of our country. In favorable situations it is said that a cutting of grass may be made every six weeks throughout the season. An analysis made at the Department of Agriculture, in 1878, shows it to be very rich in nutritive materials.

31. *P. microcarpum*, *Muhl.* (*P. multiflorum*, *Ell.*) In wet ground, from Massachusetts to Texas.
P. microcarpum, var. *sphærocarpon*, *Vasey.* (*P. sphærocarpon*, *Ell.*) Same range.
32. *P. miliaceum*, *Linn.* Introduced.

This is the Millet grass of India, or at least one of the Indian Millets. It has, in Asia, been cultivated for ages, and is, in many parts, an important article in the food supply of the natives. It is also cultivated in Egypt, Turkey, and Southern Europe. It has been cultivated to a limited extent in this country for forage, and will thrive and ripen in the Northern as well as the Southern States

Mr. Charles L. Flint says :

Millet is one of the best crops we have for cutting and feeding green for soiling purposes, since its yield is large, its luxuriant leaves juicy and tender, and much relished by milch cows and other stock. The seed is rich in nutritive qualities, but

it is very seldom ground or used for flour, though it is said to exceed all other kinds of meal or flour in nutritive elements. An acre well cultivated will yield from 60 to 70 bushels of seed. Cut in the blossom, as it should be for feeding to cattle, the seed is comparatively valueless. If allowed to ripen its seed, the stalk is no more nutritious, probably, than oat straw.

33. *P. obtusum*, *H. B. K.* Texas, Arizona, and Mexico.

This species has a strong running rootstock, which at intervals sends up flowering culms $1\frac{1}{2}$ to 2 feet high. The leafy runners 2 to 3 feet long are sent out from the base, and at intervals form thickened, woolly knots or nodes which eventually take root. This grass will evidently have great endurance of drought, and is deserving of trial with reference to its agricultural value.

34. *P. paspaloides*, *Pers.* Florida to Texas.

35. *P. plantagineum*, *Linn.* Ballast ground, Philadelphia.

36. *P. platyphyllum*, *Munro.* Texas.

A peculiar grass having the appearance of a *Paspalum*.

37. *P. proliferum*, *Lam.* Widespread from New England to Texas.

P. proliferum, var. *geniculatum*. (*P. geniculatum*, *Ell.*) Southern States.

This variety occurs in the Southern States, where it is sometimes called "sprouting crab-grass." It is an annual, growing in low, moist ground. The stems are at first erect, then become decumbent and spreading, frequently attaining a length of 6 or 7 feet, bent and rooting at the lower joints. It has much the same habit as *P. Ter-anum*, but the stems are smooth and more flattened; the leaves also are smoother and longer. The stems are sometimes nearly an inch thick at the base and very succulent. The main stem is terminated by a diffuse panicle sometimes 2 feet long. Dr. Chas. Mohr, of Mobile, says of it:

In damp grassy places it prefers rich ground throughout the coast region. It commences to vegetate vigorously in the hottest part of the summer, throwing out numerous shoots from the joints, forming large-branched bushes. The foliage is rich and tender, and the succulent, thick stems are sweet and juicy. After cutting it throws out numerous sprouts from the lower joints, which grow rapidly, so as to allow repeated cuttings until frost. It is through all stages of its growth much relished by horses and cattle.

38. *P. prostratum*, *Lam.* Gulf States.

39. *P. ramulosum*, *Michx.* (*P. dichot.* var.) Southern States.

40. *P. repens*, *Linn.* Introduced. Gulf coast.

P. repens, var. *confertum*, *Vasey.* Gulf coast.

41. *P. sanguinale*, *Linn.* (*Digitaria sanguinale*, *Scop.*) Crab-grass.
Common.

This is an annual grass, which, although a native of the Old World, has become spread over most parts of this country, and indeed over all tropical countries. It is the most common crab-grass of the Southern States. It occurs in cultivated and waste grounds, and grows very rapidly during the hot summer months. The culms usually rise to the height of 2 or 3 feet, and at the summit have from 3 to 6 slender flower spikes, each from 4 to 6 inches long. The culms are bent at the lower joints, where they frequently take root. In the Texas Exhibit there are specimens of this grass five feet ten inches long.

Prof. Killibrew, of Tennessee, says :

It is a fine pasture grass, although it has but few base leaves and forms no sward, yet it sends out numerous stems or branches at the base. It serves a most useful purpose in stock husbandry. It fills all our corn-fields, and many persons pull it out, which is a tedious process. It makes a sweet hay, and horses are exceedingly fond of it, leaving the best hay to eat it.

Professor Phares, of Mississippi, says that the corn and cotton fields are often so overrun with it that the hay which might be secured would be more valuable than the original crop: It is sometimes mowed from between the rows, sometimes cut across the ridges with the corn.

Any good piece of ground that has had this grass matured on it the preceding year may be plowed and harrowed smoothly and then rolled in May, and it will soon be covered with a rich growth. If the season is favorable two mowings should be made.

42. *P. scabriusculum*, *Ell.* Southern States.
43. *P. scoparium*, *Lam.* (*P. pauciflorum*, *Ell.*?) Massachusetts to Oregon.
44. *P. serotinum*, *Trin.* (*Digitaria serotina*, *Mx.*, *D. villosa*, *Ell.*)

In the Southern States one of the kinds of crab-grass.

45. *P. stenodes*, *Gris.* (*P. anceps*, var. *strictum*, *Chapm.*) Florida to Texas.
46. *P. Texanum*, *Buckley.* Texas. Texas millet.

This grass is a native of Texas, and was first described and named by Prof. S. B. Buckley in 1866. It is an annual, growing from 2 to 4 feet high, at first erect, then becoming decumbent and widely spreading, sparingly branched, very leafy, the sheaths and leaves

soft hairy, the margin of the leaves rough, the blade of the leaf 6 to 8 inches long, and one-half to 1 inch wide, the upper leaves reaching to the base of the panicle, or nearly so; the panicle is 6 to 8 inches long, strict or close, the branches alternate, erect, simple, 3 to 4 inches long, with somewhat scattered sessile spikelets. The branches of the panicle are rough, the pedicels with scattered hairs, especially near the flowers; the spikelets are oblong, somewhat pointed, 2 to 2½ lines long, sparsely hairy; the lower glume is half or two-thirds the length of the upper one, acute, five-nerved, the lateral nerves uniting with the mid-nerve below the apex, the upper empty glume prominently five to seven nerved, pointed; the flowering glume of the sterile flower is five to seven nerved, its palet thin and transparent, as long as the glume; the perfect flower, ovate or oblong-ovate, acutish, transversely wrinkled with fine reticulated lines.

It is a grass of rapid, vigorous growth, many stalks proceeding from the same root, growing very close and thick at the base, succulent, and yielding a large amount of forage.

Mr. Pryor Lea, of Goliad, Tex., has had it in cultivation a number of years, and states as follows:

I consider it far superior to any grass that I ever saw for hay. It is a much more certain crop than millet, and cultivated with less labor, and all kinds of stock prefer it. In this region it is regarded, in the condition of well-cured hay, as more nutritious than any other grass. It grows only in cultivated ground; it prospers best in the warmest season of the year; its luxurious growth subdues other grasses and some weeds, with the result of leaving the ground in an ameliorated condition.

Mr. H. W. Ravenel, of Aiken, S. C., says he has been cultivating *Panicum Texanum* for several years. It is hardy and naturalized there, freely seeding and propagating itself, coming up in his grounds with other grasses, and much larger and better than any of them for hay and forage.

The experiments of Professor Phares and others, in Mississippi, substantially confirm the statements of Mr. Lea, although it is said that it will hardly hold its own against the common crab grass, (*Digitaria sanguinalis*.) It has been called concho grass in some parts; in others Colorado bottom grass. It is stated that on the Colorado bottoms, in Texas, many of the farmers have devoted their farms entirely to its production, finding it more profitable than corn or cotton. It is cut twice and sometimes three times in a year, yielding about one and a half tons per acre at each cutting.

In the Texas Exhibit there are specimens 6 feet three inches high.

47. *P. Urvilleanum*, *Kth.* Southern California.
48. *P. velutinosum*, *Nees.* Arizona.
49. *P. verrucosum*, *Muhl.* New England to Texas.
50. *P. virgatum*, *Linn.* New England to Florida, and West to Rocky Mountains. Tall Panic grass. Switch grass.

A tall perennial grass, 3 to 5 feet high, growing mostly in clumps in moist or even in dry sandy soil, very common on the sea-coast, and also in the interior to the base of the Rocky Mountains. This is a good and prolific grass if cut when young; when ripe it becomes harsh and unpalatable. It forms a large constituent of the native grasses of the prairies, particularly in moist localities.

51. *P. viscidum*, *Ell.* New England to Texas. Moist meadows.
52. *P. Xanthophysum*, *Gray.* Massachusetts and New York to Minnesota.
53. *P. unisetum*, *Trin.* (*Setaria unisetata*, *Four.*) Texas.

OPLISMENUS, *Beauv.*

Spikelets with one terminal perfect flower and a rudimentary one, awned, clustered along the distant sessile branches of the simple panicle, with three empty glumes; the lowest glume nearly as long as the others and longer awned; the flowering glume awnless and hardened with the palet as in *Panicum*.

1. *O. setarius*, *R. & S.* (*Panicum hirtellum*, *Lam.*) Florida to Texas.

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 palet 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 three stamens.

1. *S. composita*, *Kth.* Florida to Texas.

A tall, coarse, broad-leaved grass resembling Hungarian grass. It frequently grows 5 to 6 feet high.

2. *S. corrugata*, *Schult.* Georgia to Florida.
3. *S. glauca*, *Beauv.* Pigeon grass. Extensively naturalized.
S. glauca, var. *lævigata*, *Chap.* North Carolina to Florida.
S. glauca, var. *imberbis*? Mississippi to Texas.
4. *S. Italica*, *Kth.* Hungarian grass. German millet. Introduced.

This grass is supposed to be a native of the East Indies, but it has been extensively introduced into most civilized countries. It has long been cultivated as a fodder grass both in Europe and in this country. It is an annual grass of strong rank growth, the culms erect, 2 to 3 feet high, with numerous long and broad leaves, and a terminal, spike-like, nodding panicle, 4 to 6 inches long, and often an inch or more in diameter. There is a great difference in the different varieties and forms of this grass, so much so that some of them have been considered different species, but the general opinion of botanists is that they are all varying forms of the same species, dependent upon the character of the soil, thickness of seeding, moisture or dryness, and time of sowing. It owes its value as a fodder plant to the abundance of its foliage and to the large quantity of seed produced. In some instances objection has been made to this grass on account of the bristles which surround the seed, and which have been said to penetrate the stomachs of cattle so as to cause inflammation and death. But it is plain that this opinion is not generally held, as the cultivation of the grass is widely extended and everywhere recommended.

For forage it should be cut as soon as it blooms, when of course it is worth nothing for seed, but is most valuable for forage and exhausts the land much less. If left for the seed to mature they are very abundant and rich feed, but the stems are worthless, while the soil is more damaged. The matured stems are very hard, indigestible, and injurious, and the ripe seeds will founder more promptly than corn, and sometimes produce diabetes if mouldy and too freely used. If cut at the right stage the whole plant is a safe and very valuable forage. On good soil, if the ground be moist, it will be ready for mowing in sixty days from seeding and produce from two to four tons of hay per acre. It is folly to sow it on poor land.—Professor PHARES.

5. *S. setosa*, *Beauv.* New Mexico, Texas, and Arizona.
S. setosa, var. *caudata*. Same region.

We know little as to the agricultural value of this species; as it is found in arid districts it is deserving of the attention of farmers in that section.

6. *S. verticillata*, *Beauv.* Introduced from Europe.
7. *S. viridis*, *Beauv.* Green Pigeon grass. Naturalized.

A native of most tropical and many temperate climates, and has been introduced into most cultivated fields, springing up or growing after the cutting of wheat and early grain, and making its growth in the latter part of the season. It is often associated with *Setaria glauca* in stubble fields, and, like that species, furnishes a considerable amount of fodder, which is as nutritious as Hungarian grass, but not so productive.

CENCHRUS, *Linn.*

Spikelets much as in *Panicum*, inclosed 1 to 3 together in a thick, coriaceous, spiny involucre, or bur, these arranged in an oblong or cylindrical panicle.

1. *C. echinatus*, *Linn.* North Carolina to Texas.
2. *C. incertus*, *M. A. C.* (*C. strictus*, *Chap.*) Florida to North Carolina.
3. *C. myosuroides*, *H. B. K.* Florida to Mexico.
4. *C. tribuloides*, *Linn.* Massachusetts to Texas and California.

All the species of *Cenchrus* are found in sandy or saline grounds, and are called Bur-grass from the hard spiny seed involucre, which renders the grass very troublesome and annoying both to man and animals. They are very hurtful to the wool of sheep. The plants are valueless.

PENNISETUM, *Pers.*

Spikelets with one terminal perfect flower, and a second male or neuter one below it, solitary, or two to three together, closely surrounded by an involucre of usually numerous simple or plumose bristles which disarticulate from the pedicel with the spikelets. The spikelets are 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 ?* Florida.

SPARTINA, *Schreb.*

Spikelets one-flowered, much flattened, sessile along one side of the long, triangular rhachis or spikes, which are racemose on the panicle; outer glumes strongly compressed with a rigid keel, une-

qual, awnless; flowering glume membranaceous, compressed, carinate, awnless; palet nearly equaling its glume, two-keeled.

1. *S. cynosuroides*, Willd. Common. New England to the Rocky Mountains.

In the Western States this species is very common, often forming a large part of the grass of the sloughs and wet marshes of that region. It is coarse and stout, growing from 3 to 6 feet high, with leaves 2 to 3 feet long. It is frequently cut for hay, but is a very coarse inferior article, unless cut when very young. It gives good feed very early in the spring, but soon becomes so coarse as to be rejected by cattle when anything better is procurable. In the bottom lands of the Mississippi, where it is abundant, it has been manufactured into paper.

2. *S. gracilis*, Trin. Oregon to Dakota, south to Texas and Arizona.
3. *S. juncea*, Willd. Marsh-grass, Salt-grass, Rush-grass.

This grass forms a large portion of the salt marshes near the Atlantic sea-coast. It makes an inferior hay, called salt-hay, much used also as a packing material.

4. *S. polystachya*, Willd. Salt Reed-grass. Near the coast.
A tall, coarse grass, much like the *S. cynosuroides*.
5. *S. stricta*, Roth. Marshes near the coast.
S. stricta, var. *alterniflora*, Gr. Near the coast.
S. stricta, var. *glabra*, Gr. Near the coast.

STENOTAPHRUM, Trin.

Spikelets two-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 are imbedded, singly or two or three together, in alternate excavations of the broad flattened rhachis of a spike-like panicle.

1. *S. Americanum*, Schkr. Southern States, near the coast.

PHARUS, Linn.

Flowers monœcious in a terminal panicle. Spikelets in pairs, unequal, the smaller one pediceled, its flowering glume membranaceous and with 6 stamens; the larger one sessile, its flowering glume

indurated and involving the membranous palet and the pistil; empty glumes two, nearly equal, membranaceous.

1. *P. latifolius*, *Trin.* South Florida.

COIX, *Linn.*

Flowers monœcious in terminal and lateral cymose panicles, the upper part male, the lower part female. Male spikelets two-flowered, empty glumes two, the flowers membranaceous. The pistillate spikelets, one to two flowered, are inclosed within a bract which becomes a round, bony, shining involucre; they have each two empty membranaceous glumes, the terminal flower pistillate and fertile, the lower flower neutral.

1. *C. lachryma*, *Linn.* Job's tears. Hardly naturalized.

TRIPSACUM, *Linn.*

Flowers monœcious in jointed spikes, the upper part of which is male and the lower female. The upper or male spikelets are sessile, in pairs at each joint of the triangular rhachis; each spikelet contains two membranaceous male flowers, the outer glumes coriaceous or rigid. The pistillate spikelets are single and imbedded in the joints of the thickened cartilaginous rhachis, two flowered, the upper flower fertile, the lower neutral; the outer empty glume is thickened and cartilaginous, the inner much thinner and pointed; the flowering glumes and palets are thin and scarious. At maturity the rhachis breaks up at the joints with the imbedded spikelets.

1. *T. dactyloides*, *Linn.* Gama grass.

A tall, stout, perennial grass, growing sparingly at the North, more common southward to Texas, and in the Western States.

Mr. Howard, of South Carolina, says of it:

This is a native of the South, from the mountains to the coast. The seed stem runs up to the height of 5 to 7 feet. The seeds break off from the stem as if from a joint, a single seed at a time. The leaves resemble those of corn. When cut before the seed stems shoot up they make a coarse but nutritious hay. It may be cut three or four times during the season. The quantity of forage which can be made from it is enormous. Both cattle and horses are fond of the hay. The roots are almost as large and strong as cane roots. It would require a team of four to six oxen to plow it up. It can, however, be easily killed by close grazing, and the mass of dead roots would certainly enrich the land. As the seeds of this grass vegetate with uncertainty, it is usually propagated by setting out slips of the roots about 2 feet apart each way. On rich land the tussocks will soon meet. In the absence of the finer

hay grasses this will be found an abundant and excellent substitute. The hay made from it is very like corn fodder, is quite equal to it in value, and may be saved at a tithe of the expense.

This account is concurred in by other writers.

2. *T. Floridanum*, *Porter*. Florida.
3. *T. Lemmoni*, *Vasey*. Arizona.

HYDROCHLOA, *Beauv.*

Flowers in small ($\frac{1}{2}$ to 1 inch) simple monœcious spikes, mostly included in the sheaths of the upper leaves. Spikelets 3 to 5 in each spike, the upper ones staminate, the lower pistillate; spikelets 1 flowered, consisting of 2 nearly equal hyaline scales, which are considered glumes, the true palet wanting. Stamens 6, styles 2, stigmas elongated.

1. *H. Caroliniensis*, *Beauv.* North Carolina to Florida and Mississippi.

A small semi-aquatic grass, with short oblong-linear leaves.

LUZIOLOA, *Juss.*

Flowers monœcious, in separate, spreading panicles, the staminate spikelets smaller than the fertile ones. Spikelets 1 flowered, the glumes nearly equal, membranaceous, strongly nerved, the true palets wanting. Stamens 5 to 11, anthers linear, much longer than the short filaments, styles 2, short, stigmas plumose. Perennial aquatic or marsh grasses, with long narrow leaves, the culms creeping and rooting at the lower joints.

1. *L. Alabamensis*, *Chap.* Alabama.
2. *L.?* *Peruviana*, *Pers.* Louisiana.

ZIZANIA, *Linn.*

Spikelets unisexual, monœcious, 1 flowered, in diffusely spreading panicles. Spikelets with 2 somewhat unequal glumes, membranaceous, convex, awnless in the male flowers, in the female ones the lower glume tipped with a straight awn; palets wanting. Pedicels of the spikelets club-shaped.

Tall aquatic or marsh grasses.

1. *Z. aquatica*, *Linn.* Wild Rice. Indian Rice.

This grass is botanically related to the common commercial rice, (*Oryza sativa*,) but is very different in general appearance. It is

widely diffused over North America, and is found in Eastern Siberia and Japan. It grows on the muddy banks of rivers and lakes, both near the sea and far inland, sometimes in water 10 feet or more deep, forming patches or meadows covering many acres or extending for miles. Its ordinary growth is from 5 to 10 feet high, with a thick spongy stem and abundant long and broad leaves. The panicle is pyramidal in shape, 1 to 2 feet long, and widely branching below. The upper branches are rather appressed and contain the fertile flowers, and the lower branches contain only staminate ones. The spikelets are one-flowered, each with one pair of external husks or scales, which are by some botanists called glumes, and by others called palets. These husks or glumes in the fertile flower are nearly or quite an inch long, with an awn or beard as long or twice as long. The grain inclosed between them is half an inch long, slender, and cylindrical. The glumes of the staminate flowers are about half an inch long and without awns, each flower containing six stamens. These flowers fall off soon after they expand. The fertile flowers also drop very readily as soon as the grain is ripened. The grass abounds in the small lakes of Minnesota and the Northwest, and is there gathered by the Indians for food. The husk is removed by scorching with fire. It is a very palatable and nutritious grain. Some attempts have been made to cultivate the grass, but the readiness of the seed to drop must interfere with a successful result. Near the sea-coast multitudes of reed birds resort to the marshes where it grows and fatten upon the grain. The culms are sweet and nutritious, and cattle are said to be very fond of the grass.

2. *Z. miliacea*, *Mx.* Pennsylvania to Texas.

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 palets. Stamens 1 to 6, stigmas 2, styles short, distinct. Perennial grasses, the leaves and sheaths usually rough with minute prickles.

1. *L. hexandra*, *Swz.* Springing from North Carolina to Texas.

In Manilla, one of the Phillippine Islands, (as we learn from the United States consul at that place,) this species is cultivated as food for horses and cattle. It is treated like rice, being transplanted to

the wet and previously plowed meadows. The local name there is *Zacate*. It occurs in all tropical countries.

2. *L. lenticularis*, *Michx.* White grass. Virginia, South and West.
3. *L. monandra*, *Swz.* Florida.
4. *L. oryzoides*, *Swz.* False rice. Massachusetts to Texas.
5. *L. Virginica*, *Willd.* Cut-grass. Maine to Texas.

The two latter species are common on marshy or moist ground. They are sometimes cut for hay.

THURBERIA, *Benth.*

Panicle rather long and loose. Spikelets narrow, one-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. *T. Arkausana*, *Benth.* (*Limnas*, *Steudel*, *Greenia*, *Nutt.*, *Sclerachne*, *Torr.*) Arkansas and Texas to Florida.

Trinius made a second species, from Texas, (*T. pilosa*), but it is probably only a pubescent form of the first. Dr. Chapman says "spikelets two flowered," which must be a mistake.

HILARIA, *H. B. K.*

Inflorescence in terminal spikes; the spikelets in small clusters of three, closely sessile at the joints of the rhachis, the central spikelet containing a single fertile flower, either female or perfect; the two lateral spikelets each with two or three male flowers. The spikelets are so closely sessile as to require much care to separate them properly. The outer glumes of the spikelets are 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.

1. *H. cenchroides*, *H. B. K.*, var. *Texana*. Texas and New Mexico.
2. *H. Jamesii*, *Benth.* (*Pleuraphis*, *Torr.*) Texas and New Mexico.
3. *H. mutica*, *Benth.* (*Pleuraphis mutica*, *Buckl.*) Texas and New Mexico.
4. *H. rigida*. (*Pleuraphis rigida*, *Thurber.*) Arizona.

The grasses of this genus are natives of the arid regions extend-

ing from Colorado to New Mexico. In some places they form a considerable proportion of the vegetation, and are eaten by cattle, some of them being considered as next in value to Grama grass, (*Bouteloua*.)

ÆGOPOGON, *H. B. K.*

Inflorescence in loose, one-sided, terminal and lateral spikes or racemes; the spikelets are one-flowered in clusters of two or three, one of which is usually sterile or male only. The outer glumes are cuneate, emarginate, aristate, and shorter than the flowering glumes, which are three-nerved and three-awned; the palets are two-nerved and two-awned. Stamens 3, styles 3.

1. *Æ. cenchroides*, *Willd.* Texas.
2. *Æ. geminiflorus*, *H. B. K.* New Mexico and Arizona.

CATHESTECHUM, *Presl.*

Spikelets mostly 2-flowered, in fascicles of three, rarely four, each, along the rhachis of a somewhat one-sided simple raceme, which is about 1 inch long, and composed of from 5 to 9 fascicles of flowers. Flowers mostly perfect, or the upper one sterile. Outer glumes unequal, the lower one small, the upper lanceolate, acute, or mucronate, flowering glumes oblong, four-lobed, with the 3 nerves extended into short awns between the lobes; palet 3-toothed at the apex, the two nerves extended into a short point. Low grasses growing in clumps, sending out runners which take root at intervals to form new stools.

1. *C. erectum*, *Vasey & Hackel.* Texas to Arizona.

TRAGUS, *Hall.* (*Lappago*, *Schreb.*)

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

1. *T. racemosus*, *Hall.* Introduced. Rare.

IMPERATA, *Cyr.*

Inflorescence densely spicate or in a spike-like panicle, the spikelets usually in pairs, one sessile and the other pediceled along the slender rhachis of the short branches of the panicle, with long silky hairs at the base and on the outer glumes. Spikelets with one perfect and one neutral flower, the outer glumes thin, nearly equal, silky; the flowering glumes smooth and hyaline; palet usually truncate and jagged at the top. Stamens 1 or 2, styles 2.

1. *I. Brasiliensis*, *Trin.* (*I. caudata*, *Chap.*) Florida.
2. *I. brevifolia*, *Vasey.* (*I. arundinacea*, authors.) West Texas to California.

ERIANTHUS, *Michx.*

Panicle terminal, dense and woolly, or lax, with the branches distant. Spikelets one-flowered, in pairs at the joints of the slender branches, one sessile, the other pedicelled, otherwise both alike. Glumes 4, the 2 outer nearly equal, 5-nerved, thick, the third glume smaller, thin, and hyaline, the fourth thin, slender, mostly bifid, terminated by a slender, rigid awn, and enclosing the stamens and style. In addition there are two lodicules or scales at the base of the last (upper) glume. There is a tuft of long silky hairs at the base of each spikelet, except in *E. strictus*. No true palet present.

1. *E. breviarbis*, *Michx.* Virginia to Texas.
2. *E. contortus*, *Ell.* North Carolina to Texas.
3. *E. saccharoides*, *Michx.* (*E. alopecuroides*, *Ell.*) Maryland to Texas.
4. *E. strictus*, *Baldw.* North Carolina, Tennessee to Texas.

