Bulletin No. 371 - Key to the Major Grasses of the Big Horn Mountains Based on Vegetative Characters

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Key to the Major Grasses of the Big Horn Mountains

Based on Vegetative Characters

by Morton May

University of Wyoming
Agricultural Experiment Station

July 1960
The Parts of a Typical Grass Plant

- Midrib
- SHEATH
- Node
- Auricles
- Stem (Culm)
- BLADE
- Internode
- Collar
- Ligule
Key to the Major Grasses of the Big Horn Mountains, Wyoming, Based on Vegetative Characters

by MORTON MAY, Range Conservationist*

It is often necessary to identify native range grasses before flowering, during unusual dry periods, when flower heads are not produced, or when most of the flowering parts have been utilized by livestock. The usual taxonomic criteria based on structure and arrangement of the flowering parts are not useful under these conditions. This paper purports to present a simple, usable key based entirely on vegetative characters for use when flowering parts are not available.

Adaptability of grasses to various site conditions is indicated by their presence in numerous habitats. This adaptability results when several kinds of grasses are able to occupy the various ecological niches rather than the adaptability of a single species. The selectivity of certain species, making them incapable of growing in all the ecological niches, makes it possible to use site conditions as an aid in identification where the separation of two species is indefinite.

Although the vegetative characters of grasses over wide areas are normally constant, it is possible that local variations may arise. Hence this publication will be restricted to the major grass species found in the Big Horn Mountains of Wyoming.

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FIG. 1—Creeping rhizomes. Note scale-like leaves
**VEGETATIVE CHARACTERS OF GRASSES**

**Roots:** Roots in all grasses are fibrous and are important as a distinct vegetative character largely in separating annual from perennial grasses. Most annual grasses have a root system that is comparatively smaller and more confined than that of the perennial grasses.

**Stems:** The stems (culms) of grasses are usually of five groups: (1) erect; (2) reclining (decumbent); (3) abruptly bent (geniculate); (4) prostrate above ground, rooting at the nodes (stolons); and (5) prostrate underground, jointed stems (rhizomes or root stalks) having scale-like, reduced leaves (Figure 1).

**Nodes:** The stems are made up of a number of joints (nodes) which appear as narrow, swollen rings. The portions of stem between these joints are referred to as internodes. The nodes in a few species are covered by fine soft hair (pubescent) while in others they are devoid of hairs of any sort (glabrous). The node commonly differs in color from the sheaths and internodes.

**Vernation:** Vernation refers to the particular manner in which the young leaf blades are rolled or folded before they emerge from the sheaths. In folded vernation the leaf edges (in cross-section) do not overlap, in rolled vernation they do (Figures 2 and 3). Vernation can often be checked by examining leaf blades as they naturally unfold from the sheath.

**Leaves:** The leaves of grasses are alternately arranged in two rows, although this arrangement is not always readily visible (Figures 4 and 5). A grass leaf is composed of the sheath, the blade, the ligule, the collar, and the auricle.

**Sheaths:** The sheath encloses the stem. The sheaths of grasses may be completely open or they may be closed (tube-like) for one-half or more of their length. Sometimes the pressure of the expanding inner leaves will cause a closed sheath to tear open longitudinally, but margins in such cases will not be smooth and even, as it is on those which are naturally open. Some grasses with closed sheaths are species of: (1) Bromus, (2) Melica, (3) Glycera, (4) Dactylis, and (5) Schizachne as well as (6) Poa nervosa.

Occasionally the sheaths, especially near or at ground level, bear a tinge of red or purple color. Such coloring may disappear as the herbage nears maturity. Other useful sheath characters are: (1) shape in cross-section; (2) presence or absence and the degree of hairiness; (3) smooth, or rough to the touch (scabrous); (4) persistence of old sheaths; (5) sheaths that fit snugly or loosely on the stems; and (6) sheaths that are inflated or contain cavities in back (Figures 6 and 7).