ELIONURUS, *H. B. K.*

Flowers in narrow cylindrical spikes, the spikelets in pairs, (one sessile and one pedicelled,) at each alternate joint of the grooved rhachis, the sessile spikelet with one perfect flower, the pedicelled one sterile. Glumes 4, all awnless, the lower one usually the largest and thickest, the 2d rather smaller and thinner, the 3d and 4th hyaline; the true palet generally wanting. Stamens 3, style distinct, stigmas plumose.

1. *E. candidus*, *Hack.* (*Andropogon candidus*, *Trin.*) Texas to Arizona.

2. *E. ciliaris*, *H. B. K.* Texas to Arizona.
3. *E. Nuttallii*, *Vasey.* (*Andropogon*, *Chap.*) Florida to Texas.

Dr. V. Havard states that this species forms a large portion of the vegetation of the plains of Southeast Texas.

ROTTBŒLIA, *Linn.*

Flowers in terminal and lateral cylindrical spikes. Spikelets in pairs at each joint of the rhachis, one sessile and imbedded in an excavation of the rhachis, the other short pedicelled, erect and appressed. The sessile spikelet has two thick outer glumes, two hyaline ones and a hyaline palet, with the stamens and pistil. Rarely this spikelet has a second male or imperfect flower. The pedicelled spikelet is usually imperfect, male only or reduced to empty glumes.

1. *R. corrugata*, *Bald.* South Carolina to Texas.
2. *R. cylindrica*, *Chap.* Florida to Texas.
3. *R. rugosa*, *Nutt.* Delaware to Florida.

MANISURIS, *Swartz.*

Spikelets in pairs in the one-sided notches of the articulate rhachis of a simple spike, one sessile and half imbedded in a cavity of the rhachis, with one perfect flower, the other on a short appressed pedicel and reduced to two empty glumes. Outer glumes of perfect flower two, the lower globular and hard, the second smaller and concave, thin but rigid. Third and fourth glumes small and hyaline. Palet, none; the fourth glume usually considered a palet.

1. *M. granularis*, *Swz.* Introduced. Texas and New Mexico.

HEMARTHRIA, *R. Br.*

Spikelets in pairs in the alternate notches of a simple spike, one sessile and half imbedded in a cavity of the scarcely articulate rhachis, with one perfect flower, the other on a closely appressed and often adnate pedicel reduced to 2 or 3 empty glumes; the spikes terminal and lateral, and with the culm often flattened. Glumes in the sessile spikelet 4, the outer one thick, appressed and covering the cavity of the rhachis, the second thinner and convex or keeled, the third and fourth and the palet in the fourth thin and hyaline.

1. *H. fasciculata*, *Ath.* Southeast Texas.

ISCHÆMUM, *Linn.*

Spikelets in pairs in the alternate notches of the articulate flexuous rhachis of simple spikes, one sessile with one perfect flower and a male one below it, the other pedicelled and similar or defective. The sessile spikelet has two thickish outer glumes and two thin hyaline flowering glumes, the upper one usually awned. The palea are small and hyaline, sometimes absent.

1. *I. leersioides*, *Munro*. Introduced in California.

HETEROPOGON, *Pers.*

Spikelets one-flowered, monœcious, in pairs in the notches of the rhachis of a one-sided spike, one sessile and pistillate, cylindrical, turned to one side of the spike, the other pedicelled and staminate, imbricate on the other side of the spike. The lower outer glume is hard and convolute; the upper, thinner and keeled; the third glume is thin and hyaline; the fourth, or flowering glume, terminated with a hard, twisted awn; palea very small and thin or wanting.

1. *H. contortus*, *R. & S.* (*Andropogon contortus*, *L.*) Texas and Southwest.
2. *H. contortus*, var. *glaber*. *Hackel*. (*H. Allioni*, *R. & S.*) West Texas to Arizona.
3. *H. acuminatus*, *Trin.* (*Andropogon melanocarpus*, *Chap.*) South Carolina to Florida.

TRACHYPOGON, *Nees.*

Spikelets arranged and constituted as in *Heteropogon*, except that the sessile spikelet is male and the pedicelled one pistillate.

1. *T. polymorphus*, *Hack.*, var. *Montufari*, *Hack.* (*T. Montufari*, *Nees.*) West Texas to Arizona.

ANDROPOGON, *Linn.*

Inflorescence in simple or paniculate spikes. Spikelets in pairs in the alternate notches of the rhachis, one sessile and fertile, the other pedicelled and sterile, (either male or empty.) 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. Palea small and hyaline or wanting.

This genus is quite largely developed in the United States. They are perennial grasses, mostly tall, and with tough, wiry stems. Some of them occur in nearly all parts of the country from New England to Florida and west to Arizona. They are most abundant, however, in the Southern States, where they have been employed for permanent pastures. When they occur in quantity they can be utilized, but to be of value they should be kept from sending up their strong stems, as these are universally rejected by cattle and horses. They are not to be recommended for cultivation, but their place should as soon as possible be supplanted by more valuable grasses. They are commonly known as Broom grass or Broom sedge.

1. *A. arctatus*, *Chap.* Florida.
2. *A. argyræus*, *Schultz.* (*A. argenteus*, *Ell.*) Virginia to Texas.
3. *A. brachystachyus*, *Chap.* Florida.
4. *A. Cabanisii*, *Hack.* Pennsylvania, southward.
5. *A. cirrhatus*, *Hack.* New Mexico to Arizona.
6. *A. dissitiflorus*, *Michx.* (*A. Virginicus*, *Linn.*) Massachusetts to Texas.
 - A. dissitiflorus*, var. *glaucus*, *Hack.* Florida to Texas.
 - A. dissitiflorus*, var. *tetrastachyus*, *Hack.* (*A. tetrastachyus*, *Ell.*)
 - A. dissitiflorus*, var. *vaginatus*, *Hack.* Virginia and southward.
7. *A. Elliottii*, *Chap.* Virginia to Texas.
8. *A. gracilis*, *Spreng.* Florida.
9. *A. Hallii*, *Hack.* Kansas to Arizona.
10. *A. hirtiflorus*, *Kunth*, var. *Feensis*, *Hack.* (*A. Feensis*, *Fourn.*) New Mexico to Arizona.
 - A. hirtiflorus*, *Kunth*, var. *oligostachyus*, *Hack.* (*A. oligostachyus*, *Chap.*) Florida.
11. *A. longiberbis*, *Hack.* Florida.
12. *A. macrourus*, *Michx.* New York to Florida and west to Southern California.
 - A. macrourus*, var. *abbreviatus*, *Hack.*
 - A. macrourus*, var. *corymbosus*, *Chap.*
 - A. macrourus*, var. *glaucopsis*, *Chap.*
13. *A. provincialis*, *Lam.* (*A. furcatus*, *Muhl.*) East of Rocky Mountains.
 - A. provincialis*, var. *pycranthus*, *Hack.*
 - A. provincialis*, var. *Lindheimeri*, *Hack.* Texas.

- A. *provincialis*, var. *geminatus*, *Hack.* Texas.
14. A. *saccharoides*, *Swz.* (A. *argenteus*, *D. C.*) Texas to Arizona.
15. A. *scoparius*, *Michx.* Rocky Mountains to the Atlantic.
 A. *scoparius*, var. *maritimus*, *Hack.* (A. *maritimus*, *Chap.*)
 Florida.
 A. *scoparius*, var. *simplex*, *Hack.* Texas to Arizona.
 A. *scoparius*, var. *multiramea*, *Hack.* Common.
16. A. *tener*, *Kth.* Florida to Texas.
17. A. *Wrightii*, *Hack.* New Mexico to Arizona.

A. *scoparius* forms an important portion of the native grasses of the prairies in Kansas and Nebraska, extending in some of its forms to the Atlantic coast.

A. *macrourus*, or Heavy-topped Broom-grass, is frequent on low, sandy ground near the coast from New Jersey to Florida, and thence westward to Arizona.

A. *provincialis*, or Finger-spiked Broom-grass, frequently also called Blue-stem in the West, is the tallest of our species. It grows to the height of 5 or 6 feet, in rocky or hilly ground, or at the West on the virgin prairies and plains, where it is one of the principal hay grasses, being extensively cut for winter-feeding.

CHRYSOPOGON, *Trin.*

Flowers loosely paniculate. Fertile spikelets one-flowered, sessile between two pedicellate male or barren spikelets at the end of the slender branches of the panicle, with, sometimes, one to three pairs of spikelets on the branch below the terminal three. Fertile spikelets with the lower glume larger and coriaceous; the second narrower, thick, keeled, pointed, or awned; the third hyaline and empty; the fourth or flowering glume hyaline and awned. Palea minute or none.

1. C. *avenaceum*, *Benth.* (*Sorghum avenaceum*, *Chap.*) North Carolina to Texas.
2. C. *nutans*, *Benth.* (*Sorghum nutans*, *Gr.*) New England to Rocky Mountains.

This is a tall, perennial grass, having a wide range over all the country east of the Rocky Mountains. It grows rather sparsely, and forms a thin bed of grass. The stalks are 3 to 4 feet high, smooth, hollow, straight, and having at the top a narrow panicle of handsome straw-colored or brownish flowers, 6 to 12 inches long,

which is gracefully drooping at the top. The spikelets are at the ends of the slender branches of the loose panicle, generally of a yellowish color. At the base of each spikelet are two (one on each side) short, feathery pedicels; the flowers which they are supposed to have been made to support have entirely disappeared. The outer glumes are about three lines long, both alike lanceolate, obtusish, coriaceous, five to seven nerved, the lower one sparsely hairy, and with hairs at the base and on the stalk below.

3. *C. secundum*, *Benth.* (*Sorghum secundum*, *Chap.*) Florida.
4. *C. Wrightii*, *Munro.* (*Sorghum pauciflorum*, *Chap.*) Florida.

SORGHUM, *Pers.*

Spikelets much as in *Chrysopogon*, differing chiefly in habit and in the glumes of the fertile spikelets becoming more hardened after flowering.

1. *S. halepense*, *Linn.* Introduced and sparingly naturalized. Johnson grass. Means' grass

This grass has been often called Guinea grass, but that name properly belongs to a quite different plant, *Panicum jumentorum*, of which see an account elsewhere. The underground root-stocks are sometimes half an inch thick, very succulent, and are eagerly sought for and eaten by hogs. The grass spreads and is readily propagated from these root-stocks, every joint being capable of developing a new shoot. Mr. N. B. Moore, of Augusta, Ga., has cultivated this grass for over forty years, and prefers it to all others. He says it is perennial, as nutritious as any other, when once set is difficult to eradicate, will grow on ordinary land, and yields abundantly.

Many farmers and planters especially object to this grass because of the difficulty of eradicating it. But Mr. Hubert Post says it is not as hard to get rid of as many suppose. He says that one of his neighbors, in 1878, broke up some 15 acres, which he has since successfully planted in cotton with no trouble from the grass. He also says that in this Johnson grass a kind Providence has given the South a mine of wealth, which could easily be made a foundation for wealth and prosperity such as the South has never seen. The history of the grass in this country is said to be as follows:

Governor Means, of South Carolina, obtained some of the seed from Turkey as early as 1835. He planted it on his plantation, where it is still called Means grass. In 1840 or 1845 William

Johnson, of Alabama, obtained some of the seed and sowed it upon his farm, whence it derived the name of Johnson grass. It is said to have been introduced into California from Australia, and has there been cultivated under the name of *evergreen millet*. It has been tried in Kansas with very promising results. A farmer there obtained some seed from his brother in California, who had cultivated it successfully on a very dry soil on an upland farm. This farmer finds it to be in Kansas perfectly hardy, rapid in growth, affording three cuttings in one season, and producing a heavy growth of aftermath for fall grazing. Horses and cattle are fond of it, both in its dry and green condition. Probably no grass gives better promise for the dry, arid lands of the West. In Utah it has been cultivated under the name of *Arabian millet grass*.

PHALARIS, *Linn.*

Spikelets one-flowered, compressed, densely crowded in an ovoid or cylindrical spike, or on the short, densely-flowered branches of a panicle. The outer glumes are acute, boat-shaped, keeled, three-nerved, the keel in some species bordered by a scarious wing; within these is the flower, consisting of two glumes, sometimes called palets, which are thicker than the outer ones, becoming shining and coriaceous, obscurely nerved, compressed, enclosing the stamens and style. Below the flower are one or two small bristles, which are considered abortive glumes. There is no ordinary two-nerved palet.

1. *P. arundinacea*, *Linn.* Reed Canary. New England to Virginia, and westward to the Pacific coast.

A perennial grass, with strong creeping rhizomas, growing from 2 to 5 feet high, usually in low or wet ground. It ranges from New England and New York westward to Oregon, and northward to Canada, also in the mountainous parts of Pennsylvania and Virginia. It is common, also, in the north of Europe. The culm is stout, smooth, and leafy; the leaves are mostly from 6 to 10 inches long and about half an inch wide, the upper ones shorter.

The well-known ribbon grass of the garden is a variety of this grass, and will, it is said, easily revert to the normal type. In mountainous regions it may be worth trial for meadows.

2. *P. amethystina*, *Trin.* California and Oregon.
3. *P. Canariensis*, *Linn.* Canary grass. Introduced.

4. *P. intermedia*, *Bose*. (*P. Californica*, *H. & A.*)

P. intermedia, var. *angusta*, *Chap.* (*P. angusta*, *Nees.*)

(Southern reed Canary grass, Gilbert's Relief grass, Stewart's Canary grass, California Timothy grass.)

This species resembles the foreign Canary grass, (*Phalaris Canariensis*,) which produces the seed commonly sold as food for Canary birds. It is, however, a taller and more robust species, growing 2 to 3 feet high, with a stout, erect culm and broad linear leaves, which are from 4 to 10 inches long. The spike is oblong and compact, 1 or 2 inches long. There is a variety called var. *angustata*, in which the spike is 3 or 4 inches long. The spikelets are much like those of the preceding species, (*P. arundinacea*,) having one perfect flower and two abortive ones. The outer glumes in *P. intermedia* are lanceolate and nearly alike and have a narrow wing extending down the keel. The glumes of the fertile flower are nearly like those of *P. arundinacea* already described.

This species grows in South Carolina and the Gulf States, extending to Texas, then stretching across to the Pacific coast and occurring through California and Oregon. It has frequently been sent to the Department from the Southern States as a valuable winter grass.

Mr. Thomas W. Beaty, of Conway, S. C., writes as follows:

The grass I send you was planted last September, and the specimens were cut on the 9th of March (following.) You will notice that it is heading out and is just now in a right condition for mowing. It is wholly a winter grass, dying down in the latter part of April and first of May, and it seems to me should be a great thing for the South if properly introduced and cultivated, or rather the ground properly prepared and the seed sown at the right time. It would afford the best of green pasturage for sheep and cattle all winter. It is what we call Gilbert's relief grass.

Many years ago Dr. Lincecum, of Texas, experimented with this grass and recommended it very highly. In California it is called California timothy, and is said to have little or no agricultural value. It is an annual or biennial. Professor Phares says:

The variety *angustata* is much larger and more valuable. It grows 2 to 3 feet high, and in swamps 5 feet, with many leaves 4 to 10 inches long, the spike somewhat resembling the head of timothy; stock like it well, especially as hay. Mr. D. Stewart, of Louisiana, having tested other grasses, prefers this for quantity and quality for winter and spring grazing, and for soiling for milk cows. There is much testimony from many parts of the South of the same import, and this grass is doubtless worthy of extended, careful testing.

5. *P. Lemmoni*, *Vasey*. Arizona.

ANTHOXANTHUM, *Linn.*

Panicle somewhat spike-like. Spikelets apparently 3-flowered, but only the terminal one perfect; the lower pair of glumes unequal, the lower one much smaller than the upper; above these and below the perfect flower are two short, thin, two-lobed pubescent glumes, sometimes called abortive flowers, each one with an awn between the lobes; the upper or perfect flower is smaller, consisting of one broad, thin, three-nerved glume, and one (commonly considered the palet) narrow, one-nerved, hyaline glume. No true palet. Stamens 2, styles 2, distinct.

1. *A. odoratum*, *Linn.* Sweet vernal-grass. Naturalized.

A perennial grass, native of Europe, much employed as a part of mixed lawn grasses, and also frequently found in meadows. It grows thinly on the ground, with slender culms, seldom more than 1 foot to 18 inches in height, and scanty in foliage. The panicle is 2 to 3 inches long, narrow, and close, but expands considerably during flowering time. It is very fragrant, and gives a pleasant odor to hay.

HIEROCHLOA, *Gmelin.*

Spikelets three-flowered in an open panicle; the terminal flower perfect, but with only two stamens, the two lower flowers male only, each with three stamens; the two outer glumes thin and scarious, acutely keeled, the glumes of the male flowers thicker, sometimes short-awned, each inclosing a narrow, thin, bifid, two-keeled palet; the upper or perfect flower has a one-nerved glume in place of the usual palet.

1. *H. alpina*, *R. & S.* High mountains.

2. *H. borealis*, *R. & S.* Northern and subalpine.

This is a perennial grass of northern latitudes, growing in moist meadows near the coast, also in low marshy ground in some parts of Illinois and other States bordering the Great Lakes, and in the mountains of Colorado and northward. The name *Hierochloa* means sacred grass, so called because it, with other sweet-scented grasses, was strewed before the church doors in the north of Europe. The culms grow from 1 to 2 feet high, with short lanceolate leaves, and an open pyramidal panicle from 2 to 5 inches long. It is very sweet-scented and is often used to perfume drawers, &c. It grows

commonly in the northern parts of Europe, as Norway, Sweden, and Russia. It does not appear to be adapted to general cultivation.

3. *H. macrophylla*, *Thurb.* California and Oregon.
4. *H. pauciflora*, *R. Br.* Melville Island.

ALOPECURUS, Linn.

Flowers crowded in a cylindrical spike. Spikelets one-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. agrestis*, *Linn.* Sparingly naturalized.
2. *A. alpinus*, *Sm.* Rocky Mountains.
- 3.? *A. cæspitosus*, *Trin.* Northwest America—not since seen.
4. *A. geniculatus*, *Linn.* From Atlantic to Pacific. Water-Fox tail.

A. geniculatus, var. *aristulatus*, *Munro.* From Atlantic to Pacific. Water-Fox tail.

This species, especially the variety *aristulatus*, is native to this country. It is commonly found on the muddy banks of streams and lakes, and sometimes is found in wet meadows and ditches. It seldom grows more than a foot in height; the stem is usually bent at the lower joints, and the sheaths of the leaves are more or less swollen, especially the upper one. It is of no value for cultivation, being only useful for the amount of grass it may contribute to the wild forage where it grows.

5. *A. pratensis*, *Linn.* Meadow Fox-tail. Introduced.

This is a perennial grass, native of Europe, but has been introduced and is frequently found in meadows in the Eastern States. It has considerable resemblance to timothy, but will be readily distinguished by an examination. It ordinarily grows about 2 feet high, but frequently in good soil reaches 3 feet or more. The culms are erect, with four or five leaves at pretty uniform distances. The sheaths are long and rather loose, particularly the upper one. The blade of the leaf is 3 or 4 inches long, about one-quarter inch wide at the base, and tapering gradually to a point. The panicle terminates the stalk and is a cylindrical spike 2 or 3 inches long,

dense, soft, and with the awns of the flowers conspicuously projecting. The spikelets are single-flowered, between two and three lines long. The outer glumes are strongly compressed, boat-shaped, keeled, nearly equal, sometimes slightly united together at the base, and have a line of soft, short hairs on the keels. These glumes closely inclose the flower, which is of nearly the same length, and consists of a flowering glume (formerly called the lower palet) and the floral organs, but without any true palet. This flowering glume is folded upon itself and incloses the stamens and styles. It gives rise on its back near the base to a fine awn, which extends two or three lines beyond the glumes.

Mr. J. S. Gould says:

It flourishes in May, nearly four weeks in advance of timothy, and is one of the earliest grasses to start in the spring. Pastures well covered with this grass will afford a full bite at least one week earlier than those which do not have it. It does not flourish in dry soils, but loves moist lands; no grass bears a hot sun better, and it is not injured by frequent mowings, on which account, as well as for its early verdure, it is valuable for lawns.

A. pratensis, var. *alpestris*. Rocky Mountains.

This variety is indigenous in Montana and Idaho, and is very common along mountain streams, frequently covering acres of the mountain meadows. It is called in some localities Mountain Timothy. It yields a large quantity of fine bright hay, for which purpose it is often harvested and highly valued. It has little value for grazing. Probably under cultivation it would become as useful as the European form of the species.

6. *A. saccatus*, *Vasey*. Oregon.

ARISTIDA, *Linn.*

Spikelets one-flowered in a spicate, or an open branching panicle generally on filiform pedicels; outer glumes unequal, often bristle-pointed; flowering glume narrow, rolled around the flower, terminating with a trifid awn, or apparently three-awned. Palet small and thin, inclosed in the flowering glume.

The grasses of this large genus are either worthless or of little agricultural value. The perennial species in some localities furnish a considerable amount of wild forage of an inferior character. They are very abundant in sandy and sterile soil.

1. *A. Americana*, *Linn.* (*A. dispersa*, *Trin.*) New Mexico and Arizona.

2. *A. Arizonica*, *Vasey*. Arizona and California.
3. *A. basiramea*, *Engel*. Nebraska to Minnesota.
4. *A. bromoides*, *H. B. K.* New Mexico to California.
5. *A. Californica*, *Thurb.* Arizona and California.
6. *A. desmantha*, *Rupt.* Texas.
7. *A. dichotoma*, *Lin.* Maine to Texas.
A. dichotoma, var. *Curtissii*, *Gr.* Virginia.
8. *A. divaricata*, *H. B. K.* (*A. Humboldtiana*, *Tr.*) New Mexico and Arizona.
9. *A. Floridana*, *Vasey*. (*Streptachne Floridana*, *Chap.*) Florida.
10. *A. gracilis*, *Ell.* New England to Texas.
A. gracilis, var. *depauperata*, *Gr.*
11. *A. gyrans*, *Chap.* Florida.
12. *A. Havardii*, *Vasey*. Texas.
13. *A. Jonesii*, *Vasey*. Arizona.
14. *A. lanata*, *Poir.* Delaware to Texas.
15. *A. oligantha*, *Michx.* Virginia, Illinois, Arkansas.
16. *A. Orcuttiana*, *Vasey*. Arizona.
17. *A. Palmeri*, *Vasey*. Arizona.
18. *A. palustris*, *Vasey*. (*A. virgata*, var. *palustris*, *Chap.*) Florida.
19. *A. purpurascens*, *Poir.* New England to Texas,
A. purpurascens, var. *minor*, *Vasey*. South Carolina to Texas.
20. *A. purpurea*, *Nutt.* Great Plains to Arizona.
A. purpurea, var. *Berlandieri*, *Tr.* Great Plains to Arizona.
A. purpurea, var. *Californica*, *Vasey*. Arizona to California.
A. purpurea, var. *Hookeri*, *Tr.* Texas and Southwest.
21. *A. ramosissima*, *Engel.* Illinois and Missouri.
A. ramosissima, var. *uniseta*, *Engel.* Illinois and Missouri.
22. *A. Reverchoni*, *Vasey*. Texas.
23. *A. scabra*, *Chap.*, non *Kunth.* Florida.
24. *A. Schiediana*, *Trin.* Texas to Arizona.
25. *A. simplicifolia*, *Chap.* Florida.
26. *A. spiciformis*, *Ell.* Florida.
27. *A. stricta*, *Michx.* North Carolina to Florida and Alabama.
A. stricta, var. *condensata*, *V. & S.* (*A. condensata*, *Chap.*) Florida.
28. *A. tuberculosa*, *Nutt.* Illinois, westward and southwest.

STIPA, *Linn.*

Spikelets one-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.

This genus has its principal range in the region of the Rocky Mountains and the Great Plains. They are mostly coarse, rigid grasses, having little agricultural value. In common with many other kinds they are usually called Bunch grass, sometimes Beard grass or Feather grass. The more abundant species are *Stipa spartea*, *S. comata*, and *S. viridula*. These prevail from British America southward, on the plains, and in the mountains. The genus is particularly distinguished by the awn or beard of the flowering glume, and the sharp-pointed and barbed *stipe* or base of the glume. Complaint has been made among stockmen of great injury to sheep by the penetration of these sharp points into their wool, and even into their flesh. The awns or feathery appendages are in some species 4 to 6 inches long, and are subject to a spiral twisting when dry, which assists in forcing the seed into the ground for germination. *Stipa avenacea* is the only species prevailing in the Eastern and Southern States, and is of no agricultural importance. The long, feathery awns of *Stipa pennata* are beautiful and ornamental.

1. *S. avenacea*, *Linn.* Wisconsin, New England, and southward.
2. *S. chrysophylla*, *Desv.* California and Arizona.
3. *S. comata*, *Trin.* Bunch grass. Rocky Mountains.
4. *S. coronata*, *Thurb.* Arizona and California.
5. *S. eminens*, *Cuv.* Arizona and California.
6. *S. fimbriata*, *H. B. K.* New Mexico and Arizona.
7. *S. Kingii*, *Boland.* California and Nevada.
8. *S. Mongolica*, *Turcz.* Colorado. Alpine.
9. *S. occidentalis*, *Thurb.* California, Nevada, and Oregon.
10. *S. Parishii*, *Vasey.* Arizona and California.
11. *S. pennata*, var. *Neo-Mexicana*, *Thurb.* West Texas, New Mexico to Arizona.
12. *S. Pringlei*, *Scribner.* Arizona.
13. *S. Richardsonii*, *Link.* Maine, Lake Superior to Montana.

14. *S. setigera*, *Presl.* New Mexico to California.
15. *S.?* *Sibirica*, *Lam.* Rocky Mountains, but doubtful.
16. *S. Scribneri*, *Vasey.* New Mexico.
17. *S. spartea*, *Trin.* Prairies and plains, Illinois to California.
18. *S. speciosa*, *Trin.* Arizona and California.
19. *S. Stillmanii*, *Boland.* California.
20. *S. stricta*, *Vasey.* California, Nevada to Oregon.
21. *S. tenuissima*, *Trin.* New Mexico and Arizona.
22. *S. viridula*, *Trin.* Rocky Mountains.
 - S. viridula*, var. *pubescens*, *Vasey.* Rocky Mountains.
 - S. viridula*, var. *minor*, *Vasey.* Rocky Mountains.

ORYZOPSIS, Mich.

This genus differs from *Stipa* chiefly in having a shorter, ovate or oblong flower, with the callus at the base shorter and broader, and in having usually a very short and deciduous awn to the flowering glume.

1. *O. asperifolia*, *Michx.* Northern States to Colorado.
2. *O. Canadensis*, *Torr.* Northern States to Colorado.
3. *O. cuspidata*, *Benth.* (*Eriocoma*, *Nutt.*) Rocky Mountains.

This grass has a wide distribution, not only on the Sierras of California, but northward to British America, and eastward through all the interior region of Utah, Nevada, New Mexico, Texas, Colorado, and Nebraska to the Missouri River. It is a perennial, growing in dense tufts, whence its common name of bunch grass. The culms are 1 to 2 feet high, with about three narrow, convolute leaves, the upper one having a long, inflated sheath which incloses the base of the panicle. The radical leaves are narrow, rigid, and as long as or longer than the culm. The panicle is about 6 inches long, very loose, spreading, and flexuous. The branches are in pairs, slender, rather distant, and are subdivided mostly in pairs. The spikelets are at the ends of the capillary branches, each one flowered. The outer glumes are three to four lines long, inflated and widened below, gradually drawn to a sharp-pointed apex, thin and colorless except the three or five green nerves, and slightly hairy. The glumes inclose an ovate flower, which is covered externally with a profusion of white, silky hairs, and tipped with a short awn, which falls off at maturity. This apparent flower is the flowering glume, of a hard, coriaceous texture, and incloses a similar

hard, but not hairy, and smaller palet. In Montana it is one of the most esteemed *bunch grasses*, and thrives on soil too sandy for other valuable species.

4. *O. exigua*, *Thurb.* (*O. Oregona*, *Trin.?*) Oregon to Montana.
5. *O. melanocarpa*, *Muhl.* New England, Pennsylvania to Wisconsin.
6. *O. micrantha*, *Thurb.* Colorado to Arizona.
7. *O. Webberi.* (*Eriocoma*, *Thurb.*) California.

MILIUM, *Linn.*

Spikelets paniced; outer glumes membranaceous, equal and convex, the flowering glume and its palet coriaceous, much as in *Panicum*, but the articulation with the rhachis is above the outer glumes. All the glumes are unawned and there is no sterile pedicel.

1. *M. effusum*, *Linn.* New England, New York, and Northwest.

A tall perennial grass, 4 or 5 feet high, growing in damp woods in the northern portions of the United States and in Canada. It is also found in Northern Europe and in Russian Asia.

Hon. J. S. Gould, in the Report of the New York State Agricultural Society, says respecting this grass:

Mountain meadows and borders of streams and cold woods. It thrives when transplanted to open and exposed situations. It is one of the most beautiful of the grasses; the panicle is often a foot long, and the branches are so exceedingly delicate that the small glossy spikelets seem to be suspended in the air. Birds are very fond of the seed. Mr. Colman says that he has raised 3 tons to the acre of as good nutritious hay as could be grown from it, when sown in May. The plants multiply by the roots as well as by the seed, sending out horizontal shoots of considerable length, which root at the joint as they extend.

MUHLENBERGIA, *Schreb.*

Spikelets one-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 three to five 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.

1. *M. Arizona*, *Scribn.* Arizona.

2. *M. arenicola*, *Buckl.* Texas to Arizona.
3. *M. Berlandieri*, *Trin.* Texas to Arizona.
4. *M. Calamagrostidea*, *Trin.* Texas to Arizona.
5. *M. Californica*, *Vasey.* South Carolina.
M. Californica, var. *Lemmoni*, *Vasey.* Arizona.
6. *M. capillaris*, *Kth.* New England to Florida and Texas.
M. capillaris, var. *filipes*, *Chap.* (*M. filipes*, *Curtis.*) South Carolina to Florida.
M. capillaris, var. *trichopodes*. (*M. trichopodes*, *Chap.*) Virginia to Louisiana.
7. *M. comata*, *Benth.* (*Vaseya*, *Thurber.*) Woolly seeded Muhlenbergia. Rocky Mountain region, Colorado to California.

This species grows throughout the Rocky Mountain region in Colorado, Utah, Wyoming, Idaho, Nevada, and California, usually on the sandy or alluvial banks of streams. It grows in tufts from firm, creeping root-stocks. There is reason to think it may be a valuable grass for arid regions. The culms are erect, simple, 2 to 3 feet high, leafy below, the leaves 3 to 6 inches long and roughish, the upper one at first inclosing the base of the panicle, the joint slightly pubescent. The panicle is 2 to 4 inches long, narrow, and close, sometimes interrupted below, generally of a purplish lead color and of soft texture.

8. *M. debilis*, *Trin.* Texas to Arizona.
9. *M. depauperata*, *Scrib.* Arizona.
10. *M. dumosa*, *Scrib.* Arizona.
11. *M. diffusa*, *Schreb.* Nimble Will. New England to Mexico.

Professor Killebrew, of Tennessee, says :

It is hardly more than necessary to mention this grass, which forms in many sections the bulk of the pastures of the woods. It does not grow in fields, but in woods, where, after rains have set in, it carpets the earth with living green. Various opinions are entertained as to its nutritive qualities. Some farmers assert that their stock are fond of it, and that on sufficient range cattle, horses, and sheep will go into the winter sleek and fat from this vigorous grass. Others regard it as well nigh worthless.

12. *M. glomerata*, *Trin.* Spiked Muhlenbergia.

This grass grows in wet, swampy grounds, chiefly in the northern and western portions of the United States. It is found in Colorado, Utah, Nevada, New Mexico, and Texas. It grows to the height of 2' or 3 feet, stiffly erect, and generally unbranched. The culm is

hard, somewhat compressed, and very leafy. The panicle is narrow, 2 to 4 inches long, composed of numerous close clusters of flowers, becoming looser below, forming an interrupted glomerate spike. The spikelets are closely sessile in the clusters. The outer glumes are linear-lanceolate, gradually tapering into an awn or bristle of equal length. The flowering glume is one-third to one-half shorter than the outer glumes and very acute. The root-stock is hard and knotty and furnished with numerous short, firm shoots or stolons. In the Eastern States it is utilized as one of the native products of wet meadows in the making of what is called wild hay. Specimens have been sent from Colorado and Kansas and recommended as an excellent grass for hay.

13. *M. glomerata*, var. *ramosa*, *Vasey*. A much branched spreading form. Illinois to Colorado and Montana.
14. *M. gracilis*, *Trin.* Rocky Mountains and plains.
M. gracilis, var. *major*, *Vasey*. New Mexico.
15. *M. gracillima*, *Torr.* Plains, Colorado, and New Mexico.
16. *M. Mexicana*, *Trin.* New England to Mexico.

A perennial grass of decumbent habit, 2 to 3 feet high, much branched, from scaly creeping root-stocks. It is frequently found in moist woods and low meadows, or prairies. It probably would not endure upland culture, but in its native situations it fills an important place among native grasses.

M. Mexicana, var. *filiformis*. With the preceding.

17. *M. monticola*, *Buckley*. West Texas to Arizona.
18. *M. pauciflora*, *Buckl.* West Texas to Arizona.
19. *M. Parishii*, *Vasey*. California.
20. *M. pungens*, *Thurb.* Colorado and New Mexico.
21. *M. Pringlei*, *Scrib.* New Mexico and Arizona.
22. *M. Reverchonii*, *Vasey & Scribner*. Texas.
23. *M. Schaffneri*, *Fourn.* Arizona.
24. *M. setifolia*, *Vasey*. West Texas.
25. *M. sobolifera*, *Trin.* New England to Texas.
26. *M. subalpina*, *Vasey*. (*M. gracilis*, var. *breviaristata*, *Vasey*.)
Colorado and Wyoming.
27. *M. sylvatica*, *T. & G.* New England to the Rocky Mountains.
M. sylvatica, var. *setiglumis*, *S. W.* Nevada.

This species has much the appearance and habit of *M. Mexicana*. The panicle is looser, the spikelets not so densely clustered, and the

flowering glume bears an awn two or three times as long as itself. It is found in dry, open, or rocky woods and fence corners. In agricultural value it corresponds to that species.

28. *M. Texana*, *Thurb.* Texas to Arizona.
 29. *M. virescens*, *Trin.* New Mexico and Arizona.
 30. *M. Willdenovii*, *Trin.* New England to Arkansas.
 31. *M. Wrightii*, *Vasey.* Colorado to Arizona.
- M. Wrightii*, var. *annulata*, *Vasey.* Arizona.

BRACHYELYTRUM, *Beauv.*

Spikelets one-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, two-keeled, bifid at the apex. The rudiment (continuation of the rhachilla) is bristle-like, half as long as the palet, and partly lodged in the groove on its back.

1. *B. aristatum*, *Beauv.* Common.

LYCURUS, *H. B. K.*

Spikelets one-flowered, single on the short branches of the spike-like panicle, both the outer and the flowering glumes awned; outer glumes small, membranaceous, the upper, one awned, and the lower, two or three awned, the awns longer than the flower; flowering glume and palet of thicker texture (as in *Muhlenbergia*.) There are sterile spikelets intermixed with the fertile ones.

1. *L. phleoides*, *H. B. K.*

HELEOCHLOA, *Host.*

Spikelets one-flowered, perfect, crowded in a spike or spike-like panicle, which is partly included in the bract-like sheath of the upper leaf. Outer glumes membranaceous, acute, complicate, carinate, not awned; flowering glume similar, keel thickish and herbaceous; palet rather shorter, compressed, two-nerved or two-keeled.

1. *H. alopecuroides*, *Host.* (*Crypsis*, *Lam.*) Introduced on ballast.
2. *H. schœnoides*, *Host.* (*Crypsis*, *Lam.*) Introduced on ballast.

PHLEUM, *Linn.*

Spikelets one-flowered, in small clusters, crowded into a dense

spike-like cylindrical panicle; outer glumes one-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. *P. alpinum*, *Linn.* Mountain Timothy. Mountains of New England and Rocky Mountains.

In Montana it grows plentifully at altitudes of 5,000 to 8,000 feet, where it is often called "Native Timothy." Probably in mountainous situations it may become by cultivation as valuable as the next species.

2. *P. pratense*, *Linn.* Timothy. Extensively cultivated.

This is one of the commonest and best-known grasses. For a hay crop it is, perhaps, the most valuable, especially in the Northern States. The height of the grass depends on the soil and cultivation. In poor ground it may be reduced to 1 foot, while in good soil and with good culture it readily attains 3 feet, and occasionally has been found twice that height. It is a perennial grass with fibrous roots. The base of the culm is sometimes thickened and inclined to be bulbous. The culm is erect and firm, with four or five leaves, which are erect and usually from 4 to 6 inches long. The flower spike varies from 2 to 6 inches in length, is cylindrical and very densely flowered. The spikelets are sessile, single-flowered, and cylindrical or oblong in outline. The outer glumes are rather wedge-form, with a mucronate point or short bristle. The main nerve on the back is fringed with a few short hairs. The flowering glume is shorter than the outer ones and thinner, five-nerved, and toothed at the apex. The palet is thinner in texture and much narrower.

This grass, as known in cultivation, is supposed to have been introduced from Europe, but it appears to be indigenous in the mountain regions of New England, New York, and the Rocky Mountains. It is said that about the year 1711 a Mr. Herd found this grass in a swamp in New Hampshire and cultivated it. From him it took the name of Herd's grass. About the year 1720 it was brought to Maryland by Timothy Hanson and received the name of Timothy grass. It is now the favorite and prevailing meadow grass over a large part of the country.

COLEANTHUS, *Seid.*

Spikelets one-flowered, very small, perfect; outer glumes wanting; flowering glume membranaceous, one-nerved, keeled, acuminate or short aristate; palet shorter and wider than the flowering glume, two-keeled, acutely two-toothed. A minute annual grass. Stamens 2, stigmas 2, sessile.

1. *C. subtilis*, *Seid.* Sauvie's Island, Oregon.

PHIPPSIA, *R. Br.*

Spikelets one-flowered, outer glumes minute, unequal, membranaceous; flowering glume thin, three to four times longer than the outer ones, obscurely three-nerved, keeled, acute; palet a little shorter, two-keeled, two to four toothed at the apex.

1. *P. algida*, *Br.* Melville Island and Arctic regions.

SPOROBOLUS, *R. Br.* (including *Vilfa*, *Beauv.*)

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

1. *S. airoides*, *Torr.*
2. *S. arundinaceus*, *Vasey.* (*Vilfa*, *Trin.*) Alaska and British America.
3. *S. argutus*, *Kth.* var. *Arkansana.* Texas to Arizona.
4. *S. Arizonicus*, *Thurb.* (*S. interruptus*, *Vasey.*) Arizona.
5. *S. asper*, *Kth.* (*Vilfa*, *Beauv.*) New England to Texas.
S. asper, var. *Hookeri.* (*Vilfa Hookeri*, *Trin.*) Texas.
6. *S. asperifolius*, *N. & M.* British America to Arizona.
7. *S. Buckleyi*, *Vasey.* Texas.
8. *S. compressus*, *Kth.* New Jersey.
9. *S. cryptandrus*, *Gray.* New England to Mexico.

This species has an extensive range. It is common in sandy fields in the Northern and Southern States, as well as over all the dry plains west of the Mississippi, extending from British America to Mexico, furnishing a considerable share of the wild pasturage.

- S. cryptandrus*, var. *flexuosus*, *Thurb.* New Mexico to Arizona.

- S. cryptandrus*, var. *strictus*, *Scrib.* Nebraska to Arizona.
10. *S. cuspidatus*, *Torr.* Rocky Mountains, northward.
11. *S. depauperatus*, *Vasey.* (*Vilfa depauperata*, *Torr.*) Rocky Mountain region.
12. *S. Domingensis*, *Trin.* Florida.
13. *S. Drummondii*, *Vasey.* (*Vilfa Drummondii*, *Trin.*) Louisiana to Texas.
14. *S.?* *filiculmis.* (*Vilfa filiculmis*, *Thurb.*) Texas?
15. *S. Floridanus*, *Chap.* Florida.
S. Floridanus, var. *Curtissii*, *Vasey.* Florida.
16. *S. gracillimus*, *Vasey.* (*Vilfa*, *Thurb.*) California, Oregon.
17. *S. heterolepis*, *Gray.* Sparingly found in Connecticut and New York; common on prairies from Illinois westward, and south to Texas.

A writer on the grasses of the Rocky Mountains and plains in the Agricultural Report for 1870 says :

This species may be identified from its long, slender leaves, growing abundantly from the base of the plant, gracefully curving and frequently resting their tips on the ground; from its tendency to grow branches or stools, and when in fruit, from its small panicle of sharp-pointed spikelets and its round seeds. These when bruised emit a strong, heavy odor, which has been compared to that of *Eragrostis megastachya* when crushed in the hands; but to most olfactories it is much less offensive, and to some not at all disagreeable. It attains to the average height of about 2½ feet in fruit, but in dry seasons large tracts almost exclusively composed of this species are without a single fruiting plant. It is sometimes cultivated for hay, in the absence of the more productive species, and makes an article of fine quality.

18. *S. Indicus*, *R. Br.* Introduced and naturalized.

This grass is a native of India, but has spread over most tropical and warm climates. It occurs more or less abundantly in all the Southern States, and is called smut grass, from the fact that after flowering the heads become affected with a black smut. It grows in tufts or loose patches, is erect, from 1½ to 3 feet high, with an abundance of long, flat, fine pointed leaves near the base, and a narrow, terminal panicle frequently a foot in length, composed of short, erect, sessile branches, which are very closely flowered.

Professor Phares says :

It grows abundantly and luxuriously on many uncultivated fields and commons, and furnishes grazing from April till frost. It thrives under much grazing and many mowings, and grows promptly after each if the soil be moist enough. Cattle and horses are fond of it if frequently cut or grazed down, but if allowed to remain

untouched long they will not eat it unless very hungry, as it becomes tough and unpalatable and probably difficult to digest.

19. *S. junceus*, *Kth.* Pennsylvania to Wisconsin, and southward to Florida.
20. *S. Jonesii*, *Vasey.* California.
21. *S. purpurascens*, *Haml.* Texas.
22. *S. ramulosus*, *Kth.* Colorado to California, New Mexico, and Arizona.
23. *S. serotinus*, *Gr.* Maine, New Jersey, Michigan.
24. *S. tenacissimus*, *Beauv.* On ballast. Introduced.
25. *S. tricholepis*, *Torr.* New Mexico and Arizona.
26. *S. vaginæflorus*, (*Vilfa*, *Torr.*) Maine to Texas.
S. vaginæflorus, var. *tenera*, *Vasey.* Maine to Texas.
27. *S. Virginicus*, *Kth.* Virginia to Texas, near the coast.
28. *S. Wolfii*, *Vasey.* Colorado. A minute species.
29. *S. Wrightii*, *Munro.* New Mexico to Arizona.

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, three-nerved; flowering glume mostly equalling the outer ones, sometimes three to five nerved, entire or sometimes awned from the apex; palea hyaline, about equalling the flowering glume, two nerved or two-keeled.

1. *E. distichophylla*, *Vasey.* (*Muhlenbergia*, *Munro.*) Texas to Arizona.
2. *E. macroura*, *Benth.* (*Cinna*, *Kth.*) Texas to Arizona.
3. *E. rigens*, *Benth.* (*Cinna macroura*, *Thurb.*) Arizona to California.

AGROSTIS, *Linn.*

Spikelets one-flowered in a contracted or open panicle; outer glumes nearly equal or the lower rather longer, and longer than the flowering glume, one-nerved, acute, unawned; flowering glume shorter and wider, hyaline, three to five nerved, awnless, or sometimes awned on the back; palea shorter than the flowering glume, frequently reduced to a small scale or entirely wanting. Stamens usually 3, grain free.

1. *A. æquivalvis*, *Trin.* (*Deyeuxia æquivalvis*, *Benth.*) California to Alaska.
2. *A. arachnoides*, *Ell.* Tennessee to Texas.
3. *A. arenaria*, *Scrib.* California.
4. *A. asperifolia*, *Trin.* California.
5. *A. canina*, *Linn.* Mountains of New England to Rocky Mountains.

A grass usually of low size, 6 to 12 inches high, with slender culms and a light, flexible, expanded panicle, and with a perplexing variety of forms. There are several varieties growing in mountainous regions throughout the United States, and in Europe. It forms a close sod, and affords considerable pasturage in those regions.

A. canina, var. *alpina*, *Oakes.* New England.

A. canina, var. *rupestris*, *Gray.* (*A. rupestris*, *Chap.*) Mountains North Carolina.

6. *A. elata*, *Trin.* Massachusetts to Texas.
7. *A. exarata*, *Trin.* Wisconsin to Oregon, California, Nevada, and Arizona.

This is chiefly a northern species, being found in Wisconsin and westward to the Rocky Mountains, also in British America, and California to Alaska. It is very variable in appearance, and presents several varieties. It is generally more slender in growth than the common red top. The panicle is usually longer, narrower, and looser. In all the forms the palet is wanting or is very minute. The form chiefly growing on the Pacific slope from California to Alaska is often more robust than the *A. vulgaris*, growing 2 to 3 feet high, with a stout, firm culm, clothed with three or four broadish leaves, 4 to 6 inches long. The panicle is 4 to 6 inches long, pale green, rather loose, but with erect branches.

A. exarata, var. *littoralis*, *Vasey.* Oregon.

8. *A. exigua*, *Thurb.* California.
9. *A. foliosa*, *Vasey.* California and Oregon.
10. *A. geminata*, *Trin.* Oregon to Alaska.
11. *A. grandis*, *Trin.* California to Alaska.
12. *A. humilis*, *Vasey.* Oregon and Washington Territory.
13. *A. microphylla*, *Steud.* Oregon and California.
14. *A. mucronata*, *Presl.* Oregon and California.
15. *A. multiculmis*, *Vasey.* South California.
16. *A. pallens*, *Trin.* Oregon and California.

17. *A. perennans*, *Tuck.* New England to Texas.
18. *A. scabra*, *Willd.* New England to Alaska and southward.
A. scabra, var. *cæspitosa*, *Torr.* Mountains of New York.
19. *A. Scouleri*, *Trin.* California to Alaska.
20. *A. tenuis*, *Vasey.* Oregon to California.
21. *A. varians*, *Trin.* Oregon to California.
22. *A. verticillata*, *Vill.* Texas to California.
23. *A. virescens*, *H. B. K.* California.
24. *A. vulgaris*, *With.* Naturalized and cultivated.
A. vulgaris, var. *alba*. (*A. alba*, *Linn.*) Naturalized and cultivated.
A. vulgaris, var. *stolonifera*. (*A. stolonifera*, *Linn.*) Naturalized and cultivated.

Extensively cultivated and known as Red-top, Fine-top, Herd's grass of Pennsylvania, Bent grass, &c.

A perennial grass, growing 2 or 3 feet high from creeping rootstocks, which interlace so as to make a very firm sod; the culms are upright, or sometimes decumbent at the base, smooth, round, rather slender, and clothed with four or five leaves, which are flat, narrow, and roughish, from 3 to 6 inches long, with smooth sheaths, and generally truncate ligules.

Agrostis alba, the *Fiorin* grass of Ireland, and *Agrostis stolonifera* are usually considered synonymous, and are distinguished from *A. vulgaris* by having a closer, more verticillated panicle, and with longer and more acute ligules.

Mr. J. G. Gould says of *Agrostis vulgaris* :

This is a favorite grass in wet, swampy meadows, where its interlacing, thick roots consolidate the sward, making a firm matting which prevents the feet of cattle from poaching. It is generally considered a valuable grass in this country, though by no means the best one. Cattle eat hay made from it with a relish, especially when mixed with other grasses. As a pasture grass it is much valued by dairymen, and in their opinion the butter would suffer much by its removal.

Professor Phares, of Louisiana, says respecting this grass :

It grows well on hill tops and sides, in ditches, gullies, and marshes, but delights in moist bottom land. It is not injured by overflows, though somewhat prolonged. It furnishes considerable grazing during warm spells in winter, and in spring and summer an abundant supply of nutrition. Cut before maturing seed, it makes good hay and a large quantity. It seems to grow taller in the Southern States than it does farther north, and to make more and better hay and grazing.

Mr. Flint says :

It is a good permanent grass, standing our climate as well as any other, and con-

sequently well suited to our pastures, in which it should be fed close; for if allowed to grow up to seed the cattle refuse it; and this seems to show that it is not so much relished by stock as some of the other pasture grasses.

POLYPOGON, *Desf.*

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. *P. elongatus*, *H. B. K.* Southern California.
2. *P. littoralis*, *Sm.* Introduced. Texas to California.
3. *P. Monspelienis*, *Desf.* Introduced. Atlantic coast to the Pacific.

ARCTAGROSTIS, *Gris.*

Spikelets one-flowered, in a contracted panicle; rarely with a minute bristle-like rudiment; outer glumes persistent, thin, the upper rather longer and three-nerved, the lower one-nerved; flowering glume as long as the outer one, or longer, narrow, lateral nerves obscure, awnless; palet about as long as its glume, two-nerved, obtuse, or obtusely two-toothed. A pedicel or rudimentary flower sometimes present.

1. *A. latifolia*, *Gris.* Arctic coast and Hudson's Bay.
A. latifolia, var. *Alaskensis*, *Vasey.* (? *A. latifolia*, var. *B.*, *Gris.*,
not *Vilfa arundinacea*, *Trin.*) Alaska.

CINNA, *Linn.*

Spikelets one-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, three-nerved, short-awned on the back near the apex; palet nearly as long as its glume, only one-nerved (probably by the consolidation of two, *Bentham*;) stamen 1. A sterile pedicel sometimes present.

1. *C. arundinacea*, *Linn.* Common northward. Wood Reed-grass.

A perennial grass, with erect, simple culms from 3 to 6 feet high, with a creeping rhizoma; growing in swamps and moist, shaded woods in northern or mountainous districts. The leaves are broadly

linear-lanceolate, about 1 foot long, four to six lines wide, and with a conspicuous elongated ligule. The panicle is from 6 to 12 inches long, rather loose and open in the flower, afterwards more close. The branches are four or five together below, about 2 inches long, above in twos or threes and shorter. The spikelets are one-flowered, much flattened, rather crowded on the branches, frequently purple colored. The glumes are linear-lanceolate, roughish, acute, and strongly keeled, mostly three-nerved, firm in texture, about two lines long, the lower rather the shorter. The flower is short-stalked within the glumes; the flowering glume is as long as the outer ones, and of the same texture, rather scabrous and three-nerved, and usually with a very short awn near the apex. The palet is rather shorter than its glume, thin and membranaceous, except on the green somewhat rough nerve. This is one of the very rare cases in which the true palet has only a simple nerve, probably, Mr. Bentham says, by the consolidation of two. There is but one stamen.

This leafy-stemmed grass furnishes a large quantity of fodder, but experiments are wanting to determine its availability under cultivation.

2. *C. Bolanderi*, *Scrib.* California.

3. *C. pendula*, *Trin.* New England to California.

This species is more slender, with a looser drooping panicle and more capillary branches, and with thinner glumes. It occurs in the same situations as the preceding, and is more common in the Rocky Mountains and Oregon.

GASTRIDIDIUM, *Beauv.*

Spikelets one-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 glumes 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.* Sparingly introduced.

APERIA, *Adans.*

Spikelets one-flowered, small, loosely paniculate, the rhachilla

produced beyond the flower in a short bristle; outer glumes persistent, unequal, thinly membranaceous, keeled, acute, not awned, upper one larger, three-nerved; flowering glume somewhat shorter, membranaceous, apex shortly two-toothed, with a slender awn from the back below the apex; palet thin, rather shorter than its glume, two-keeled and two-toothed.

1. *A. spica venti*, *Beauv.* (*Agrostis spica-venti*, *L.*) Introduced on ballast.

DEYEUZIA, *Clarion*, (Calamagrostis of American authors.)

Spikelets one-flowered, in a contracted or open panicle, usually with a bristle-like or penicillate hairy rudiment opposite the palet, (a continuation of the rhachilla;) outer glumes about equal, keeled, awnless, membranaceous, or scariose; flowering glume usually with a ring of hairs surrounding its base, entire or two to four toothed, usually bearing an awn on the back; palet narrow, thin, two-nerved, two-keeled.

1. *D. Aleutica*, *Vasey.* (*C. Aleutica*, *Trin.*) California to Alaska.
2. *D. Bolanderi*, *Vasey.* (*C. Bolanderi*, *Thurb.*) California.
3. *D. Breweri*, *Vasey.* (*C. Breweri*, *Thurb.*) California.
4. *D. Canadensis*, *Beauv.* Blue joint.

A stout, erect, tall, perennial grass, growing chiefly in wet, boggy ground or in low, moist meadows. Its favorite situation is in cool, elevated regions. It prevails in all the northern portions of the United States, in the Rocky Mountains, and in British America. In those districts it is one of the best and most productive of the indigenous grasses. It varies much in luxuriance of foliage and size of panicle, according to the location. The culms are from 3 to 5 feet high, stout and hollow, hence in some places it is called the small reed-grass. The leaves are a foot or more long, flat, from a quarter to nearly half an inch wide, and roughish; the stem and sheaths smooth.

5. *D. confinis*, *Kth.* New York to the Rocky Mountains.
6. *D. crassiglumis*, *Vasey.* (*C. crassiglumis*, *Thurb.*) California.
7. *D. Cusickii*, *Vasey.* Oregon and Washington.
8. *D.?* *deschampsoides*, (*C. deschampsoides*, *Trin.*) California to Alaska.
9. *D.?* *Halleriana*. (? *C. Halleriana*, *D. C.*) Washington Territory.

10. *D. Howellii*, *Vasey*. Oregon and Washington.
11. *D. Langsdorfii*, *Kth.* New England to Rocky Mountains.
12. *D.?* *Laponica*, *Kth.* Canada to Rocky Mountains.
13. *D. Macouniana*, *Vasey*. British America.
14. *D.?* *neglecta*, *Kth.* (*C. stricta*, *Nutt.*) Rocky Mountain region.
15. *D. Nuttalliana*, *Vasey*. (*C. Nuttalliana*, *Steud.*) New England to North Carolina.
16. *D. Pickeringii*, *Vasey*. (*C. Pickeringii*, *Gr.*) New England to Canada.
17. *D. Porteri*, *Vasey*. (*C. Porteri*, *Gr.*) Pennsylvania.
18. *D. purpurascens*, *Kth.* Alaska.
19. *D. rubescens*, *Vasey*. (*C. rubescens*, *Buckl.*) California to Oregon.
20. *D. strigosa*, *Kth.* Alaska.
21. *D. sylvatica*, *Kth.* New England to Rocky Mountains.
22. *D. Suksdorfii*, *Scrib.* Washington Territory and Oregon.

AMMOPHILA, *Host.* (*Calamagrostis*.)

Spikelets one-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, five-nerved; flowering glume similar in texture, about equal in length, sometimes mucronate at the apex; palet as long as its glume, of similar texture, two-keeled, sulcate between the keels; hairs at the base of the flower usually scanty and short.

1. *A. arundinacea*, *Host.* Sea coast. (*Psamma*, *Beauv.*) Beach grass. Sand grass.

This is the *Calamagrostis arenaria* of the older books. The entire plant is of a whitish or pale-green color. It grows on sandy beaches of the Atlantic at least as far south as North Carolina, and on the shores of the Great Lakes, but has not so far been recorded from the Pacific coast. It also grows on the sea-coast of the British Isles and of Europe. It forms tufts of greater or less extent, "its long creeping roots extending sometimes to the extent of 40 feet, and bearing tubers the size of a pea, interlaced with death-like tenacity of grasp, and form a net-work beneath the sand which resists the most vehement assaults of the ocean waves." The culms are from 2 to 3 feet high, rigid and solid; the leaves long, involute, smooth, rigid, and slender-pointed; the panicle dense, 6 to 10 inches

long, close and spike-like ; the spikelets are about half an inch long, compressed, crowded on the very short branchlets.

This grass has no agricultural value, but from time immemorial its utility in binding together the loose sands of the beach and restraining the inroads of the ocean has been recognized and provided for in some places by law. Mr. Flint, in his work on grasses, says that the town and harbor of Provincetown, once called Cape Cod, where the Pilgrims first landed, one of the largest and most important harbors in the United States, sufficient in depth for ships of largest size, and in extent to anchor three thousand vessels at once, owe their preservation to this grass. The usual way of propagating the grass is by transplanting the roots. The grass is pulled up by hand and placed in a hole about a foot deep and the sand pressed around it by the foot. There are undoubtedly many places on the sea-coast where this grass would be of inestimable value in restraining the encroachment of the ocean. It would also be useful in forming a dense turf for the protection of dikes and banks subject to water-washing.

2. *A. brevipilis*, *Benth.* (*C. brevipilis*, *Gr.*) New Jersey.
3. *A. Curtissii*, *Vasey.* Florida.
4. *A. longifolia*, *Benth.* (*C. longifolia*, *Hook.*)

This grass, formerly called *Calamagrostis longifolia*, has recently been transferred by Mr. Bentham to the genus *Ammophila*. It grows on the sandy plains of the interior from British America to Arizona, and on the borders of the Great Lakes. It has strong running root-stalks, like the preceding, but is much taller, the culms being 3 to 6 feet high, stout and reed-like ; the leaves long, rigid, and becoming involute, with a long thread-like point. The panicle is quite variable, from 4 to 16 inches long, at first rather close, but becoming open and spreading, the branches in the smaller forms being 2 or 3 inches long, and in the larger ones often 10 or 12 inches and widely spreading. It is abundant on the plains of Western Nebraska, Kansas, and Colorado, and furnishes a resource in winter for food for the cattle of the ranches.

AIRA, *Linn.*

Spikelets two-flowered, small, in a loose or rarely contracted panicle with capillary branches, the rachis not produced into a bristle ; outer glumes thinly scarious, nearly equal, acute ; flowering glumes

shorter, thin, and hyaline, finely pointed or shortly bifid, with a fine dorsal awn below the middle, which is twisted at the base; palet two-nerved; style short.

1. *A. caryophylla*, *Linn.* Introduced and naturalized.
2. *A. præcox*, *Linn.* Introduced and naturalized.

DESCHAMPSIA, *Beauv.* (Aira of authors.)

Spikelets two-flowered, mostly in a loose panicle with slender branches, rhachis hairy and produced into a hairy bristle, which rarely bears an empty glume; outer glumes acute, keeled, with scarious margins; flowering glumes obtuse, more or less toothed, with a fine dorsal awn below the middle. Palet prominently two-nerved, often two-toothed. Spikelets larger than in *Aira*.

1. *D. atropurpurea*, *Wahl.*? White Mountains.
2. *D. cæspitosa*, *Beauv.* North and West. Bunch grass.
D. cæspitosa, var. *Bottnica*. (*Aira Bottnica*, *Walh.*) California and Oregon.
D. cæspitosa, var. *arctica*. Rocky Mountains.
D. cæspitosa, var. *longiflora*, *Trin.* California.

This is an exceedingly variable species, having a very wide distribution in this and other countries. It is rare east of the Mississippi, but on the elevated plains and in the Rocky Mountains, also in California and Oregon, it is one of the common bunch grasses which afford pasturage to cattle and horses. In the East it is found in the hilly regions of New England and the Alleghanies.

3. *D. calycina*, *Presl.* (*D. danthonioides*, *Munro.*) California to Alaska.
4. *D. elongata*, *Munro.* (*Aira elongata*, *Hook.*) California to British America.
5. *D. flexuosa*. (*Aira flexuosa*, *Trin.*) New England, South, and West.
6. *D. gracilis*, *Vasey.* Southern California.
7. *D. holciformis*, *Presl.* California.
8. *D. latifolia*. (*Aira latifolia*, *Hook.*) California to Alaska.

CORYNEPHORUS, *Beauv.*

Spikelets two-flowered, with the rhachilla produced into a short hairy bristle; glumes much as in *Deschampsia*, but distinguished by the peculiar articulate club-shaped awn of the flowering glumes.

1. *C. canescens*, *Beauv.* Introduced on Ballast ground, Philadelphia.

HOLCUS, *Linn.*

Spikelets two-flowered, crowded in an open panicle, the lower flower perfect, the upper one male only, and with a minute hairy rhachilla or rudiment at its base. Outer glumes nearly equal, compressed, membranaceous, large (fully inclosing the two flowers;) flowering glumes half shorter, the lowest awnless, the upper with a short dorsal awn.

1. *H. lanatus*, *Linn.* Velvet grass, Velvet Mesquite, Soft grass. Introduced from Europe.

A foreign grass, which has been introduced and has become tolerably well established in many places. It is a perennial, with a stout, erect culm, 2 to 3 feet high, the leaves, and especially the sheaths, densely clothed with soft hairs feeling like velvet. The culm is leafy and the sheaths loose; the upper ones longer than the blade, which is three to six lines wide, 4 to 5 inches long, and rather abruptly pointed. The panicle is open and spreading, rather oblong in outline, and 4 to 6 inches long. It is not held in good repute as an agricultural grass in Europe. In this country, especially at the South, it has frequently been favorably spoken of. Professor Phares says:

It luxuriates in moist, peaty lands, but will grow on poor, sandy, or clay hill lands, and produce remunerative crops where few other plants will make anything. It has been cultivated in North Carolina on such land, and after cutting and allowed to grow again, plowed under with so much advantage that other crops were subsequently produced. Hon. H. W. L. Lewis, of Louisiana, has cultivated this grass many years with great satisfaction. It is by no means the best of our grasses, but best for some lands, and on such lands more profitable than other grasses. It seems to have been greatly improved by acclimating in Texas and other Southern States, and this is true of some of the other grasses and forage plants.

2. *H. mollis*, *Linn.* Introduced on Ballast ground, Philadelphia.

DUPONTIA, *R. Br.*

Spikelets in a contracted panicle, purplish, 2 to 3 flowered, outer glumes about equal, awnless, scarious, three-nerved, compressed, acute or produced at the apex, as long as the spikelet; flowering glumes awnless, scarious, three-nerved, each with a thin ring of short hairs at the base, palet narrow, two-nerved,

1. *D. Fischeri*, *R. Br.* Arctic coast to Hudson's Bay.
2. *D. philosantha*, *Rupt.* Arctic coast to Hudson's Bay.

GRAPHEPHORUM, *Desv.*

Spikelets two to three flowered, with a minute sterile pedicel, in a narrow loose panicle; outer glumes unequal, membranaceous, compressed, acute; the upper one about equalling the spikelet, broad above the middle, the lower one shorter and narrower, one-nerved; flowering glumes lanceolate, membranaceous with a scarious margin, compressed, 3 to 5 nerved, acute or obtusish or slightly emarginate and sometimes mucronate; palet narrow, as long as the glume, two-nerved; the flowers surrounded at the base with a ring of soft hairs, and the rhachis also more or less hairy.

1. *G. melicoides*, *Beauv.* New England and Canada.
G. melicoides, var. *major*, *Gray.* Michigan.
2. *G. Wolfii*, *Vasey.* (*Trisetum subspicatum*, var. *muticum*, *Thurb.*)
Rocky Mountains to Oregon, California, and Montana.
- 3.? *G. flexuosum*, *Thurb.* Plains and Rocky Mountains.

This is provisionally placed here, but does not agree with the characters of the genus.

TRISSETUM, *Pers.*

Spikelets two to three, rarely five-flowered, in a dense or open panicle, the rhachis usually hairy and produced into a bristle at the base of the upper flower; outer glumes unequal, acute, keeled, membranaceous, with scarious margins; flowering glumes of similar texture, keeled, acute, the apex two-toothed, the teeth sometimes prolonged into bristle-like points, the middle nerve furnished with an awn attached above the middle, which is usually twisted at the base and bent in the middle; palet hyaline, narrow, two-nerved, two-toothed.

1. *T. barbatum*, *Steud.* California and Oregon.
2. *T. canescens*, *Buckley.* California and Oregon.
3. *T. cernuum*, *Trin.* California and Oregon.

These Pacific coast species deserve further attention with reference to their agricultural value.

4. *T. Hallii*, *Scrib.* Texas.

5. *T. interruptum*, *Buckley*. Texas to New Mexico.
6. *T. Ludovicianum*, *Vasey*. Louisiana.
7. *T. montanum*, *Vasey*. Colorado to New Mexico.
8. *T. palustre*, *Linn.* New York to Illinois and southward.
9. *T. subspicatum*, *Beauv.* Mountains New England to the Pacific.
T. subspicatum, var. *molle*, *Gr.* Mountains New England to the Pacific.

A perennial grass of the mountainous regions of Europe and North America. It is found sparingly in New England, on the shores of Lake Superior, in the Rocky Mountains of Colorado, Utah, California, Oregon, and northward to the Arctic circle. It varies in height according to the altitude at which it grows, being sometimes reduced to 3 or 4 inches, at other times running up to 2 feet high. The culms are erect and firm, smooth, or downy. The panicle is spike-like, dense, and cylindrical or elongated, and more or less interrupted, generally of a purplish color. The spikelets are two to three flowered. The flowers are slightly longer than the outer glumes, slightly scabrous, the flowering glumes acutely two-toothed at the apex, and bearing a stout awn which is longer than its glume.

This undoubtedly furnishes a considerable portion of mountain pasturage.

AVENA, *Linn.*

Spikelets usually large, two to five flowered, the uppermost generally imperfect, in a loose panicle, the rhachis hairy below the flowers; outer glumes nearly equal, lanceolate, acute, scarious; the flowering glumes of firmer texture (in some species cartilaginous,) shortly bifid at the apex, with a long dorsal twisted awn below the apex; palet similar in texture to its glume, narrow, prominently two-nerved, two-toothed.

1. *A. barbata*, *Brot.* Introduced in Southern California.
2. *A. fatua*, *Linn.* Wild oats. Introduced in California. Also found in Texas, Minnesota, and Wisconsin.

This species is very common in California. It is generally thought to have been introduced from Europe, where it is native, but it has become diffused over many other countries, including Australia and South America. It is thought by some to be the original of the cultivated oat *Avena sativa*, that the common oat will degenerate

into the wild oat, and that by careful cultivation and selection of seed the wild oat can be changed into the common cultivated oat. But on this question there is a conflict of opinions, and the alleged facts are not sufficiently established. The wild oat differs from the cultivated one chiefly in having more flowers in the spikelets, in the long brown hairs which cover the flowering glumes, in the constant presence of the long twisted awn, and in the smaller size and lighter weight of the grain. It is a great injury to any grain-field in which it may be introduced, but for the purpose of fodder, of which it makes a good quality, it has been much employed in California.

3. *A. pratensis*, var. *Americana*, *Scrib.* Montana and British America.
4. *A. Smithii*, *Porter.* Shore of Lake Superior.
5. *A. striata*, *Michx.* New England, New York, and northwestward.

ARRHENATHERUM, *Beauv.*

Spikelets two-flowered in an open panicle, the rhachis hairy and produced beyond the upper flower into a stripe or rudiment; the lower flower male only, the second perfect or female; outer glumes unequal, keeled, very thin, acuminate; flowering glumes five to seven nerved, that of the lowest or male flower with a dorsal, twisted awn attached near the base, that of the fertile flower with a short, straight awn near the tip; palea narrow, hyaline, two-keeled.

1. *A. avenaceum*, *Beauv.* Meadow oat-grass, Tall oat-grass, Evergreen grass.

A perennial grass of strong, vigorous growth, introduced from Europe, and sparingly cultivated. Culms, 2 to 4 feet high, erect, rather stout, with four or five leaves each; the sheaths smooth, the leaves somewhat rough on the upper surface, 6 to 10 inches long, and about three lines wide, gradually pointed. The panicle is loose, rather contracted, from 6 to 10 inches long, and rather drooping; the branches very unequal, mostly in fives, the longer ones 1 to 3 inches, and subdivided from about the middle; the smaller branches very short, all rather full-flowered. The spikelets are mostly on short pedicels. The structure of the flowers is similar to that of common oats, but different in several particulars. The spikelets consist of two flowers, the lower of which is staminate only, the upper one both staminate and pistillate; the outer glumes are thin and transparent, the upper one about four lines long and three-

nerved, the lower one nearly three lines long and one-nerved. The flowering glume is about four lines long, green, strongly seven-nerved, lanceolate, acute, hairy at base, roughish, and in the lower flower gives rise on the back below the middle to a long, twisted, and bent awn; in the upper flower the glume is merely bristle-pointed near the apex. The palet is thin and transparent, linear, and two-toothed. This grass is much valued on the continent of Europe. The herbage is very productive and its growth rapid. When growing with other grasses cattle and sheep eat it very well, but do not like to be confined to it exclusively.

Professor Phares, of Mississippi, says :

It is widely naturalized and well adapted to a great variety of soils. On sandy or gravelly soils it succeeds admirably, growing 2 to 3 feet high. On rich, dry upland it grows from 5 to 7 feet high. It has an abundance of perennial, long fibrous roots penetrating deeply in the soil, being therefore less affected by drought or cold, and enabled to yield a large quantity of foliage, winter and summer. These advantages render it one of the very best grasses for the South, both for grazing, being ever-green, and for hay, admitting of being cut twice a year. It is probably the best winter grass that can be obtained. It will make twice as much hay as timothy. To make good hay it must be cut as soon as it blooms, and after cut, must not be wet by dew or rain, which damages it greatly in quality and appearance. For green soiling it may be cut four or five times with favorable seasons. In from six to ten days after blooming the seeds begin to ripen and fall, the upper ones first. It is therefore a little troublesome to save the seed. As soon as those at the top of the panicle ripen sufficiently to begin to drop the seeds should be cut off and dried, when the seeds will all thresh out readily and be matured. After the seeds are ripe and taken off the long, abundant leaves and stems are still green, and being mowed make good hay. It may be sown in March or April and mowed the same season; but for heavier yield it is better to sow in September or October. Not less than 2 bushels (14 pounds) per acre should be sown. The average annual nutriment yielded by this grass in the southern belt is probably twice as great as in Pennsylvania and other Northern States.

DANTHONIA, *D. C.*

Spikelets three to five, or many flowered, in a panicle or simple raceme; the rhachis hairy and produced beyond the flowers in a stipe or imperfect flower; outer glumes narrow, keeled, acute, usually as long as the spikelet; flowering glumes convex on the back, of firmer texture, seven to nine nerved, with two rigid or scarious terminal teeth or lobes, and with a flattish, twisted and bent awn between the teeth; palet broad, two-keeled, obtuse or two-pointed.

1. *D. Californica*, *Boland*. Rocky Mountains and California.
2. *D. compressa*, *Aust*. Mountain Oat grass.

This species grows in Pennsylvania, New York, and New England. Mr. C. G. Pringle sends it from Vermont growing on dry hillocks along the Waterbury River. It also grows on the summit of the Roan Mountains, North Carolina, over large areas, and furnishes good summer pasturage. Probably it occurs on the other mountains of the Alleghany range.

3. *D. intermedia*, *Vasey*. Rocky Mountains, Oregon, Br. America to Canada.
4. *D. sericea*, *Nutt.* Massachusetts to Florida.
5. *D. spicata*, *Beauv.* New England to Texas.
6. *D. unispicata*, *Munro*. California, Oregon, and Washington.

CYNODON, *Pers.*

Spikelets sessile in two rows on one side of the slender spikes, which are digitate at the end of the peduncle or culm; one-flowered, with a short pediceled, naked rudiment of a second flower; outer glumes nearly equal, keeled; flowering glume boat-shaped, broader, prominently keeled; palet narrower, prominently two-keeled.

1. *C. dactylon*, *Pers.* Bermuda grass. Naturalized and cultivated.

A low, creeping perennial grass, with abundant short leaves at the base, sending up slender, nearly leafless flower stalks or culms, which have three to five slender, diverging spikes at the summit. The spikelets are sessile in two rows on one side of the slender spikes; they each have one flower, with a short, pediceled, naked rudiment of a second flower; the outer glumes nearly equal, keeled; the flowering glume boat-shaped, broader, and prominently keeled; the palet narrow and two-keeled. This grass is a native of Southern Europe and of all tropical countries. It is a common pasture grass in the West Indies. In the Southern States it has long been a chief reliance for pasture, has been extravagantly praised by some, and cursed by others who find it difficult to eradicate when once established. Its properties have been very fully discussed in Southern journals. It rarely ripens any seed, and the usual methods of reproducing is to chop up the roots with a cutting knife, sow them broadcast, and plow under shallow.

Col. T. C. Howard, of Georgia, says :

The desideratum to the South is a grass that is perennial, nutritious, and adapted to the climate. While we have grasses and forage plants that do well when nursed, we have few that live and thrive here as in their native habitat. The Bermuda and

crab grasses are at home in the South. They not only live, but live in spite of neglect, and when petted and encouraged they make such grateful returns as astonish the benefactor.

Professor Killebrew, of Tennessee, says :

In Louisiana, Texas, and the South generally it is and has been the chief reliance for pasture for a long time, and the immense herds of cattle on the Southern prairies subsist principally on this food. It revels in sandy soils, and has been grown extensively on the sandy hills of Virginia and North and South Carolina. It is used extensively on the Southern rivers to hold the levees and embankments of the roads. It will throw its runners over a rock six feet across, and soon hide it from view, or it will run down the sides of the deepest gully and stop its washing. Hogs thrive upon its succulent roots, and horses and cattle upon its foliage. It has the capacity to withstand any amount of heat and drought, and months that are so dry as to check the growth of blue grass will only make the Bermuda green and the more thrifty.

Professor Phares, of Mississippi, says :

As a permanent pasture grass, I know of no other that I consider so valuable as this, after having transferred it from near the mouth of the Red River to my present residence, thirty-five years ago, and having studied it on hundreds of other farms, commons, and levees for a longer period. To make good hay and the largest yield this grass must be mowed from three to five times every summer. Thus briars, broom grass, and other weeds are repressed and prevented from seeding, multiplying, and ruining the meadow.

CTENIUM, *Panz.*

Spikelets densely imbricated in two rows on one side of the rhachis of the usually solitary terminal spike, elegantly pectinate, with one perfect and one or more imperfect or neutral flowers; outer glumes very unequal, the lower small, the upper large and bearing on the middle of the back a recurved awn tuberculate at the base; usually only one of the flowering glumes has a palet; glumes of the perfect and lower imperfect ones are mucronate or aristate at the apex, the upper imperfect ones awnless.

1. *C. Americanum*, *Spreng.* Southern States.

CHLORIS, *Swz.*

Spikelets crowded in two rows on one side of simple spikes which are digitate or fasciculate at the summit of the culm; one (the lower) perfect, and one to several imperfect flowers in each spikelet; outer glumes thin, keeled, awnless; flowering glumes of thicker texture, obtuse, usually awned, sometimes truncate and obtuse; palet folded, with two prominent nerves.

1. *C. cucullata*, *Bisch.* Texas and Arkansas.
2. *C. elegans*, *H. B. K.* (*C. alba*, *Presl.*) Texas to Mexico.

3. *C. Floridana*, (*Eustachys Floridana*, *Chap.*) Florida.
4. *C. glauca*, (*Eustachys glauca*, *Chap.*) Florida.
5. *C. Swartziana*, *Doell.* (*Chloris petræa*, *Swz.*) Florida to Texas.
6. *C. verticillata*, *Nutt.* Texas.

TRICHLORIS, *Fournier.*

Spikelets sessile in two rows on the rhachis of long spikes which are crowded, or in approximate verticils, near the apex of the culm; like *Chloris* the spikelets have one (the lower) perfect, and from one to three imperfect flowers, the glumes of which are three awned at the apex; outer glumes unequal, acute or the upper aristate; palet of the fertile flower narrow, hyaline, two-nerved.

1. *T. pluriflora*, *Fourn.* Texas to Arizona.
2. *T. verticillata*, *Fourn.* Texas to Arizona.

GYMNOPOGON, *Beauv.*

Spikelets sessile and remotely alternate on long and filiform branches of the panicle, each with one, or rarely two perfect flowers and a bristle-like rudiment, or an awn-like pedicel; outer glumes long lanceolate, as long as the spikelet, nearly equal, keeled, acute; flowering glume cylindrical, involute, two-toothed or lobed at the apex, and from the midrib a straight slender awn; palet included in its glume, narrow, two-keeled; glume of the imperfect flowers also terminated with a long awn.

1. *G. brevifolius*, *Trin.* Southern States, Delaware.
2. *G. racemosus*, *Beauv.* New Jersey and southward to Texas.

SCHEDONNARDUS, *Steudel.*

Spikelets one-flowered, solitary at each joint of the slender triangular rhachis of the paniculate spikes, and partly immersed in an excavation; the spikes alternate and distant; outer glumes acuminate, unequal, the longer equaling the flowering glume, which is linear-acuminate, and thickish at the keel; palet shorter and thinner.

1. *S. Texanus*, *Steudel.* (*Lepturus paniculatus*, *Nutt.*) Illinois to Texas, northward to Colorado, Kansas, Montana.

BOUTELOUA, *Lag.*

Spikes single, or numerous in a racemose, commonly one-sided

panicle; spikelets commonly densely crowded in two rows on one side of the rhachis, each consisting of one perfect flower, and a stalked pedicel bearing empty glumes and one to three stiff awns; outer glumes unequal, acute, keeled, membranaceous; flowering glume broader, usually thicker, with three to five lobes, teeth, or awns at the apex; palet narrow, hyaline, entire or two-toothed, enfolded by its glume.

1. *B. aristoides*, *Thurb.* Texas to Arizona.
2. *B. bromoides*. (*Dinebra bromoides*, *H. B. K.*) Arizona.
3. *B. Burkei*, *Scrib.* Texas.
4. *B. eriopoda*, *Torr.* Texas.
5. *B. Havardii*, *Vasey.* Texas to Arizona.
6. *B. hirsuta*, *Lag.* (*B. fœna*, *Torr.*) Texas to British America.
7. *B. juncifolia*. (? *B. Humboldtiana*, *Gris.*) Texas to Arizona.
8. *B. oligostachya*, *Torr.* Grama, Mesquite grass. Texas to British America.

B. obligostachya, ? var. *major*, *Vasey.* Texas to Arizona.

This is the commonest species on the Great Plains. It is frequently called Buffalo grass, although that name strictly belongs to another grass, (*Buchloë dactyloides*.) On the arid plains of the West it is the principal grass, and is the main reliance for the vast herds of cattle which are raised there. It grows chiefly in small, roundish patches, closely pressed to the ground, the foliage being in a dense, cushion-like mass. The leaves are short and crowded at the base of the short stems. The flowering stalks seldom rise over a foot in height, and bear, near the top, one or two flower spikes, each about an inch long, and from one-eighth to one-quarter of an inch wide, standing out at right angles, like a small flag floating in the breeze. Where much grazing prevails, however, these flowering stalks are eaten down so much that only the mats of leaves are observable. In bottom lands and low, moist, ground it grows more closely, and under favorable circumstances forms a pretty close sod, but even then it is not adapted for mowing, although it is sometimes cut, making a very light crop. Under the most favorable circumstances the product of this grass is small compared with the cultivated grasses. It is undoubtedly highly nutritious. Stock of all kinds are fond of it, and eat it in preference to any grass growing with it. It dries and cures on the ground, so as to retain its nutritive properties in the winter. No attempt is made by stock-

men to feed cattle in the win'er. They are expected to "rustle around," as the phrase is, and find their living, and in ordinary winters, as the fall of snow is light, they are enabled to subsist and make a pretty good appearance in the spring. But in severe winters there are losses of cattle, sometimes very heavy.

9. *B. polystachya*, *Torr.* (*Chondrosium*, *Benth.*) Texas to Arizona.
B. polystachya, var. *major*, *Vasey.* Texas to Arizona.
10. *B. prostrata*, *Lag.* (*B. pusilla*, *Vasey.*) Colorado to Arizona.
11. *B. racemosa*, *Lag.* (*B. curtispindula*, *Gr.*)

This species ranges from Mexico to British America, and east of the Mississippi River in Wisconsin and Illinois. It is easily distinguished from the others by its taller growth, and by the long, slender raceme of twenty to fifty or more slender spikes. These are usually about half an inch long and reflexed. There are from six to ten spikelets on each spike.

12. *B. Rothrockii*, *Vasey.* Arizona and New Mexico.
13. *B. Texana*, *Watson.* (*B. affinis*, of some.) Texas.
14. *B. trifida*, *Thurb.* Texas to Arizona.

ELEUSINE, *Gaert.*

Spikes two to five or more, digitate at the summit of the culm, sometimes a few scattering ones lower down; spikelets sessile and crowded along one side of the rhachis, two to six or more flowered, the uppermost flowers imperfect or rudimentary; outer glumes membranaceous, shorter than the spikelet; flowering glumes usually obtuse; palet folded, two-keeled.

1. *E. Indica*, *Gaert.* Yard-grass, Crow-foot, Crab-grass, Wire-grass.
 Introduced.

An annual grass belonging to tropical countries, but now naturalized in most temperate climates. In the Southern States it is found in every door-yard and in all waste places. The culms are from 1 to 3 feet high, usually coarse and thick, and very leafy, especially below. The leaves are long and rather wide. At the top of the culm there are two to five or more thickish, densely-flowered spikes proceeding from a common point, with sometimes one or two scattering ones lower down on the culm. The spikelets are sessile and crowded along one side of the axis, each being from two to six flow-

ered, the upper flower imperfect or rudimentary ; the outer glumes are membranaceous, shorter than the flowers, the flowering glumes usually obtuse ; the palet folded and two-keeled.

Professor Phares, of Mississippi, says :

The clumps have many long leaves and stems, rising 1 or 2 feet high, and many long, strong, deeply penetrating fibrous roots. It grows readily in door-yards, barn-yards, and rich cultivated grounds, and produces an immense quantity of seeds. It is a very nutritious grass, and good for grazing, soiling, and hay. The succulent lower part of the stems, covered with the sheaths of the leaves, renders it difficult to cure well, for which several days are required. It may be cut two or three times, and yields a large quantity of hay.

2. *E. Ægyptiaca*, *Pers.* (*Dactylotænium*, *Gaert.*) Introduced.
Crowfoot.
3. *E. Barcinomensis*, *Costa*. Introduced on Ballast.

LEPTOCHLOA, *Beauv.*

Spikelets several (rarely one) flowered, perfect, sessile in two rows along one side of the slender, usually numerous spikes or branches of the panicle ; outer glumes keeled, obtuse or acute, awnless, or mucronate ; flowering glumes usually obtuse, prominently nerved, awnless ; palet prominently two-nerved.

1. *L. Langloisii*, *Vasey*. Louisiana.
2. *L. mucronata*, *Kth.* Throughout the West.
3. *L. Nealleyi*, *Vasey*. Texas.

BUCHLOË, *Engelm.*

Spikelets dioecious, or rarely monœcious, heteromorphous.

Male plant.—Spikelets two or three flowered in short one-sided two-ranked spikes, of which there are two or three at the summit of the culm ; spikes four to five lines long, composed of five or six closely approximated spikelets ; outer glumes unequal, one-nerved, the lower one half as long as the flower above it, the upper shorter ; flowering glumes and palets of equal length, membranaceous, the flowering glume three-nerved, the palet two-nerved.

Female plant.—Spikelets closely approximated in short capitate spikes, which are mostly near the ground, and partly inclosed in the bract-like sheaths of the upper leaves ; spikelets one-flowered, all the upper glumes indurated and cohering at their bases with the thickened rachis, the lower glume of the lowest spikelet lanceolate with an herbaceous tip, or two or three cleft, thickened and adnate to the

upper glume; the lower glumes of the other spikelets free, much smaller, membranaceous, ovate-lanceolate, acute, one-nerved, the flowering glume shorter, three-nerved, tricuspidate; palet two-nerved.

1. *B. dactyloides*, *Engl.* Buffalo grass. Mexico to British America.

This grass is extensively spread over all the region known as the Great Plains. It is very low, the bulk of leaves seldom rising more than 3 or 4 inches above the ground, growing in extensive tufts or patches, and spreading largely by means of stolons or offshoots similar to those of Bermuda grass, these stolons being sometimes 2 feet long, and with joints every 3 or 4 inches, frequently rooting and sending up flowering culms from the joints. The leaves of the radical tufts are 3 to 5 inches long, one or one-half line wide, smooth, or edged with a few scattering hairs. The flowering culms are chiefly dioecious, but sometimes both male and female flowers are found on the same plant but in separate parts. Next to the Grama grass it is perhaps the most valuable grass in the support of the cattle of the Plains.

PAPPOPHORUM, *Schreb.*

Spikelets in a dense spike-like, or narrow and loose, panicle, with two to four approximate flowers, usually only the lowest perfect, the others male or rudimentary; outer glumes membranaceous, many-nerved, awnless; flowering glumes broader and thicker, convex on the back, pubescent, produced above into nine to thirteen straight, subulate awns; palet smaller, two-keeled.

1. *P. apertum*, *Munro.* Texas to Arizona.

2. *P. Wrightii*, *Watson.* (*P. boreale?*) Texas to Arizona.

COTTEA, *Kth.*

Flowers in a loose contracted panicle; spikelets six to nine flowered, of which the two or three lower are perfect and the upper male or neutral; outer glumes membranaceous, acute, convex on the back, prominently many-nerved, one to three toothed at the apex; rhachis and base of flowers hairy; flowering glumes broad, convex on the back, somewhat five-lobed, nine to eleven awned, the awns straight and unequal; palet two-keeled, bifid at apex.

1. *C. pappophoroides*, *Kth.* Texas and Southwest.

TRIODIA, *R. Br.* (*Tricuspis*, *Beavn.*)

Spikelets several to many flowered in a strict spike-like or an open spreading panicle, some of the upper flowers male or imperfect; outer glumes keeled, acute or acutish, awnless; flowering glumes imbricated, rounded on the back, at least below, hairy or smooth, three-nerved, either mucronate, three-toothed or three-lobed at the apex, or obscurely erose, often hardened and nerveless in fruit; palet broad, prominently two-keeled.

1. *T. acuminata*, (*Tricuspis acuminata*, *Munro.*) Texas to Arizona.
2. *T. albescens*, (*Tricuspis albescens*, *Munro.*) Texas to Arizona.
3. *T. ambigua*, (*Tricuspis ambigua*, *Chap.*) Texas to Arizona.
4. *T. avenacea*, *H. B. K.* Texas to Arizona.
5. *T. eragrostoides*, *Vasey and Scribner.* Florida.
6. *T. mutica*, (*Tricuspis mutica*, *Torr.*) Texas to Arizona.
7. *T. pulchella*, *H. B. K.* Texas to Arizona.
T. pulchella, var. *parviflora*, *Vasey.* Texas to Arizona.
8. *T. seslerioides*, (*Tricuspis*, *Torr.*) New York to Texas. Tall Red top.

This grass grows from 3 to 5 feet high. The culms are very smooth; the leaves are long and flat, the lower sheaths hairy or smoothish. The panicle is large and loose, at first erect, but finally spreading widely. The branches are single or in twos or threes below, and frequently 6 inches long, divided, and flower-bearing above the middle. The spikelets are on short pedicels, three to four lines long, and five or six flowered. The outer glumes are shorter than the flowers, unequal and pointed; the flowering glumes are hairy toward the base, having three strong nerves, which are extended into short teeth at the summit. It is a large and showy grass when fully matured, the panicles being large, spreading, and of a purplish color. It grows in sandy fields, and on dry sterile banks, from New York to South Carolina, and westward. This is eaten by cattle when it is young, but the culms are rather harsh and wiry and not relished by them. It is, however, cut for hay, where it naturally abounds.

9. *T. stricta*, (*Tricuspis*, *Nutt.*) Texas to Arizona.
10. *T. Texana*, *S. W.* (*Tricuspis*, *Thurb.*) Texas to Arizona.
11. *T. trinerviglumis*, (*Tricuspis*, *Benth.*) Texas to Arizona.

DIPLACHNE, *Beauv.*

Spikelets many-flowered, narrow, sessile or nearly so, and distant on the long slender branches of the panicle, usually in two rows, but not regular as in *Leptochloa*; outer glumes keeled, acute, not awned; flowering glumes one to three nerved, with a thin or hyaline shortly two-lobed apex, the keel produced into a short point or awn between the lobes; palea thin, prominently two-nerved.

1. *D. biflora*, *Scrib.* Arizona.
2. *D. dubia*, *Benth.* (*Leptochloa dubia*, *Nees.*) Florida to Texas.
3. *D. fascicularis*, *Benth.* (*Leptochloa fascicularis*, *Gr.*) New England to Arizona.

An annual grass of vigorous growth, 2 to 3 feet high, growing in brackish marshes or wet ground near the sea-coast, and also far inland in the Mississippi Valley, Texas, Arizona, &c., in alkaline soil.

4. *D. imbricata*, (*Leptochloa*, *Thurb.*) Arizona.
5. *D. rigida*, (*Leptochloa*, *Munro.*) Florida to Texas.
6. *D. viscida*, *Scrib.* Texas to Arizona.

TRIPLASIS, *Beauv.*

Panicle simple and scanty, partly included in the leaf-sheath; spikelets remotely two to five flowered; outer glumes much shorter than the flowers, membranaceous, one-nerved; flowering glumes two-lobed or two-cleft, the midnerve extended into an awn between the lobes, three-nerved, strongly fringed on the nerves; palea shorter, two-keeled, long ciliate on the keels.

1. *T. Americana*, *Beauv.* (*Uralepis cornuta*, *Nutt.*) South.
2. *T. purpurea*, *Chap.* (*Uralepis purpurea*, *Nutt.*) North and South.
3. *T. sparsiflora*, *Chap.* Florida.

EREMOCHLOE, *S. Watson.*

Panicle short and contracted, simple, or nearly so; spikelets four-flowered, the two lower flowers neutral, the third flower perfect and fertile, the uppermost reduced to a stipitate villous triple awn; outer glumes membranaceous, carinate, one-nerved, acute, glabrous, nearly equal; flowering glumes three-nerved, two-cleft to the middle, the nerves strongly villous, extended into awns, of which the middle one is longest; the lobes in the neutral flowers obtuse, in the perfect

flower attenuate. Palets shorter, two-keeled, two-toothed at the apex.

1. *E. Bigelovii*, *S. W.* New Mexico.
2. *E. Kingii*, *S. W.* Nevada.

SCLEROPOGON, Philippi.

Spikelets unisexual, two to many flowered, in a narrow, scanty panicle, the rhachilla elongated in each sex. Male spikelets, rhachilla glabrous, inarticulate, glumes paleaceous, narrow, acute, unawned, three-nerved, the lower ones a little shorter and unequal, the flowering ones sometimes minutely three-toothed at the apex, the middle tooth mucroniform, palet narrow, rigid, about as long as the glume, two-keeled, two-toothed. Female spikelets, one to many flowered, the upper ones sterile, the two lower glumes persistent, very unequal, larger than in the male spikelets, flowering glumes many, rigid, narrow, convolute around the flower, the three nerves or ribs produced into very long, slender, rigid, often somewhat twisted awns, with three short, lanceolate hyaline lobes on the margin of the lateral awns and between the awns, the upper sterile flowering glumes similar; palet rigid, narrow, included in the flowering glumes.

1. *S. Karwinskianus*, *Benth.* Texas to Arizona.

ARUNDO, Linn.

Tall grasses with an ample panicle, spikelets two to many flowered, the flowers rather distant, silky, villous at the base and with a conspicuous silky-bearded rhachis, all perfect; outer glumes narrow, unequal, glabrous, lanceolate, keeled, acute; flowering glumes membranaceous, slender, awl-pointed; palets much shorter than the glumes, two-keeled, pubescent on the keels.

1. *A. Donax*, *Linn.* Giant Reed Grass. Texas and Arizona.

This grass is often cultivated for its very ornamental plumes. It is a native of Southern Europe, but is well established on the borders of the Rio Grande river, where it is probably indigenous.

PHRAGMITES, Trin.

Only differing from *Arundo* in the lowest flower of the spikelet being male only and glabrous.

1. *P. communis*, *Trin.* Reed Grass. New York to Texas and the Rocky Mountains.

A tall, coarse, perennial grass, growing on the borders of ponds and streams, almost rivalling sorghum in luxuriance. It attains a height of 6 to 10 feet; the culms sometimes an inch in diameter, and leaves an inch or two in width. The panicle is from 9 to 15 inches long, loose but not much spreading, of an oblong or lanceolate form and slightly nodding. The branches are very numerous, irregularly whorled, 4 to 8 inches long, much subdivided, and profusely flowering. The larger panicles form very ornamental plumes, almost equal to those of *Arundo Donax*, so much cultivated for ornamental purposes. It sometimes attains the height of 15 feet.

MONANTHOCHLÖE, *Engelm.*

Spikes very short, two to three flowered, dioecious, sessile, single or fascicled at the distant nodes of the culm, terminating short, leafy-bracted branches, almost hidden by and seeming like a continuation of them, very similar in the two sexes; outer glumes similar to the distichous leafy bracts; flowering glumes linear, rigid, obtuse; palets hyaline, two-nerved, infolding the stamens or styles.

1. *M. littoralis*, *Engelm.* Near the coast, Florida, Texas, to California.

MUNROA, *Torr.*

Spikelets two or three together in small, sessile, leafy heads or clusters terminating the numerous fasciculate and lateral branches, and at the nodes, each about three-flowered, the upper flower imperfect; outer glumes shorter than the flowers, lanceolate, acute, hyaline one-nerved; flowering glumes larger, herbaceous, rather rigid, three-nerved, entire or two-toothed, the central nerve excurrent in a mucro or short awn; palets hyaline, narrow, two-keeled, complicate.

1. *M. squarrosa*, *Torr.* Arid plains of the West.

LAMARCKIA, *Möench.*

Panicle short and dense, the spikelets one-sided on the crowded branches, fertile and sterile intermixed in small clusters; fertile spikelets short and two-flowered, the lower flower perfect, the upper one rudimentary and long-awned, outer glumes lanceolate-subulate,

one-nerved, thin, about equalling the spikelet, flowering glume stalked, oblong, chartaceous, five-nerved, bifid, and emitting between the teeth a slender awn ; sterile spikelets slender, with ten to twelve distinct, broadly-obtuse, empty glumes above the two lower, much longer, linear, acute ones.

1. *L. aurea*, *Moench*. Introduced. California.

KÆLERIA, *Pers.*

Spikelets three to five flowered, compressed, numerous in a dense, spike-like cylindrical or interrupted panicle ; outer glumes membranaceous, keeled, unequal, lanceolate, about as long as the spikelet, scarious on the margin ; flowering glumes similar, more scarious or hyaline, rarely mucronate, the upper one usually smaller and imperfect ; palet very thin, acutely two-keeled, two-toothed.

1. *K. cristata*, *Pers.* Common. Pennsylvania to Rocky Mountains, California, Oregon, &c.

This grass has a very wide diffusion both in this country and in Europe and Asia. It favors dry hills or sandy prairies, and on the great plains is one of the commonest species. It occurs throughout California and into Oregon. It varies much in appearance, according to the location in which it grows, these variations being so striking that they have been considered different species, and perhaps two species ought to be admitted. It is perennial, with erect culms usually from 1 to 2 feet high, and a spike-like panicle varying from 3 to 6 inches in length, and more or less interrupted or lobed at the lower part. When grown in very arid places the culms may be only a foot high, the radical leaves short, and the panicle only 2 inches long. When grown in more favored situations the radical leaves are 18 inches long, the stem 3 feet, and the panicle 6 inches long. The branches of the panicle are, in short, nearly sessile clusters, crowded above, looser and interrupted below. The spikelets are from two to four flowered. On the prairies west of the Mississippi it is one of the commonest and most useful of the grasses. In Montana it is sometimes called June grass.

EATONIA, *Raf.*

Spikelets usually two-flowered and with an abortive rudiment or pedicel, numerous, in a contracted or slender panicle, very smooth ; outer glumes unequal, the lower narrowly linear, keeled, one-nerved,

the upper broadly obovate, shorter than the spikelet, three-nerved, not keeled, scarious margined; flowering glumes oblong, obtuse, compressed, chartaceous; palet narrow, hyaline.

1. *E. obtusata*, *Gr.* Common. Pennsylvania to Oregon.
2. *E. Pennsylvanica*, *Gr.* Common. New England to Montana.
E. Pennsylvanica, var. *filiformis*, *Chap.* Florida.
E. Pennsylvanica, var. *major*, *Vasey.* New Mexico.

DISSANTHELIUM, *Trin.*

Spikelets two to four flowered, all fertile, in a narrow panicle; outer glumes herbaceous, narrow, and acute, keeled, the lower one-nerved, the upper three-nerved, both much longer than the flowers; flowering glumes ovate, obtuse or obtusish, obtusely keeled, three to five nerved, the outer nerves near the margin, scarious at the tip, pubescent, especially on the marginal nerves and keel; palet narrow, strongly two-keeled, nearly equalling its glume.

1. *D. Californicum*, *Benth.* (*Stenochloa Californica*, *Nutt.*) California.

CATABROSA, *Beauv.*

Spikelets two to three flowered, in a loose panicle; outer glumes hyaline-membranaceous, shorter than the flowers, the lower short and narrow, the upper obovate, three-nerved, erosely dentate at the apex; flowering glumes membranaceous, obtuse, prominently three-nerved; palet little shorter than its glume, prominently two-keeled. An aquatic grass.

1. *C. aquatica*, *Beauv.* Rocky Mountains and British America to Alaska.

ERAGROSTIS, *Host.*

Spikelets several, usually many-flowered, pedicellate or sessile, in a loose and spreading, or narrow and clustered, panicle, the rhachis of the spikelet usually glabrous and articulate under the flowering glumes, but often tardily so and sometimes inarticulate. Outer empty glumes unequal and rather shorter than the flowering ones, keeled, one-nerved; flowering glumes obtuse or acute, unawned, three-nerved, the keel prominent, the lateral nerves sometimes very faint; palet shorter than the glume, with two prominent nerves or keels, often persisting after the glume and grain have fallen away.

1. *E. alba*, *Presl.* New Mexico and Arizona.

2. *E. Brownei*, *Nees?* Florida.
3. *E. campestris*, *Trin.* (*E. nitida*, *Chap.*) Delaware to Texas.
4. *E. capillaris*, *Linn.* Common. New England to Texas.
5. *E. ciliaris*, *Link.* Florida to Texas.
E. ciliaris, var. *patens*, *Chap.* Florida.
6. *E. conferta*, *Trin.* Florida to Texas.
7. *E. curtipedicellata*, *Buckl.* Texas.
8. *E. Frankii*, *Meyer.* Common. Pennsylvania to Kansas.
9. *E. glutinosa*, *Trin.* (3500 Curtiss' fascicle.) Florida.
10. *E. lugens*, *Nees.* Texas to Arizona.
11. *E. Mexicana*, *Link.* Texas and New Mexico.
12. *E. major*, *Host.* (*E. poæoides*, var. *megastachya.*) Introduced.

This is a foreign grass which has become extensively naturalized, not only in the older States but in many places in the western and southwestern Territories. It is found in waste and cultivated grounds and on roadsides, growing in thick tufts, which spread out over the ground by means of the geniculate and decumbent culms. The culms are from 1 to 2 feet long, the lower joints bent and giving rise to long branches. The sheaths are shorter than the internodes, the leaves from 3 to 6 inches long. The panicle is frequently 4 or 5 inches long, oblong or pyramidal, somewhat open, but full-flowered; the branches irregularly single or in pairs, branched and flowering nearly to the base. The spikelets are oblong or lanceolate one-fourth to one-half inch long, and ten to twenty flowered when well developed. The empty glumes are smaller than the flowering ones, rough on the keel, acutish. The flowering glumes are one line long, ovate, rather obtuse, and strongly three-nerved. The paleas are shorter than their glumes, narrow, the sides reflexed and the margin ciliate. This grass is said to have a disagreeable odor when fresh. It produces an abundance of foliage and is apparently an annual, reaching maturity late in the season. We are not aware that its agricultural value has been tested.

13. *E. minor*, *Host.* (*E. poæoides*, *Beauv.*) With the preceding, also introduced.
14. *E. oxylepis*, *Torr.* (*E. interrupta*, *Nutt.*) Texas and New Mexico.
15. *E. pectinacea*, *Gray.* Massachusetts to Kansas and Texas.
E. pectinacea, var. *refracta*, *Chap.* Florida to North Carolina.
E. pectinacea, var. *spectabilis*, *Gr.* Massachusetts, southward and westward.

16. *E. pilifera*, *Scheele*. Texas to Arizona.
17. *E. pilosa*, *Linn.* Introduced.
18. *E. Purshii*, *Schrad.* New England to Arizona.

Very widely diffused over the United States, extending into Mexico. It is of no agricultural value.

19. *E. reptans*, *Nees*. New England to Texas.
20. *E. tenuis*, *Gray*. New England to Texas.

MELICA, *Linn.*

Panicle narrow and strict, or lax and spreading, or racemose and secund; spikelets two to many flowered, the flowers usually convolute around each other, the upper one to three smaller and imperfect; outer glumes membranaceous or hyaline, acute or obtuse, awnless, the lower three to five nerved, the upper sometimes seven to nine nerved, the lateral nerves vanishing within the scarious margin. Flowers somewhat distant; flowering glumes of thicker texture, becoming somewhat coriaceous, rounded or flattish on the back, five to nine nerved, the lateral nerves vanishing below the apex, the central one sometimes ending in a point or an awn; paleas shorter than their glumes, two-keeled, ciliate on the keels and apex.

1. *M. acuminata*, *Bolander*. California and Oregon.
2. *M. aristata*, *Thurber*. California and Oregon.
3. *M. bromoides*, *Gray*. California and Oregon.
M. bromoides, var. *Howellii*, *Scrib.* California and Oregon.
4. *M. bulbosa*, *Geyer*. California, Nevada, to Montana and Oregon.
5. *M. Californica*, *Scrib.* (*M. poæoides*, *Torr.*) California.
6. *M. diffusa*, *Pursh*. Texas to Arizona.
M. diffusa, var. *nitens*, *Scrib.* Texas to Arizona.
7. *M. frutescens*, *Scrib.* Southern California and Arizona.
8. *M. fugax*, *Bol.* California and Oregon.
9. *M. Harfordii*, *Bol.* California and Oregon.
10. *M. imperfecta*, *Trin.* California and Oregon.
M. imperfecta, var. *flexuosa*, *Bol.* California.
M. imperfecta, var. *minor*, *Scrib.* California.
M. imperfecta, var. *refracta*, *Thurb.* California.
11. *M. mutica*, *Walt.* (*M. glabra*, *Michx.*) Melic grass. Eastern and Atlantic States.

A perennial grass, growing sparingly in rich, rocky woods through-

out most of the States east of the Rocky Mountains. It grows in loose tufts, the culms about 2 feet high, the lower leaves and sheaths soft hairy, the upper leaves narrow, 3 to 4 inches long, gradually pointed. The panicle is very simple or little branched; the spikelets are loosely arranged on the branches, almost sessile, and rather on one side of the branches. They are large and graceful in appearance, each one consisting of two perfect flowers and a small chaffy knob, called a rudiment. The outer glumes are thin, scarious-margined, five to seven nerved, purplish, and three to four lines long. The flowering glumes are thicker, strongly ribbed, scarious at the blunt apex, and minutely rough on the nerves. The two flowers are somewhat distant from each other. The palets are narrower and shorter than the flowering glumes, arched and ciliate on the keels. This grass is eaten and relished by cattle, but is probably not well adapted to cultivation.

12. *M. Porteri*, *Scrib.* (*M. mutica*, var. *parviflora*, *Porter.*) Colorado to Arizona.
13. *M. spectabile*, *Scrib.* California, Oregon, Montana.
14. *M. stricta*, *Bol.* California, Oregon, Montana.

It will be observed that the larger portion of the species of this genus belong on the Pacific side of the continent. They are mostly perennial and furnish a large quantity of foliage, but we are not informed as to their economic value. Experiments should be instituted to ascertain this point.

DIARRHENA, *Raf.*

Panicle narrow and loose; spikelets three to five flowered, the one or two uppermost imperfect; outer glumes unequal, shorter than the flowers, coriaceous, the lower narrow, acute, keeled, one-nerved, the upper larger, ovate, five-nerved, keeled, acute, or mucronate; flowering glumes broadly ovate, rigidly coriaceous, rounded on the back, three-nerved, the nerves prominent and uniting at the apex in a strong cuspidate or awl-shaped tip; palets shorter than their glumes, rigid, broad, two-keeled. Stamens 2. Grain very large, rather longer than the flower, oblong, obtusely pointed.

1. *D. Americana*, *Beauv.* Ohio, Illinois, and southward.

STREPTOGYNE, *Beauv.*

Spikelets one to four flowered, cylindrical, shortly pedicellate, in

unilateral sessile spikes, the lower flowers perfect; outer glumes unequal, the outer one small, the upper longer, wider, convolute, many nerved, acute; flowering glumes longer, more rigid, closely convolute, terminated in a straight, slender awn, upper flowers gradually smaller and empty; palet narrow, membranaceous, two-keeled, bifid, closely inclosed in its glume.

1. *S. crinita*, *Beauv.* This is credited to the Southern United States by Grisebach, but we have not seen it.

PLEUROPOGON, *R. Br.*

Spikelets in a long, simple raceme, many-flowered, long, compressed; the rachis smooth, zigzag, disarticulating under each flower at maturity; outer glumes shorter than the lowest flowers, unequal, membranaceous, the lower one-nerved, the upper three-nerved, awnless; flowering glumes much longer, narrow, herbaceous to subcoriaceous, with a smooth rounded callus at the base, prominently seven-nerved, truncate or bifid at the apex, the mid-nerve terminating in a straight awn; palet nearly as long as its glume, strongly two-nerved, two-keeled.

1. *P. Californicum*, *Benth.* (*Lophochlæna Californica*, *Gr.*) California.
2. *P. refractum*, *Benth.* (*Lophochlæna refracta*, *Gr.*) California and Oregon.
3. *P. Sabinii*, *Brown.* Melville Island, Arctic America.

UNIOLA, *Linn.*

Spikelets closely many-flowered, very flat and two-edged, one or more of the lowest flowers neutral and consisting only of an empty glume; glumes lanceolate, complicate-keeled, rigid or coriaceous, the flowering ones larger, many-nerved, usually acute or pointed, entire; palet rigid, two-keeled, the keels narrowly winged. Stamens 1 to 3.

1. *U. gracilis*, *Michx.* Common.
2. *U. latifolia*, *Michx.* Common.

This a handsome grass, growing 2 to 3 feet high, with very broad leaves and a spreading panicle; the drooping spikelets larger than those of any other grass we have, being an inch long or more, and nearly half as wide, consisting of ten to twelve flowers. It grows

from Pennsylvania and Illinois southward. Mr. Charles Mohr, Mobile, Ala., says of this grass:

A fine vernal grass, with a rich foliage, blooming early in May; 2 to 3 feet high; frequent in damp, sandy loam, forming large tufts. This perennial grass is certainly valuable, affording an abundant range early in the season; if cultivated it would yield large crops ready for cutting from the 1st of May. It is called by some *wild fescue* or *oat grass*. It is not found near the coast, consequently I had no chance to observe its growth during the latter part of the summer and in the winter season, and therefore am not able to judge of its value as a pasture grass.

3. *U. nitida*, *Bald.* Georgia to Texas.

4. *U. paniculata*, *Linn.* Sea Oats, near the coast, Virginia to Florida.

A tall, coarse grass, with a dense heavy panicle. In Florida and on the Gulf coast it sometimes grows from 10 to 12 feet high, and is called Sea-oats.

DISTICHLIS, *Raf.*

Spikelets diœcious, many-flowered, compressed, crowded in a dense spicate or capitate, or rather open panicle; outer glumes herbaceous, narrow, keeled, acute, shorter than the flowers; flowering glumes rigidly membranaceous or subcoriaceous, keeled, many-nerved, acute; palet complicate, two-keeled, the keels narrowly winged. The pistillate flowers are more rigid than the staminate, styles long with stigmas exerted from the top of the palet.

1. *D. maritima* *Raf.* (*Brizopyrum spicatum*, *Hook.*). Sea-shore and interior saline grounds. Salt grass. Alkaline grass.

This is described in most botanical works as *Brizopyrum spicatum*, but recently the name given by Rafinesque has been accepted and restored to it by Mr. Bentham. It is a perennial grass, growing in marshes near the sea-coast on both sides of the continent, and also abundantly in alkaline soil throughout the arid districts of the Rocky Mountains. It has strong, creeping root-stocks, covered with imbricated leaf-sheath, sending up culms from 6 to 18 inches high, which are clothed nearly to the top with the numerous, sometimes crowded, two-ranked leaves. The leaves are generally rigid and involute, sharp-pointed, varying greatly in length on different specimens. The plants are diœcious, some being entirely male and some female. The panicle is generally short and spike-like, sometimes, especially in the males, rather loose, with longer, erect branches, and sometimes reduced to a few spikelets. The spikelets are from four to six lines

long and five to ten flowered, the flowers being usually much compressed. The outer glumes are smooth, narrow, and keeled; the flowering ones are broader, keeled, acute, rather rigid, and faintly many-nerved. The palets have an infolded margin, the keels prominent or narrowly winged. The pistillate spikelets are more condensed and more rigid than the staminate. Although this cannot be considered a first-rate grass for agricultural purposes, it is freely cut with other marsh grasses, and on the alkaline plains of the Rocky Mountains it affords an inferior pasturage.

DACTYLIS, *Linn.*

Spikelets three to five flowered, in dense fascicles or glomerate clusters at the ends of the short branches of a close, short panicle. Outer glumes unequal, lanceolate, acute, rigid, with hyaline margins, keeled, one to three nerved; flowering glumes larger, more rigid, keeled, five-nerved, mucronate or bristle-pointed, ciliate on the keel; palet little shorter than its glume, narrower and thinner, two-keeled.

1. *D. glomerata*, *Linn.* Orchard grass. Cultivated.

This is one of the most popular meadow grasses of Europe, and is well known to most farmers in the Northern and Eastern States. It is a perennial, of strong, rank growth, about 3 feet high, the culm and leaves roughish, the leaves broadly linear, light green, and five to six on the culm. The panicle is generally but 2 or 3 inches long, the upper part dense from the shortness of the branches; the lower branches are longer and spreading, but with the spikelets glomerated or closely tufted. The spikelets are usually three to four flowered, one-sided, and on short, rough pedicels. The glumes are pointed and somewhat unequal, the upper one being smaller and thinner than the lower. The flowering glumes are ovate-lanceolate, roughish, and ending in a sharp point or short awn, and are rather longer than the outer glumes.

Professor Phares, of Mississippi, says :

Of all grasses this is one of the most widely diffused, growing in Africa, Asia, every country of Europe, and all our States. It is more highly esteemed and commended than any other grass by a larger number of farmers in most countries, a most decided proof of its great value and wonderful adaptation to many soils, climates, and treatments. Yet, strange to say, though growing in England for many centuries, it was not appreciated in that country till carried there from Virginia in 1764. But, as in the case of timothy grass, soon after its introduction from America, it came into high favor among farmers, and still retains its hold on their estimation.

as a grazing and hay crop. It will grow well on any soil containing sufficient clay and not holding too much water. If the land be too tenacious, drainage will remedy the soil; if worn out, a top dressing of stable manure will give it a good send-off, and it will furnish several mowings the first year. It grows well between 29° and 48° latitude. It may be mowed from two to four times a year, according to latitude, season and treatment, yielding from 1 to 3 tons of excellent hay per acre on poor to medium land. It is easily cured and handled. It is readily seeded and catches with certainty. It grows well in open lands and in forests of large trees, the underbrush being all cleared off. I know but one objection to it. Like tall oat grass it is disposed to grow in clumps and leave much of the ground uncovered. This may be obviated by thick seeding, using 2½, or, better, 3 bushels of seed per acre. The gaps may be prevented by sowing with it a few pounds of red-top seed. But as the latter multiplies annually from seeds dropping, it would in a few years root out the orchard grass. In common with others I prefer red clover with orchard grass. It fills the gaps and matures at the same time with the orchard grass; the mixture makes good pasture and good hay; but if mowed more than twice a year, or grazed too soon after the second mowing, the clover will rapidly fail. One peck of red clover seed and six pecks of orchard grass seed is a good proportion per acre. * * * After being cut it has been found to grow four inches in less than three days. Sheep leave all other grasses if they can find this, and acre for acre it will sustain twice as many sheep or other stock as timothy. Cut at the proper stage it makes a much better hay than timothy, and is greatly preferred by animals, being easier to masticate, digest, and assimilate; in fact, more like green grass in flavor, tenderness, and solubility.

Mr. J. S. Gould, of New York, says :

The testimony that has been collected from all parts of the world for two centuries past establishes the place of this species among the very best of our forage grasses, and we have not the shadow of a doubt that the interests of our graziers and dairymen would be greatly promoted by its more extended cultivation. It is always found in the rich old pastures of England, where an acre of land can be relied on to fatten a bullock and four sheep. It is admirably adapted for growing in the shade, no grass being equal to it in this respect, except the rough-stalked meadow grass (*Poa trivialis*.) It receives the name of orchard grass from this circumstance. We have seen it growing in great luxuriance in dense old New England orchards, where no other grass except *Poa trivialis* would grow at all. It affords a good bite earlier in the spring than any other grass except the meadow fox-tail (*Alopecurus pratensis*.) It affords a very great amount of aftermath, being exceeded in this respect by no other grass, except Kentucky blue grass, (*Poa pratensis*.) and it continues to send out root leaves until very late in the autumn. When sown with other grasses its tendency to form tussocks is very much diminished; indeed, it is always unprofitable to sow it alone in meadows or pastures, as it stands too thin upon the ground to make a profitable use of the land, and the filling up of the interspaces with other varieties greatly improves the quality of the orchard grass by restraining its rankness and making it more delicate.

BRIZA, *Linn.*

Spikelets many-flowered, paniculate, ovate or roundish, flattish-tumid. Outer glumes unequal, persistent, three to five nerved, sca-

rious margined, concave or ventricose; flowering glumes imbricated, appressed or spreading, broad or roundish, ventricose, often heart-shaped at the base, five to many nerved; palet much shorter than its glume, hyaline, on the margin two-nerved.

1. *B. media*, *Linn.* Naturalized in some places. Quaking grass.
2. *B. minor*, *Linn.* Naturalized in some places. Quaking grass.

These are small grasses often used for ornamental purposes.

Poa, *Linn.*

Spikelets somewhat compressed, usually two to five flowered, in a narrow or loose and spreading panicle, the rhachis between the flowers glabrous or sometimes hairy, the flowers generally perfect, in a few species dioecious; outer glumes commonly shorter than the flowers, membranaceous, keeled, obtuse or acute, one to three nerved, not awned; flowering glumes membranaceous, obtuse or acute, five or rarely seven nerved, the intermediate nerves frequently obscure, often scarious at the apex and margins, smooth or pubescent, often with a few loose or webby hairs at the base; palet about as long as the flowering glumes, prominently two-nerved or two-keeled.

1. *P. abbreviata*, *R. Br.* Oregon to the Arctic coast.
2. *P. alpina*, *Linn.* Mountains of New England and Rocky Mountains.
P. alpina, var. *minor*. Rocky Mountains.
P. alpina, var. *purpurascens*, *Vasey.* (*Poa purpurascens*, *Vasey.*)
 Oregon and Rocky Mountains.
3. *P. alsodes*, *Gr.* New York, New England, and Alleghany Mountains.
P. alsodes, var. *Wolfii*, *Vasey.* Illinois.
4. *P. andina*, *Nutt.* Rocky Mountain region.
5. *P. annua*, *Linn.* Introduced.
6. *P. arachnifera*, *Torr.* Texas Blue grass. Texas to New Mexico.
P. arachnifera, var. *glabrata*, *Vasey.* Texas Blue grass. Texas to New Mexico.

This species was first described by Dr. John Torrey in the report of Captain Marcy's exploration of the Red River, of Louisiana, as having been found on the headwaters of the Trinity, and named *Poa arachnifera* from the profuse webby hairs growing about the flowers, although it is found that this character is very variable,

probably depending somewhat on the amount of shade or exposure to which the grass is subject.

Several years ago Mr. Hogan, of Texas, sent specimens of the grass to this Department, and, as it was shown to be a relative of the Kentucky blue grass, Mr. Hogan adopted for the common name Texas blue grass. We give some extracts from his letters relating to the grass :

I find it is spreading rapidly over the country, and I claim for it all and more in Texas than is awarded to the *Poa pratensis* in Kentucky. It seems to be indigenous to all the prairie country between the Trinity River and the Brazos in our State. It blooms here about the last of March, and ripens its seeds by the 15th of April. Stock of all kinds, and even poultry, seem to prefer it to wheat, rye, or anything else grown in winter. It seems to have all the characteristics of *Poa pratensis*, only it is much larger, and therefore affords more grazing. I have known it to grow ten inches in ten days during the winter. The coldest winters do not even nip it, and although it seems to die down during summer it springs up as soon as the first rains fall in September and grows all winter. I have known it in cultivation some five years, and have never been able to find a fault in it. It will be ready for pasture in three or four weeks after the first rains in the latter part of August or first of September. I have never cut it for hay. Why should a man want hay when he can have green grass to feed his stock on?

Mr. James E. Webb, of Greensborough, Hale county, Alabama, writes to the Department December 26, 1883, and says :

Recent experiments show that the Texas blue grass (*Poa arachnifera*) flourishes and grows here in west Alabama as finely as could be wished, and is likely ere long to furnish us what we so much need—a fine winter grass. With Texas blue grass, Melilotus, and Bermuda grass, Alabama is a fine stock country.

Mr. S. C. Tally, of Ellis county, Texas, has sent specimens of this grass ; he says it is abundant there, bears heavy pasturing, and makes a beautiful yard or lawn grass.

Similar favorable accounts have been received from others. It is likely to prove one of the most valuable grasses for the South and Southwest. By means of its strong stolons or offshoots it multiplies rapidly and makes a dense permanent sod. It produces an abundance of radical leaves, and those of the culm are long, smooth, and of good width, about 4 to 8 inches long and two lines wide. The culms are 2 to 3 feet high, each with two or three leaves, with long sheaths and blade, the upper leaf sometimes reaching nearly to the top of the panicle. The ligule is short and rounded, or lacerated when old. The panicle is from 3 to 8 inches in length, rather narrow, and with short, erect branches of unequal length, in clusters of from three to five, the longest seldom 2 inches, most of them short, some nearly

sessile, and profusely flowering to the base. The spikelets usually contain about five flowers. The outer glumes are ovate-lanceolate, acute, with whitish scarious margins, and scabrous on the keel. The flowering glumes are longer, gradually sharp-pointed, and smooth, except on the margins and midnerve, which are usually pubescent, sometimes densely so. In many cases there is a remarkable development of long, silky hairs at the base of each flower, but sometimes these are quite absent.

7. *P. Bigelovii*, *Vasey and Scribner*. (*P. annua*, var. *stricta*, *Vasey*.)
Texas to Arizona.
8. *P. Bolanderi*, *Vasey*. California.
9. *P. brevifolia*, *Muhl*. Pennsylvania and Virginia, sparingly westward.
10. *P. cæsia*, *Sm*. Maine to Oregon, and Rocky Mountains.
P. cæsia, var. *stricta*, *Gr*. Maine to Rocky Mountains.
11. *P. Californica*, *Vasey*. (*Atropis Californica*, *Thurb*.) California, Oregon, Utah, &c.
12. *P. cenisia*, *All*. (*P. arctica*, *R. Br*.) Rocky Mountains to Alaska.
13. *P. compressa*, *Linn*. Introduced. English Blue grass, Wire grass.

This species has sometimes been confounded with the Kentucky blue grass, from which it differs in its flattened, decumbent, wiry stems, its shorter leaves and shorter, narrower, and more scanty panicle. It is found in many old pastures, on dry banks, and in open woods. The culms are hard and much flattened, 1 foot to 18 inches long, more or less decumbent, and frequently bent at the lower joints. The leaves are scanty, smooth, short, and of a dark bluish-green color. The panicle is short and contracted, 1 to 3 inches long. Very contradictory accounts have been given as to its agricultural value, some denouncing it as worthless and others entertaining a good opinion of it. It thrives well on clay, or hard trodden and poor soils.

Hon. J. S. Gould says respecting it :

It is certain that cows that feed upon it both in pasture and in hay give more milk and keep in better condition than when fed on any other grass. Horses fed on this hay will do as well as when fed on timothy hay and oats combined.

These discrepant opinions may be due in part to having mistaken the *Poa pratensis* for this grass. It is probably a nutritious grass,

but from its spare yield can hardly obtain much favor for a hay crop.

14. *P. debilis*, Torr. Lower Canada, New England, New York to Wisconsin.
15. *P. Douglasii*, Nees. California.
16. *P. Eatoni*, S. W. Utah, Nevada, and Montana.
17. *P. flavicans*, Ledb. Alaska.
18. *P. flexuosa*, Muhl. Pennsylvania to Texas.
P. flexuosa,? var. *occidentale*. Colorado, Utah, and Nevada.
19. *P. glumaris*, Trin. Alaska to Lower Canada.
20. *P. gracillima*, Vasey. Oregon and Washington Territory.
21. *P. Howellii*, Vasey and Scribner. (*P. trivialis*, var., Vasey.) Oregon.
22. *P. Kelloggii*, Vasey. (†705, Bolander.) California.
23. *P. Kingii*, S. W. Utah and Nevada.
24. *P. lævis*, Vasey. (*P. tennifolia*, var. *lævis*, Vasey.) Colorado to Montana.
25. *P. laxa*, Hænke. New England to Rocky Mountains.
26. *P. leptocoma*, Trin. Alaska.
27. *P. nemoralis*, Linn. Rocky Mountains and New England.
28. *P. Nutkænsis*, Presl. Alaska.
29. *P. Nevadensis*, Vasey. Utah, Nevada, Montana to Oregon.
P. Nevadensis, var. *glauca*, Scribner. Montana to Oregon.
30. *P. occidentalis*, Vasey and Scribner. Oregon.
31. *P. pauciflora*. (*Atropis pauciflora*, Thurb.) California.
32. *P. pratensis*, Linn. June grass, Kentucky Blue grass, Spear grass. Introduced and cultivated, but undoubtedly indigenous in the Rocky Mountains.

This grass is too well known to need an extended description. It is a perennial, growing usually $1\frac{1}{2}$ to 2 feet high, with an abundance of long, soft, radical leaves. There are several well-marked varieties, which are much modified and improved by good cultivation. It is indigenous in the mountainous regions of this country as well as of Europe, and has been introduced into cultivation in many countries. The panicle is generally pyramidal in outline, 2 to 4 inches long, open and spreading, the branches fine, mostly in fives, the lower ones 1 to 2 inches long, subdivided and flowering above the middle. The spikelets are about two lines long, ovate, closely three to five flowered, mostly on very short pedicels. The outer

glumes are acute; the flowering glumes acute or acutish, five-nerved, the lateral nerves prominent, the lower part of the keel and marginal nerves more or less hairy, and at the base more or less webby-hairy. From the unexampled success its cultivation has met with in Kentucky it has acquired the name of Kentucky blue grass, although in New England it is known by the name of June grass. In all the middle portions of the United States it forms the principal constituent of pastures, though its excellence is said to be rather depreciated in the Eastern States.

Professor Killebrew, of Tennessee, says :

It would seem a work of supererogation to argue as to the advantages of cultivating this grass. All know its benefits, and all see around them the great increase in the value of the land covered by it. It grows readily in all parts of the United States north of 40°, and lower down on suitable soils. It flowers in the earliest summer, and gives rich pasturage, except in the driest months, all the year. It varies in size in different localities according to soil and climate.

Professor Phares, of Mississippi, says :

Kentucky blue grass, known also in the Eastern States as June grass, although esteemed in some parts of America as the best of all pasture grasses, seems not to be considered very valuable among English farmers except in mixtures. It is certainly a very desirable grass, however. Its very narrow leaves, 1, 2, or more feet long, are in such profusion and cover the ground to such depth with their luxuriant growth that a mere description could give no one an adequate idea of its beauty, quantity, or value; that is, on rich land. On poor, sandy land it degenerates sadly, as do other things uncongenially located. Perennial, and bearing cold and drought well, it furnishes grazing a large part of the year. It is specially valuable as a winter and spring grass for the South. In prolonged summer drought it dries completely, so that if fired it would burn off clean. But this occurs even in Kentucky, where, indeed, it has seemed, without fire, to disappear utterly; yet when rain came, the bright green spears promptly recarpeted the earth. Sown alone, 20 to 26 pounds, that is 2 bushels, should be used to the acre; in mixtures, 4 to 6 pounds.

Mr. Klippart, of Ohio, says that this grass is very much in favor in Southern Ohio, whilst in Northern and Northeastern Ohio it is considered a very unwelcome guest in the grass lands. This difference of estimation is probably due to varieties, or to alteration of soil and to treatment.

33. *P. Pringlii*, *Scrib.* California.

34. *P. pulchella*, *Vasey*. Oregon and Washington Territory.

35. *P. reflexa*, *Vasey and Scribner*. (*P. arctica*, *Authors*.) Rocky Mountains.

36. *P. serotina*, *Ehrh.* Fowl Meadow grass. New England to Wisconsin.

Culms erect, 2 to 3 feet high, without running root-stocks. The leaves are narrowly linear, 3 to 6 inches long and two to three lines wide, the sheaths long, smooth, and striate, the ligules long. The panicle varies with the size of the plant from 5 to 10 or 12 inches long and 1 to 3 inches wide, and lax; the branches mostly in fives or more numerous, nearly erect, from 1 to 4 inches long, the longer ones subdivided and flowering above the middle. There are some mountain forms or varieties in which the culms are 1 foot or less in height and the panicle greatly reduced. The spikelets are one to two lines long, two to five flowered, on short pedicels. The outer glumes are about one line long and sharp-pointed. The flowering glumes are rather obtuse, the lateral nerves not prominent, slightly pubescent on the margins below, and somewhat webby at the base.

This species is most common in the Northern States, particularly in New England, New York, and westward to Wisconsin, and also in reduced forms in all mountainous districts.

Mr. J. S. Gould, of New York, says :

I have found it to grow on almost every kind of soil; but it attains the greatest perfection in a rich moist one. It is one of those grasses that thrive best when combined with others; it will not make a superior turf of itself, but it adds much to the value of a sward from its nutritive qualities and powers of early and late growth. As it perfects an abundance of seed it may be easily propagated.

Professor Phares, of Mississippi, says :

In portions of the Western States this grass has, for some years, been very highly recommended. In the Eastern States it has been cultivated for one hundred and fifty years or longer and valued highly. Jared Elliott, in 1749, spoke of it as growing tall and thick, making a more soft and pliable hay than timothy and better adapted for pressing and shipping for use of horses on shipboard. He says it makes a thick, abundant growth on land more moist than is adapted to common upland grasses, and may be mowed any time from June to October, as it never becomes so coarse and hard but the stalk is sweet and tender and eaten without waste. It has not been sufficiently cultivated in the Southern States, so far as I am aware, to know how long a meadow set with it may remain profitable. It is, however, worthy of extended trial.

Mr. Charles L. Flint says :

It grows abundantly in almost every part of New England, especially where it has been introduced and cultivated in suitable ground, such as the borders of rivers and intervals occasionally flooded. It never grows so coarse or hard but that the stalk is sweet and tender, and eaten without waste. It is easily made into hay, and is a nutritive and valuable grass.

37. *P. scabrella*. (*Atropis scabrella*, *Thurb.*) California.

38. *P. stenantha*, *Trin.* Oregon to Alaska.

39. *P. sylvestris*, *Gray*. New York to Wisconsin, and southward.
 40. *P. tenuifolia*, *Nutt*. Rocky Mountains to California.
 P. tenuifolia, var. *Oregona*, *Vasey*. (*Festuca Oregona*, *Vasey*.)
 Oregon and Washington.
 P. tenuifolia, var. *stenophylla*, *Vasey*. California, Oregon to
 Montana.

This species in several varieties is common in California, Oregon, Montana, &c., and is one of the numerous bunch grasses referred to in the accounts of the wild pasturage of that country. The foliage of some forms is scanty, but of others the radical leaves are long and abundant. It is stated that the Indians gather the seeds of this grass for food.

41. *P. trivialis*, *Linn*. Rough stalked Meadow grass. Introduced.

This species very much resembles the *Poa pratensis*. It is distinguished chiefly by its having rough sheaths, by its long, pointed ligules, its fibrous roots, and the smooth marginal nerves of the flowering glumes; whereas, in *Poa pratensis*, the sheaths are smooth, the ligules obtuse, the root-stock running, and the marginal nerves of the flowering glumes are hairy. It has been little cultivated by itself in this country, but is sometimes found in low meadows or on the banks of shaded streams. It flourishes best in low or wet ground and in shaded situations, and is not so well adapted to general cultivation as the blue grass.

Professor Phares, of Mississippi, says :

It is specially adapted to wood pastures, as it delights in shade, banks of streams, and moist ground generally. It bears tramping, and is an excellent pasture grass. It makes a good mixture with red top and orchard grass, or red top and tall oat grass, and with other pasture grasses.

P. trivialis? var. *occidentalis*, *Vasey*.

This grass, apparently a variety of *P. trivialis*, appears to be indigenous in Colorado and New Mexico. It has a larger, looser panicle than the introduced plant.

42. *P. Wheeleri*, *Vasey*. Mountains of Colorado.

Prof. Scribner, in writing of the *Poas* of Montana, says :

All the *Poas*, wherever growing in abundance, yield most excellent food for stock. On the mountain tops we find *P. alpina* and *P. cæsia*, which, though short, are sweet and nutritious. *P. Nevadensis* is common along mountain streams, and on the slopes we find *P. memorialis* and *P. serotina*. *P. pratensis* is truly indigenous, and grows abundantly along the streams and rivers. *P. tenuifolia*, in its various forms,

may be called the grass of the country ; it constitutes the chief forage upon the dryest bench lands, where it is called *bunch grass*, or, on account of its reddish color, *red top*. Another local name is *red-topped Buffalo grass*. In dry situations the culms are low and slender, and the foliage short and scant, but when growing in rich soil along streams it makes a luxuriant growth of stems and foliage, 2 to 3 feet high, and a field of it in bloom presents as fine an appearance as does a field of Kentucky blue grass, and the produce per acre is nearly the same. This grass and *Koeleria cristata* are usually associated, and both bloom about the same time—from the 15th to the 30th June. As fine a field of natural grasses as I saw in Montana contained *Poa tenuifolia*, *Koeleria cristata*, *Stipa viridula*, and *Stipa comata* as the leading species, the *Poa* being the most abundant.

GLYCERIA, *R. Br.*

Spikelets terete or flattish, several to many flowered, in a narrow or diffuse panicle, the rhachis smooth and readily disarticulating between the flowers; outer glumes shorter than the flowers, unequal, membranaceous, one to three nerved, unawned; flowering glumes membranaceous to subcoriaceous, obtuse, awnless, more or less hyaline and denticulate at the apex, rounded (never keeled) on the back, five to nine nerved, the nerves separate and all vanishing before reaching the apex; palea about as long as its glume, two-keeled, entire or bifid at the apex.

The species of this genus are not of much agricultural importance. They mostly grow in wet or swampy ground, and where found in abundance can be utilized for pasturage or hay-making.

1. *G. acutiflora*, *Torr.* Maine to Tennessee.
2. *G. angustata*, *Fries.* Alaska, Arctic coast, and Hudson's Bay.
3. *G. arundinacea*, *Kth.* (*G. aquatica* of American authors.) Tall Meadow grass. Reed Meadow grass.

This species is widely diffused in the northern portions of the United States and Canada, and in the Rocky Mountains from New Mexico to Montana. It has a stout, erect, leafy culm, 3 to 4 feet high. The leaves are a foot or two long, a quarter to half an inch wide, flat, and somewhat rough on the edges. The panicle is large, 9 to 15 inches long, and much branched.

4. *G. Canadensis*, *Trin.* Rattlesnake grass. Tall Quaking grass. Maine to Minnesota, and south to Pennsylvania.

A grass belonging to the northern portion of the United States, usually found in mountainous districts, in swamps, and river borders, growing in clumps. The culms are stout, about 3 feet high, smooth and leafy. The leaves are linear-lanceolate, 6 to 9 inches

long, or the lower ones much longer, about four lines broad and rather rigid. The panicle is large and effuse, 6 to 9 inches long, oblong pyramidal, and at length drooping. The whorls are an inch or more distant, the branches semi-verticillate, mostly in threes, the largest 3 to 4 inches long, and subdivided from near the base. It is quite an ornamental grass, resembling the quaking grass (*Briza*.) Cattle are fond of it, both green and when made into hay. It is well adapted to low meadows.

4. *G. conferta*, *Fries*. (*G. Borreri*, *Bab.*) Introduced on ballast.
5. *G. distans*, *Wahl.* Introduced and naturalized.
G. distans, var. *airoides*. (*G. airoides*, *Thurb.*) Rocky Mountain region.
6. *G. elongata*, *Trin.* New England to Minnesota.
7. *G. fluitans*, *R. Br.* Floating Manna grass. Atlantic to the Pacific.

This species grows in shallow water on the margins of lakes, ponds, and sluggish streams. Its culms are usually 3 to 4 feet high, rather thick and succulent and quite leafy. The leaves are 4 to 9 inches long and three to four lines wide. The panicle is often a foot long, very narrow, the short distant branches mostly in twos or threes, 1 or 2 inches long, erect and close, each having usually two to four spikelets. The spikelets are half an inch to three-quarters of an inch in length, rather cylindrical and nearly of the same thickness throughout, seven to thirteen flowered. The outer glumes are membranaceous and one-nerved. The flowering glumes are about two lines long, oblong, convex on the roughish back, rather thick, with a thin, scarious entire apex. The paleas are as long or sometimes longer than their glumes and minutely two-toothed.

Hon. J. S. Gould says:

This grass is found growing in shallow water, overflowed meadows and wet woods, but will bear cultivation on moderately dry grounds. Schreber says that it is cultivated in several parts of Germany for the sake of the seeds, which form the manna crop of the shops, and are considered a great delicacy in soups and gruels. When ground into meal they make bread very little inferior to that made from wheat. In Poland large quantities of the seeds are obtained for culinary purposes. All granivorous birds are exceedingly fond of these seeds. Trout and indeed most fish are very fond of them; wherever it grows over the banks of streams the trout are always found in great numbers waiting to catch every seed that falls. There is a great difference of opinion among agricultural writers with respect to the fondness of animals for the leaves and culms of this grass. We have often seen the ends of the leaves cropped by cattle, but have never seen the culms or root-leaves touched by

them. On the other hand, reliable writers have asserted that cattle, horses, and swine were alike fond of it.

8. *G. Lemmoni*, *Vasey*. Alkaline soils, California and Nevada.

9. *G. maritima*, *Wahl*. Near the coast. Introduced.

10. *G. nervata*, *Trin*. Nerved meadow grass. From the Atlantic to the Pacific.

This is similar in appearance to the *Tall Meadow grass*, but is smaller, with a lighter panicle and smaller flowers. It has also much the same general range. It usually grows along the wet margins of streams and in swamps. It is nutritious and might be advantageously mixed with other grasses in wet grounds. It is especially abundant in the Rocky Mountains.

11. *G. obtusa*, *Trin*. New England to North Carolina near the coast.

12. *G. pallida*, *Trin*. Maine to Virginia, margins of ponds, &c.

13. *G. pauciflora*, *Presl*. California to British America.

ARCTOPHILA, *Rupt*.

This genus differs from *Glyceria* chiefly in having at the base of each flower a scanty ring of short hairs, and in the obscure lateral nerves of the flowering glume. It is included in *Glyceria* by some authors, and in *Grappheporum* by Dr. Gray.

1. *A. fulva*, *Rupt*. (*Colpodium fulvum*, *Led*.) Arctic coast.

2. *A. Laestadii*, *Rupt*. (*A. pendulina*, *And*.) Arctic coast to British America.

3. *A. mucronata*, *Hack*. Arctic coast.

FLUMINIA, *Fries*.

Spikelets about five flowered, outer glumes membranaceous, three-nerved, acute, or toothed at the apex, the upper one longer than the lowest flower, and nearly as long as the spikelet, the lower one one-third shorter; flowering glumes much thicker than the outer ones, smooth, five-nerved or ribbed (when mature strongly so,) becoming scarious at the apex, and two to five toothed or mucronate from the excurrent nerves; palet as long as its glume, two keeled and ciliate on the keels, acute or bifid at the tip. The base of each flower is surrounded by a ring of short hairs. Panicle large, with long, lax, erect, verticillate branches. Culm 2 to 3 feet thick, growing in water, and with creeping rhizoma.

1. *F. arundinacea*, *Fries*. Iowa, British America.

FESTUCA, *Linn.*

Spikelets three to many flowered, variously paniced, pedicellate, rhachis of the spikelets not hairy; outer glumes unequal, shorter than the flowers, the lower one nerved, and the upper three nerved, narrow, keeled, acute; flowering glumes membranaceous, chartaceous, or sub-coriaceous, narrow, rounded on the back (not keeled,) more or less distinctly three to five nerved, acute or tapering into a straight awn, rarely obtusish; palet narrow, flat, prominently two-nerved or two keeled.

1. *F. amethystina*, *Linn.* California and Oregon.
2. *F. confinis*, *Vasey*. Rocky Mountains, Wyoming, and Colorado.
3. *F. dasyclada*, *Hackel*. Rocky Mountains. (No. 93 Parry, 1875.)
4. *F. duriuscula*, *Linn.* Atlantic coast to Rocky Mountains.
5. *F. elatior*, *Linn.* (*F. pratensis*, *Linn.*) Meadow Fescue grass.

Tall Fescue, Randall grass. Introduced and cultivated.

A perennial grass, growing from 2 to 4 feet high, with flat, broadish leaves about a foot long. The panicle is somewhat one-sided, loose, and spreading when in flower, contracted after flowering, from 6 to 10 inches long, the branches 1 to 2 inches long, erect, mostly in pairs below, single above, subdivided; the spikelets are lanceolate or linear, about half an inch long, five to ten flowered. The outer glumes are one and three nerved, shorter than the flowers; the flowering glumes are lanceolate, about three lines long, firm in texture, five-nerved, scarious at the margin, acute, and sometimes with a short but distinct awn at the apex. This is an introduced species, now frequently met with in meadows; it is one of the standard meadow grasses of Europe. Cattle are said to be very fond of it, both green and as hay. There is a smaller form or variety which is the variety *pratensis* or *Festuca pratensis*, *Hudson*.

Professor Killebrew, of Tennessee, writes of this grass as follows:

This grass has received some attention in different parts of the State, and has met with a warm reception from those testing it. It ripens its seed long before any other grass, and consequently affords a very early nip to cattle. It has been raised under various names, in Virginia as "Randall grass," and in North Carolina as "evergreen grass." Mr. James Taylor, writing from North Carolina, says: "The evergreen grass is very good for pasturing through the fall and winter. It will do best when sown on dry land, and is well adapted to sheep. It grows well on rocky soil to the height of 4 or 5 feet when ripe, continuing green in the spring, and affording fine herbage throughout the winter. It is best to sow in the spring with oats. A peck of well-cleaned seed is enough for an acre, or a bushel in the chaff. It ripens about the first of June. If sown in the spring this grass will not

go to seed before the next year, but if sown in the fall it will bring seed the next spring." From the limited cultivation it has met with in Tennessee, it seems rather to be better adapted to moist, low lands, though I have seen it growing on some of the high ridges of East Tennessee, at least 1,500 feet above the sea. There it thrives luxuriantly and makes a very superior pasture.

Professor Phares, of Mississippi, says :

It grows well in nearly all situations, wet or dry, on hill or bottom land, even though subject to overflow, and matures an extraordinary quantity of seed. The seeds germinate readily, and it is easy to set a piece of land with this grass. Seeded alone, 28 pounds, or about 2 bushels of seed, should be sown broadcast in August, September, October, or from the middle of February to the 1st of April. From remaining green through the winter it is sometimes called "evergreen grass." Mowed and dried it makes a good hay, much relished by stock.

6. *F. gigantea*, *Vill.* Introduced.
7. *F. gracillima*, *Hook.* California to Washington Territory.
8. *F. Jonesii*, *Vasey.* Nevada to British America.
9. *F. Howellii*, *Hack.* Oregon.
10. *F. microstachys*, *Nutt.* Arizona to British America.
 - F. microstachys*, var. *ciliata*, *Gr.* California.
 - F. microstachys*, var. *divergens*, *Thurb.* California.
 - F. microstachys*, var. *pauciflora*, *Scrib.* Oregon.
11. *F. Myurus*, *Linn.* Introduced and naturalized.
12. *F. nutans*, *Willd.* New England to Texas.
13. *F. occidentalis*, *Hook.* Oregon to British America.
14. *F. ovina*, *Linn.* Fescue grass.
 - F. ovina*, var. *Arizona*, *Hack.* Arizona.
 - F. ovina*, var. *brevifolia*, *Watson.* Rocky Mountains.
 - F. ovina*, var. *macrochæta*, *Hack.* California.
 - F. ovina*, var. *polyphylla*, *Vasey.* California to Oregon.

A densely-tufted, perennial grass, with an abundance of rather narrow, sometimes involute, short radical leaves and slender culms, 1 to 1½ feet high. The panicle is 2 to 4 inches long, narrow, the branches mostly single and alternate, erect and few-flowered; the spikelets are mostly three to five flowered, and about three lines long; the outer glumes are acute and narrow. The flowering glumes are lanceolate, two lines long, roughish, and with a short rough awn about half a line long.

This species has many varieties, both in this country and in Europe. It is indigenous in the mountainous parts of New England, in the Rocky Mountains, and in various Northern localities.

As found in cultivation it has been derived from Europe.

Hon. J. Gould, of New York, says :

It forms the great bulk of the sheep pastures of the highlands of Scotland, where it is the favorite food of the sheep, and where the shepherds believe it to be more nutritious for their flocks than any other. Gmelin says that the Tartars choose to encamp during the summer where this grass is most abundant, because they believe that it affords the most wholesome food for all cattle, but especially for sheep. Nature distributes it among dry, sandy, and rocky soils, where scarcely any other species would grow. It is without doubt the very best of the grasses growing on sandy soils. It roots deeply, and forms a dense, short turf, which adapts it admirably for lawns and pleasure-grounds where the soil is sandy. It is almost useless as a hay crop, as its leaves and culms are too fine to give a remunerative amount of hay; it is only as a pasture grass on sandy soils that it is valuable, and in these, when highly manured, it is driven out by the more succulent species. It is often found 4,000 feet above the level of the sea. Its seeds weigh about 14 pounds to the bushel.

15. *F. parviflora*, *Ell.* North Carolina. A doubtful species.

16. *F. Richardsonii*, *Hook.* Alaska.

17. *F. rigida*, *Kth.* Introduced on ballast.

18. *F. rubra*, *Linn.* Atlantic to Pacific.

F. rubra, var. *fallax*, *Hack.* Oregon and Rocky Mountains.

F. rubra, var. *littoralis*, *Vasey.* Coast of Oregon.

19. *F. scabrella*, *Torr.* Bunch grass. Rocky Mountains to Oregon.

A perennial grass, growing in strong clumps or bunches, and hence called "bunch grass." It is a native of the Rocky Mountain region, from Colorado westward to California and Oregon. The culms are usually 2 to 3 feet high, erect, and smooth; the radical leaves are numerous, about half as long as the culm, generally rigid, involute, and scabrous on the margins; the blade is prone to separate when old, leaving an abundance of leafless sheaths at the base; the cauline leaves are about two, short and pointed, 2 to 4 inches long; the sheath scabrous, the ligule short or wanting; the panicle is usually 3 to 5 inches long. In Montana it is called the *Great Bunch grass*, and is one of the principal grasses of that country. It is the prevailing species on the foot-hills and mountain slopes at from 6,000 to 7,000 feet altitude. "It is rather too hard a grass for sheep, but there is no grass more valued on the 'Summer ranges' for cattle and horses. It makes excellent hay for horses, and is cut in large quantities for this purpose. It grows in large tussocks, making it rather a difficult grass to mow with a machine." It is one of the most important grasses of Eastern Oregon and Washington.

20. *F. sciurea*, *Nutt.* Texas.

21. *F. Shortii*, *Kth?* *Vasey.* Illinois, Kentucky to Missouri.

22. *F. spectabilis*, *Jan.* Introduced on ballast.
 23. *F. tenella*, *Willd.* New England to the Pacific.
F. tenella, var. *aristulata*, *Torr.* Texas and westward.

BROMUS, *Linn.*

Spikelets five to many flowered, in a dense or lax or diffuse panicle, subterete or compressed, the rhachis between the flowers glabrous; outer glumes more or less unequal, shorter than the lowest flower, membranaceous, acute, awnless or short mucronate, one to nine nerved; flowering glumes membranaceous to rigid and subcoriaceous, rounded on the back or compressed and keeled, five to nine nerved, acute, or awned from below the mostly two-cleft apex; palet rather shorter than the glumes, two-keeled, the keels rigid and ciliate; grain adhering to the palet.

1. *B. Aleutensis*, *Trin.* Alaska.
 2. *B. arvensis*, *Linn.* Introduced from Europe.
 3. *B. asper*, *Linn.* Introduced from Europe.
 4. *B. breviaristatus*, *Thurb.* Rocky Mountains to Oregon.
 5. *B. carinatus*, *Hook.* California.
 6. *B. ciliatus*, *Linn.* From the Atlantic to the Pacific.
B. ciliatus, var. *purgans*, *Gr.*
B. ciliatus, var. *minor*, *Munro.* Rocky Mountains.
- A tall, coarse species much addicted to rocky woodlands, but of no agricultural value.
7. *B. depauperatus*, *Presl.* California.
 8. *B. erectus*, *Huds.* Introduced from Europe.
 9. *B. Hookerianus*, *Thurb.* California to British America.
B. Hookerianus, var. *minor*, *Scrib.* Oregon.
 10. *B. Kalmii*, *Gray.* Vermont to Montana, northward.
B. Kalmii, var. *occidentalis*, *Vasey.* Rocky Mountains.
 11. *B. maximus*, *Desf.* Introduced in California and Arizona.
 12. *B. mollis*, *Linn.* Introduced from Europe.
 13. *B. Orcuttianus*, *Vasey.* South California to Washington Territory.
 14. *B. Pumpellianus*, *Scrib.* Rocky Mountains, Colorado to Montano.
 15. *B. racemosus*, *Linn.* Introduced from Europe.
 16. *B. rubens*, *Linn.* Introduced from Europe.
 17. *B. secalinus*, *Linn.* Chess or cheat. Introduced.

It is an old tradition, which some farmers still cling to, that chess is a degenerated wheat; that the action of frost and other causes occasion the deterioration, whereas the truth undoubtedly is that chess seed was either in the land or in the seed sown, and being more hardy than wheat it survived the frost and took possession of the ground. Some years ago this grass had a temporary popularity under the name of Willard's Brome grass, but it was soon abandoned when brought into competition with better grasses.

It has a stout upright culm, 2 to 3 feet high, the panicle being from 4 to 6 inches long, rather spreading, and the large spikelets somewhat drooping when ripe. Usually there are three to five branches at each joint of the panicle; these branches are of different lengths, from half inch to 2 inches, and each with one to three spikelets. The spikelets are usually from five to ten flowered; the glumes unequal, nerved, shorter than the flowers; the flowering glume is convex or compressed, keeled on the back, with an awn variable in length from below the point.

In the South it would perhaps be a good winter grass, like its relative *Bromus unioloides*, but it is not as vigorous a grass as that species, and does not produce such an abundance of foliage.

18. *B. segetum*, *Schl.* Introduced in California.
19. *B. sterilis*, *Linn.* Introduced from Europe.
20. *B. squarrosus*, *Linn.* Introduced from Europe.
21. *B. subulatus*, *Led.* Alaska.
22. *B. Suksdorfii*, *Vasey.* Oregon and Washington.
23. *B. tectorum*, *Linn.* Introduced from Europe.
24. *B. unioloides*, *Willd.* Schrader's grass, Rescue grass. Texas to Arizona.

This is one of the so-called winter grasses; that is, it makes in the South a large share of its growth during the winter months. It belongs to the chess or cheat family. In its early growth it spreads and produces a large amount of leaves; early in the spring it sends up its flower stalks, which grow about 3 feet high, with a large, open, spreading panicle, the ends of the branchlets bearing the large flattened spikelets, which, when mature, hang gracefully upon their stems, giving them quite an ornamental appearance. These spikelets are from 1 inch to 1½ inches in length, and composed of two acute lanceolate glumes at the base, and from seven to ten flowers arranged in two rows alternate on each side of the axis. The flow-

ers are lanceolate, or ovate-lanceolate, the flowering glume extending into a fine point or short awn.

During several years past this grass has been sent to this Department, chiefly from Louisiana and Texas, and has been much commended. Many years since the same grass was distributed and experimented with under the name of Australian oats, or *Bromus Schraderi*. It is not adapted to use in a country with severe winters, and hence did not give satisfaction in all places. Mr. C. Mohr, of Mobile, says of it:

Only of late years found spreading in different parts of this State; makes its appearance in February, grows in tufts, its numerous leafy stems growing from 2 to 3 feet high; it ripens the seed in May: affords in the earlier months of spring a much-relished nutritious food, as well as a good hay.

It is said to have been introduced into Georgia by General Iverson, of Columbus, and by him called rescue grass. The favorable opinion which it at first received does not seem to have been well sustained in that State.

Professor Phares, of Mississippi, says:

This grass is also called *Bromus Schraderi*, *B. Willdenovii*, *Ceratochloa uniolooides*, and *Festuca uniolooides*. It is an annual winter grass. It varies in the time of starting growth. I have seen it ready for mowing the first of October, and furnish frequent cuttings till April. Again, it may not start before January, nor be ready to cut till February. This depends on the moisture and depression of temperature of the fall, the seeds germinating only at a low temperature. When once started, its growth after the successive cuttings or grazings is very rapid. It is tender, very sweet, and stock eat it greedily. It makes also a good hay. It produces an immense quantity of leaves. On loose soil some of it may be pulled up by animals grazing it.

LOLIUM, Linn.

Spikelets several-flowered, solitary on each joint of the continuous rhachis of the simple spike, placed edgewise against the rhachis, the glume wanting on the inside, the outer empty glume nearly as long as or longer than the spikelet; flowering glumes rounded on the back, not keeled; palea shorter, two-keeled.

1. *L. arvense*, With. Darnel. Introduced from Europe.
2. *L. perenne*, Linn. Rye-grass. Introduced and cultivated.

L. perenne, var. *Italicum*. Italian Rye grass. Introduced and cultivated.

A perennial grass, introduced from Europe. The culms are 2 to 3 feet high, very leafy, and terminating in a loose, spike-like panicle,

6 inches or more in length. The spikelets are arranged alternately on the axis, placed edgewise; that is, with one edge of the flat spikelet applied to the main stem at short distances, so that there may be twenty or more in the panicle. The spikelets are one-half to three-fourths of an inch long; generally seven to eleven flowered. The inner empty glume is generally wanting, so that, except on the terminal spikelet, only one glume is apparent, which is half or more than half the length of the spikelet, narrowly lanceolate, and acute. The general appearance of the panicle is like that of couch grass (*Triticum repens*.) The flowering glumes are thickish, obscurely nerved, rather hispid, acutely pointed, or in the variety *Italicum*, with a longish awn. The proper paleas are similar to the flowering glumes and of nearly equal length.

An intelligent writer, whom we have frequently quoted, says respecting this grass :

It occupies the same place in Great Britain that timothy does with us, and is there esteemed on the whole higher than any other species of grass, and is called rye grass or ray grass. Of all the varieties of *Lolium perenne* which are known that called *Italicum* is by far the most valuable. Its spikelets are conspicuously bearded, the flowers being all terminated by long, slender awns, which character distinguishes it very easily from *Lolium perenne*. Its name (Italian rye grass) is derived from the fact that its native habitat is on the plains of Lombardy, where broad and extensive plains of pasture land are frequently inundated by the mountain streams which intersect them. It is mainly adapted to irrigated meadows, and in these it is undoubtedly superior to any other grass.

Professor Phares says :

This grass stands drought well and grows most luxuriantly in our Southern States. If not kept grazed or mowed, however, the leaves cover the ground so deeply and densely that an excess of rain in very hot weather in the extreme South causes it to rot suddenly, destroying even the roots. This I have never seen or heard mentioned by any other person, but it occurred on my own farm one season, where I was reserving a lot for seed.

3. *L. temulentum*, *Linn.* Poison Darnel. Introduced.

This species is frequently found in grain fields. The seeds have long enjoyed a reputation of being poisonous to stock, and also to mankind, when mixed in large quantity with the wheat or rye used in the making of bread. The question seems hardly yet decided, but it is best to exterminate the grass as a weed and a pest.

AGROPYRUM, *Beauv.* (*Triticum*, in part, of authors.)

Spikelets several-flowered (three to nine or more,) compressed,

alternately sessile on the continuous or slightly notched rhachis of the simple spike, and with the side against the rhachis; outer glumes nearly equal and opposite, membranaceous or herbaceous, one to three nerved, scarcely keeled, tapering to a point or awned; flowering glumes similar to the outer ones, rounded on the back, three to seven nerved, pointed or awned from the apex; palea nearly as long as its glume, the two prominent nerves almost marginal, scabrous ciliate.

1. *A. caninum*, *R. & S.* (*Triticum*, *Linn.*) Mountains of Pennsylvania? and Rocky Mountains.
2. *A. dasystachyum*, *Vasey*. (*Triticum dasystachyum*, *Gr.*) Shores of the Great Lakes, British America, and Rocky Mountains.
3. *A. divergens*, *Nees*. (*T. strigosum*.) Rocky Mountains.
A. divergens, var. *tenue*, *Vasey*. (*Triticum ægilopoides*.) Rocky Mountains.
4. *A. glaucum*, *R. & S.* Great Plains and Rocky Mountains. Blue stem, Blue joint.

This species, which has been considered a variety of the next, prevails on the Western Plains from Texas to Montana, and is well known to stockmen. It differs from *A. repens* in having a stiffer, more erect and rigid stem and leaves; the leaves often becoming involute and stiff. It is generally of a light bluish-green color. The spike is generally shorter, denser, and with larger spikelets.

Professor Scribner, writing of this grass in Montana, says:

It is the most highly praised of the native grasses for hay. Wherever it occupies exclusively any large area of ground, as it does frequently in the lower districts, especially near Fort Benton, it is cut for hay. Naturally it does not yield a great bulk, but its quality is unsurpassed. After two or three cuttings the yield of hay diminishes so much that it is scarcely worth the harvesting. It is then customary to drag a short-toothed harrow over the sod, which breaks up the creeping roots or underground stems, and each fragment then makes a new plant.

The same valuable opinion of this grass is entertained by stockmen in Nebraska, Colorado, and New Mexico. It occurs nearly everywhere, but sparsely, on the plains, and extending quite up into the mountains. In the valleys and along streams it frequently forms large patches and grows closer and more abundant, when it is commonly cut for winter use.

5. *A. repens*, *Beauv.* (*Triticum repens*, *Linn.*) Couch grass, Quack grass. Introduced from Europe in the older States, and

some forms apparently indigenous in the Rocky Mountains.

There has been a good deal of discussion relative to this grass, some pronouncing it one of the vilest of weeds, and others claiming for it high nutritive qualities overweighing all the disadvantages of its growth. Whichever party may be right, it is proper that farmers should be acquainted with it in order to know how to treat it, and hence our description. It forms a dense sod by means of its far-reaching rhizomas or root-stalks, which have short joints, and root tenaciously at every joint.

It has an abundance of foliage, and sends up a flowering culm, 2 to 3 feet high, which is terminated by a close, narrow spike of flowers from 3 to 6 inches long. This spike consists of a succession of closely set spikelets, one at each joint of the axis, and placed flatwise with the side against the stalk. Each spikelet contains several (three to eight) flowers, with a pair of nearly equal and opposite three to five nerved glumes at the base.

Hon. J. S. Gould says :

The farmers of the United States unite in one continuous howl of execration against this grass, and it seems strange, when every man's hand is against it, that it is not exterminated. Yet we could never really satisfy ourselves that its presence in meadows and pastures was such an unmitigated curse. In lands where alternate husbandry is practiced, it must be admitted to be an evil of great magnitude. Its hardness is such, and its rapidity of growth is so great, that it springs up much more rapidly than any other crop that can be planted, and chokes it. Still it has many virtues. It is perfectly cosmopolitan in its habits. It is found in all sorts of soils and climates. Its creeping roots are succulent, and very nutritive, and are greedily devoured by horses and cows.

6. *A. Scribneri*, *Vasey*. Subalpine situations in the Rocky Mountains.

7. *A. tenerum*, *Vasey*. Rocky Mountains.

This grass prevails in the Rocky Mountain region from New Mexico to Oregon, and has been commonly called a variety of *Agropyrum repens*, from which it differs essentially in wanting the running root-stock, and in a narrower nearly cylindrical spike. It occurs mostly in low, moist grounds, and like the *Agropyrum glaucum* it is one of the best grasses for hay.

8. *A. unilaterale*, *Vasey & Scribner*. Subalpine situations in the Rocky Mountains.

9. *A. ? violaceum*. Rocky Mountains.

LEPTURUS, *R. Br.*

Spikelets one to two-flowered, single and sessile at each joint of the alternately excavated rhachis of the simple spike; outer glumes persistent, rigid, narrow, acute; flowering glumes much shorter, thin, hyaline; palet hyaline, two-nerved.

1. *L. Bolanderi*, *Thurb.* California to Oregon.
2. *L. filiformis*, *Trin.* Introduced from Europe.
3. *L. incurvatus*, *Trin.* Introduced from Europe.

HORDEUM, *Linn.*

Inflorescence a dense spike, with two or three spikelets at each joint of the notched rhachis; spikelets one-flowered, with an awl-shaped rudiment of a second flower, the central spikelet of the cluster perfect and sessile, the lateral ones short-stalked and imperfect or abortive; outer glumes side by side, two to each spikelet or six at each joint, slender and awn-pointed or bristle form; flowering glume herbaceous, shorter, oblong or lanceolate, rounded on the back, not keeled, five-nerved, acute or long awned; palet shorter, two-keeled.

1. *H. jubatum*, *Linn.* Wild barley, Squirrel-tail grass. On the sea-coast, and saline soil in the interior, especially in the Rocky Mountains.
2. *H. maritimum*, *With.* Introduced on Ballast.
3. *H. murinum*, *Linn.* Introduced from Europe.

Professor Brewer states that this grass, unfortunately, is extensively naturalized in California, and is a vile pest; it comes in when land is overstocked; is known there as "Squirrel grass," "Squirrel tail," "Fox tail," and "White oats." The heads break up and the barbed seeds work into the wool of sheep, and even into the flesh of lambs, killing them. It damages the eyes and throats of animals.

4. *H. pratense*, *Huds.*

An annual or biennial grass growing principally in alkaline soil in the Western States and Territories. It is eaten by cattle when in a young state, but when mature it is worthless and pestiferous on account of its long, barbed awns.

5. *H. pusillum*, *Nutt.* Same range as the preceding.

ELYMUS, *Linn.*

Spikelets two to four at each joint of the rhachis of the simple stout spike, sessile, one to six flowered; outer glumes two for each spikelet, nearly side by side in its front, forming a kind of involucre for the cluster, narrow, rigid, one to three nerved, acuminate or awned; flowering glumes herbaceous, rather shorter, oblong or lanceolate, rounded on the back, not keeled, acute or awned; palet shorter than its glume, two-keeled.

1. *E. arenarius*, *Linn.* Oregon to Alaska.

2. *E. Canadensis*, *Linn.* Wild rye, Rye grass, Lyme grass. New England to California.

E. Canadensis, var. *glaucifolius*, *Gr.* New England to California.

A perennial coarse grass, growing on river banks, and in rich shaded woods. In some localities, especially on moist prairies and banks in the West, it is quite common and is cut for hay. It should be cut early to be of value.

3. *E. condensatus*, *Presl.* Giant Rye grass. Colorado to California.

This is a perennial grass, ranging from San Diego throughout California, and into Oregon and Washington Territory, also in the Rocky Mountain region of the interior. It is very variable, but always a strong, heavy-rooted, coarse grass, from 3 to 5 or even to 12 feet high. Mr. Bolander states that it seems to do excellent service by fixing the soil on the banks of creeks and rivers. In the larger forms the culms are half an inch thick. The leaves are smooth, 2 feet long and an inch wide, or more, and the panicle 8 to 14 inches long and 1½ inches thick. As it usually occurs in arid grounds it is from 3 to 6 feet high, the leaves about a foot long and half an inch wide, and the spike-like panicle 4 to 8 inches. In the large form the branches of the panicle are subdivided and 1 or 2 inches long.

Mr. W. C. Cusick, of Oregon, says:

This is a very valuable grass, commonly known as Rye grass. In Baker county large quantities are cut for hay, for which it is said to be excellent. It is also much used as a winter forage plant. Cattle are driven into the dry bottoms where it grows and live upon it when the shorter grasses are covered with snow.

4. *E. dasystachys*, *Trin.* British America to Alaska.

5. *E. Macounii*, *Vasey.* Mountains of Colorado to Oregon and British America.

6. *E. mollis*, *Trin.* Seashore of New England and northward.
7. *E. Orcuttianus*, *Vasey*. Southern California.
8. *E. Saundersi*, *Vasey*. Mountains of Colorado.
9. *E. ? Sibiricus*, *Linn.* Rocky Mountains to California.
10. *E. Sitanion*, *Schultz*. Rocky Mountains to California.
11. *E. striatus*, *Willd.* Smaller Wild Rye. New England to Minnesota and southward.

E. striatus, var. *villosus*, *Gr.* New England to Minnesota and southward.

12. *E. triticoides*, *Nutt.* Rocky Mountains to California and Oregon.

This has been considered a variety of *E. condensatus*, from which it differs in having strong runners and not growing in thick clumps, but scattering and singly. Mr. Cusick says it is a valuable grass in Oregon, and cut for hay in wild meadows.

13. *E. Virginicus*, *Linn.* Wild Rye grass. Terril grass. New England to Texas.

E. Virginicus, var. *submuticus*, *Hook.* Rocky Mountains.

A coarse perennial grass, growing on alluvial river banks or in rich low grounds. The culm is rather stout, 2 to 3 feet high, leafy; the lower leaves are 10 to 15 inches long, broad and rough. The sheath of the upper leaf usually incloses the stalk, and sometimes the base of the flower spike. This spike is erect, dense, and rigid, 2 to 4 or 5 inches long and one-half inch thick. The spikelets are two or three together at each joint, all alike and fertile, sessile, two to five flowered, and each with a pair of empty glumes. These glumes are very thick and coarse, strongly nerved, lanceolate, and bristle-pointed, about 1 inch long. The flowering glumes are of firm texture, lance-oblong, five-nerved, hairy on the back, and terminating in a stiff, straight awn, half an inch to nearly an inch long, the lowest one in the spikelet having the longest awn, the others gradually shorter. The palea is oblong, obtuse, and as long as the flowering glume, excluding the awn.

This grass frequently forms a considerable portion of native meadow lands and makes a coarse hay. It starts growth early in the spring, and thus affords a good pasturage. Professor Killebrew, of Tennessee, says it is very valuable and ought to be tried in cultivation.

Professor Phares, of Mississippi, says:

This perennial grass is a native of the Southern States. As all farm stock except hogs are fond of it, and it is green through the winter and spring, it has been destroyed when grazing animals have access to it at all times. It is, however, found in many of our States along the banks of wooded streams, of ditches, and in fence-corners among briars and thickets. It will grow on thin clay, gravelly, or sandy soil, but much better on rich lands, dry or rather moist, and will thrive ten, twenty, or more years on the same land.

ASPRELLA, Willd. (Gymnostichum, Schr.)

Spikelets two to three, or sometimes solitary at each joint of the rhachis, raised on a very short callous pedicel, loosely two to four flowered (when solitary flatwise on the rhachis) in a loose terminal spike. Empty glumes none, or small, awn-like, and deciduous; flowering glumes, narrow, lanceolate, rounded on the back, three to five-nerved above, long-awned from the apex; palet two-keeled.

1. *A. Californica, Benth.* California.
2. *A. hystrix, Willd.* Hedge-hog grass. New England to Texas.

ARUNDINARIA, Mich.

Spikelets many-flowered, flattened, racemose or paniculate, the uppermost flowers imperfect; outer glumes very small, membranaceous, the upper one larger; flowering glumes much larger, membranaceous-herbaceous, convex on the back, not keeled, many-nerved, acuminate, mucronate or bristle-pointed; palet shorter than its glume, prominently two-keeled.

1. *A. macrosperma, Michx.* Southern States. Cane.
2. *A. tecta, Muhl.* Maryland, Illinois, and south. Switch cane, Small cane.

Professor Phares, of Mississippi, says of this grass :

This largest of our grasses has a hard woody stem from one-half to 3 inches in diameter, and from 10 to 40 feet high, erect, tapering from near the base, jointed every 8 to 12 inches for one-half the length or more, then the joints becoming shorter and smaller to the top; leaves 1 to 2 inches wide, persistent, on clustered spreading branches, which also are jointed and appear the second year. On rich land, in spring, the young stems shoot up full size, 10 or 20 feet high, and are as crisp as asparagus, and by some persons as much relished. Hogs, cattle, and other animals are fond of the young plants and seeds. The age at which the large cane blooms has not been definitely decided. It probably varies with the latitude, soil, and surroundings, from ten to thirty years. When the seeds mature the cane dies. Grazing animals feed greedily on the leaves in the winter, and find protection from the driving rains and piercing winds under the dense roof of the cane brake or thicket. The stems are used for fishing rods, scaffolds for drying cotton, for pipe stems and pipes, and splits for baskets, mats, and other purposes. The small cane is different

in habit from the large cane. It blooms sometimes two or more consecutive years without dying down to the root. Live stock like it as well as the large cane. Both grow best on rich lands, hills or bottoms: but they will grow on thin clay soil, improve it, and, if protected from stock, rapidly extend by sending out long roots (rootstocks) with buds.

The small cane is found sparingly as far north as Baltimore, Md. The large cane is probably confined to the Gulf States, but this is yet uncertain.

Whole number of genera.....120
Whole number of species.....675

SYNOPSIS OF THE TRIBES OF NORTH AMERICAN GRASSES.

Series 1.—Panicaceæ.

Spikelets articulated with the pedicel below the outer glumes, and consisting of one fertile terminal flower, and usually an inferior one which is male or sterile.

TRIBE 1.—PANICEÆ.

Fertile spikelets perfect, rarely by abortion unisexual (monœcious or diœcious,) spicate or paniculate. Outer glumes usually two, rarely one or none, flowering glume indurated in fruit, or at least more rigid than the outer ones, unawned.

GROUP 1.—Branches of the simple panicle spike-like, or variously branched, not produced beyond the spikelets.

Genera: 1. Reimeria; 2. Paspalum; 3. Anthænantia; 4. Amphicarpum; 5. Eriochloa; 6. Beckmannia; 7. Panicum; 8. Oplismenus; 9. Setaria.

GROUP 2.—Spikes or racemes simple, solitary or rarely paniculate. Spikelets surrounded by or intermixed with abortive branches of the panicle, forming a lobed or bristly involucre, which is deciduous with the spikelet.

Genera: 1. Cenchrus; 2. Pennisetum.

GROUP 3.—Spikes one to many on a common peduncle, rachis produced beyond the uppermost spikelet.

Genera: 1. Spartina; 2. Steuotaphrum.

GROUP 4.—

Anomalous genera: 1. Pharus.

TRIBE 2.—MAYDEÆ.

Spikelets unisexual; the male flowers terminal, spicate or paniculate; the female ones below, spicate, disarticulating (except in *Zea*) with the joints of the rhachis.

Genera: 1. *Coix*; 2. *Tripsacum*.

TRIBE 3.—ORYZEÆ.

Spikelets perfect, or rarely unisexual, paniculate or spicate. Outer glumes usually minute or absent, the flower apparently inclosed by two *one-nerved* glumes, the upper of which is generally considered a palet.

Genera: 1. *Hydrochloa*; 2. *Luziola*; 3. *Zizania*; 4. *Leersia*.

TRIBE 4.—TRISTEGINEÆ.

Spikelets perfect, paniculate or sparsely fasciculate. Glumes three or four, the two or three inferior ones empty, membranaceous; the terminal or flowering one awnless or often terminated with a geniculate awn, and with a hyaline or thinly membranaceous palet.

Genera: 1. *Thurberia*.

TRIBE 5.—ZOYSIEÆ.

Spikelets usually perfect, or some of them imperfect, articulated singly or in fascicles with the inarticulate rhachis of the simple spike; flowering glumes membranaceous; generally the outer or empty ones smaller and hyaline.

Genera: 1. *Hilaria*; 2. *Ægopogon*; 3. *Cathestechum*; 4. *Tragus*.

TRIBE 6.—ANDROPOGONEÆ.

Spikelets arranged along the rhachis of the spike or the branches of the panicle most commonly in twos, or the terminal ones in threes, homogamous or heterogamous in every pair. Flowering glume smaller than the empty ones, hyaline, often bearded.

GROUP 1.—Spikelets spicate, awnless, generally in pairs, in alternate notches of the generally articulate rhachis, one, rarely 2, sessile and fertile, more or less imbedded in the excavation of the rhachis, one pedicelled and sterile.

Genera : 1. Elionurus ; 2. Hemarthria ; 3. Rottbœllia ; 4. Manisuris.

GROUP 2.—Spikelets in pairs or threes, one sessile and fertile, and one or two pedicelled, male, empty or defective, arranged in spikes, spicate racemes, or open racemes, the flowering glume of the fertile flower commonly awned.

§ 1. Panicle strict or dense.

Genera : 1. Imperata ; 2. Erianthus.

§ 2. Panicle open and loose.

Genera : Andropogon ; Chrysopogon ; Sorghum.

§ 3. Flowers in a close spike.

Genera : 1. Heteropogon ; 2. Trachypogon ; 3. Ischæmum.

Series 2.—Poaceæ.

Spikelets usually not articulated with the pedicel below the glumes ; the rhachis continuous above the persistent lower glumes, and disarticulating with the flowers or persisting. The spikelets consist rarely of a single flower, or of one perfect and one or two inferior imperfect ones, or of from two to many flowers with the upper ones or some of them imperfect ; the rhachis sometimes produced beyond the upper flower as a stipe-like pedicel or as an imperfect flower. The lower glumes are rarely depauperate or wanting.

TRIBE 1.—PHALARIDEÆ.

Spikelets with one perfect terminal flower only, or with the addition of 2 male or imperfect ones, or with one or two sterile pedicels, below the perfect flower, and above the lower pair of glumes. Rhachilla not prolonged beyond the fertile flower. Perfect flower without a two-nerved palet.

GROUP 1.—Rhachis articulated below the spikelet. Flowers with 3 glumes and no palet.

Genus : 1. Alopecurus.

GROUP 2.—Rhachis articulated above the lower glumes.

Genera : 1. Phalaris ; 2. Anthoxanthum ; 3. Hierochloa.

TRIBE 2.—AGROSTIDEÆ.

Spikelet perfect, one-flowered ; rhachis often prolonged beyond the flower into a bristle or stipe.

SUBTRIBE 1.—STIPEÆ.

Spikelets paniculate. Rhachis not produced beyond the flower; beard of the flowering glume terminal.

Genera : 1. *Aristida*; 2. *Stipa*; 3. *Oryzopsis*; 4. *Milium*; 5. *Muhlenbergia*; 6. *Brachyelytrum*.

SUBTRIBE 2.—PHLEOIDEÆ.

Spikelets in a dense spike-like or ovoid panicle. Rhachis produced beyond the flower in a bristle, or naked. Flowering glumes awnless, or produced in one to three straight bristles.

Genera : 1. *Lycurus*; 2. *Heleochoa*; 3. *Phleum*.

SUBTRIBE 3.—SPOROBOLÆ.

Spikelets usually small, loosely spicate or variously paniculate. Rhachis not produced beyond the flower; glumes unawned, or the flowering glume rarely produced in a short straight beard.

Genera : 1. *Coleanthus*; 2. *Phippsia*; 3. *Sporobolus*.

SUBTRIBE 4.—EUAGROSTEÆ.

Spikelets generally small; variously paniculate. Flowering glume usually with a more or less twisted dorsal awn; rarely mucronate or awnless.

GROUP 1.—Rhachilla not produced beyond the flower.

Genera : 1. *Epicampes*; 2. *Agrostis*; 3. *Polypogon*; 4. *Arctagrostis*; 5. *Cinna*.

GROUP 2.—Rhachilla produced beyond the flower in a bristle which may be glabrous or most frequently hairy.

Genera : 1. *Gastridium*; 2. *Apera*; 3. *Deyeuxia*; 4. *Ammophila*.

TRIBE 3.—AVENEÆ.

Spikelets two-flowered, rarely many-flowered, often paniculate. Flowering glumes usually provided with a dorsal or sometimes a terminal awn, or awnless in some equally two-flowered genera.

SUBTRIBE AIREÆ.

Spikelets two-flowered, paniculate or rarely spicate; not produced

beyond the flowers; flowering glumes awnless or rarely with a thin short awn.

Genus: 1. *Aira*.

SUBTRIBE EUAVENEÆ.

Spikelets two to many flowered; rhachilla more or less produced beyond the flowers; flowering glumes commonly with a dorsal or terminal geniculate awn.

Genera: 1. *Corynephorus*; 2. *Deschampsia*; 3. *Holcus*; 4. *Düpontia*; 5. *Grappheporum*; 6. *Trisetum*; 7. *Avena*; 8. *Arrhenatherum*; 9. *Danthonia*.

TRIBE 4.—CHLORIDEÆ.

Spikelets one to many flowered, sessile and secund in two rows along the rhachis of one-sided spikes.

GROUP 1.—One or rarely two fertile flowers in the spikelet.

Genera: 1, *Cynodon*; 2. *Ctenium*; 3. *Chloris*; 4. *Trichloris*; 5. *Gymnopogon*; 6. *Schedonnardus*; 7. *Bouteloua*.

GROUP 2.—Two to many fertile flowers in each spikelet.

Genera: 1. *Eleusine*; 2. *Leptochloa*; 3. *Buchloë*.

TRIBE 5.—FESTUCACEÆ.

Spikelets two to many flowered, variously paniculate or rarely racemose. Flowering glumes awnless, or terminated by one to many awns.

SUBTRIBE 1.—PAPPOPHOREÆ.

Spikelets usually few-flowered; flowering glumes three to many awned.

Genera: 1. *Pappophorum*; 2. *Cottea*.

SUBTRIBE 2.—TRIODIEÆ.

Spikelets many-flowered, rarely one or two flowered, rhachilla glabrous or short pilose; glumes one to three nerved, or rarely many-nerved, three-toothed, three-divided, or three-awned.

Genera: 1. *Triodia*; 2. *Diplachne*; 3. *Triplasis*; 4. *Eremochloa*; 5. *Scleropogon*.

SUBTRIBE 3.—ARUNDINEÆ.

Tall grasses with a many-flowered panicle; spikelets two to many flowered; rhachilla or the flowering glumes generally long pilose; flowering glumes three-toothed, or one to three-awned.

Genera : 1. *Arundo*; 2. *Phragmites*.

SUBTRIBE 4.—SESLERLÆ.

Spikelets capitate, subspicate, or appressed in a spike-like panicle; flowering glumes three to five nerved.

Genera : 1. *Monanthochloe*; 2. *Munroa*; 3. *Lamarckia*.

SUBTRIBE 5.—ERAGROSTEÆ.

Spikelets variously paniculate; flowering glumes, mostly three-nerved, rarely one-nerved.

Genera : 1. *Koeleria*; 2. *Eatonia*; 3. *Dissanthelium*; 4. *Catabrosa*; 5. *Eragrostis*.

SUBTRIBE 6.—MELICEÆ.

Flowering glumes three to five or many nerved, more or less involute, the upper two or more empty or imperfect.

Genera : 1. *Melica*; 2. *Diarrhena*; 3. *Streptogyne*.

SUBTRIBE 7.—EUFESTUCEÆ.

Flowering glumes five to many nerved, the upper one empty, style short, stigmas plumose; leaves generally narrow, without transverse veins.

Genera : 1. *Pleuropogon*; 2. *Uniola*; 3. *Distichlis*; 4. *Dactylis*; 5. *Briza*; 6. *Poa*; 7. *Glyceria*; 8. *Arctophila*; 9. *Fluminia*; 10. *Festuca*; 11. *Bromus*.

TRIBE 6.—HORDEACEÆ.

Spikelets one to many flowered, sessile on the teeth or excavations of the rhachis of the simple spike.

SUBTRIBE 1.—TRITICEÆ.

Spikelets solitary at the nodes, three to many flowered, rarely two flowered; spike usually stout.

Genera : 1. *Lolium*; 2. *Agropyrum*.

SUBTRIBE 2.—LEPTUREÆ.

Spikelets one to two flowered, solitary at the nodes; spikes slender.

Genus: 1. *Lepturus*.

SUBTRIBE 3.—ELYMEÆ.

Spikelets two to many at each joint of the rhachis. Spike generally stout.

Genera: 1. *Hordeum*; 2. *Elymus*; 3. *Asprella*.

TRIBE 7.—BAMBUSEÆ.

Tall grasses, often woody, at least at the base. Leaves flat, generally articulated with the sheath; spikelets one to many flowered; stamens 3, 4, or many.

Genus: 1. *Arundinaria*.

ERRATA.

Page 82, line 16, for *tennifolia* read *tenuifolia*.

“ 83, number 33, for *P. Pringlii* read *P. Pringlei*.

“ 85, 2d line from bottom, for *P. memoralis* read *P. nemoralis*.

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