**Blades:** The blade may be flat, folded, both edges inwardly rolled (involute) (Figure 8), one edge wholly rolled in the other (convolute) (Figure 9), threadlike (filiform), or keeled (resembling the sharp keel of a boat). Many blades have whitish margins which commonly bear a row of little barbs or fine teeth. If the leaf tip is closed and
FIG. 2—Vernation—rolled
FIG. 3—Vernation—folded
FIG. 4—Two-ranked phyllotaxy (grasses). Stems usually hollow
FIG. 5—Three-ranked phyllotaxy (sedges and rushes). Rush stems cylindrical and not hollow.
FIG. 6—Cavities back of sheath
FIG. 7—Inflated sheaths as in *Phleum alpinum*
FIG. 8—Involute (inrolled leaf)

FIG. 9—Convolute (inrolled leaf)
shaped like the prow of a boat it is termed “boat-shaped” (Figure 10), or it may be sharp (acute) or tapering to a point (acuminate). In some species the blade width becomes narrower near the sheath (Fig. 13). Some grass blades have nerves or veins that are prominent and stand out as parallel ridges (striated), while in others the nerves are indistinct. In most species of *Poa* the midrib appears to be bordered by a fine light green line (median line) on either side (Figure 11), the rest of the blade being inconspicuously nerved and unridged. Other characters often used in describing the blade are the presence or absence of hairs, rough or smooth surfaces, constrictions (Figures 12 and 13), green, yellowish, or bluegreen (glaucous) tinges, and marginal characters.

At the junction of the sheath and blade are three important vegetative characters: (1) the auricles, (2) the ligule, and (3) the collar.

**Auricles:** Auricles are earlike appendages at the summit of the sheath, common in the tribe Hordeae. They also occur in some species of the genus *Festuca*. In other species they may be rudimentary or absent on some of the leaves. In most grasses the auricles are colorless or light green, but in a few species they are tinged with red or purple.

**Ligules:** The ligule, an epidermal structure, is probably a continuation of the lining of the sheath. Because of its several stable forms the ligule is considered to furnish the most constant and usable characters for identification. The shape, structure, margin, and even length varies but within usable limits (Figures 14, 15, 16, and 17). The ligule is usually membranaceous with various margins, but in some species it is wholly absent or made up completely or mostly of hairs (Figure 18).

**Collars:** The collar is a thickened, apparently veinless, ringlike region on the outside of the grass leaf which marks the junction of the sheath and blade. In some species of grasses extra long hairs are present on the collar. In most grasses the collar is continuous from one margin of the sheath or blade to the other, but in some species it is divided by the midnerve.
FIG. 10—Boat-shaped tip of blade as in genus *Poa*
FIG. 11—Median line on upper surface of blade as in the genus *Poa*
FIG. 12—Constriction in blade found in the genus *Bromus*
FIG. 13—Blade constricted near the sheath
FIG. 14—Pointed (acute) ligule
FIG. 15—Square-tipped (truncate) ligule
FIG. 16—Collar-shaped ligule
FIG. 17—Notched ligule as in Stipa comata
FIG. 18—Ligule composed mainly of hairs as in the genus *Danthonia*
CONSTRUCTION AND USE OF THE KEY

The key is dichotomously arranged with contrasting groups of characters having like numbers. For example, if the plant in question does not possess the characters listed under “1”, then the proper course is to proceed to the next paragraph marked “1”. If the plant to be identified has the characters listed under “1”, then the proper course is to proceed to the following indented paragraph marked “2”, etc.

The number in parentheses following the plant name in the key refers to the number given this grass in the general description following the key. For convenience the arrangement of the species in the descriptive list is alphabetical.

As there are many more grasses in the Big Horn Mountains than this key includes, it is possible that some grasses not mentioned in this publication might be keyed and given wrong names. If the plant in question is consistent with the requirements of the key, but does not correspond with the detailed description following the key, it must be assumed that it is not included in this publication.

Although the metric (mm) system is used for small measurements, the English measurement (inches) is also given for plant heights to enable them to be more easily visualized.

The authorities and common plant names given in this publication are in accordance with the Manual of the Plants of Colorado (Harrington, 1954), Standardized Plant Names (Kelsey and Dayton, 1942), and the Manual of the Grasses of the United States (Hitchcock, 1950).
VEGETATIVE KEY

1. Ligules composed mostly or entirely of hairs (Figure 18)

2. Sheaths usually devoid of hairs except for long hairs in the throat
   \[ Danthonia intermedia (28) \]
3. Sheaths covered with long soft hairs
   \[ Danthonia unispicata (29) \]

1. Ligules membranous

3. Sheaths closed for one-half or more of their length, forming a tube

4. Plants annual

5. Ligules 2-3 mm. long, rounded in the center and with long, pointed teeth
   \[ Bromus tectorum (23) \]
6. Ligules 1-2 mm. long, collar-shaped (Figure 16) to pointed (Figure 14) in the center, margin toothed
   \[ Bromus japonicus (20) \]

4. Plants perennial

6. Leaf blades with median lines (light-green line on either side of midrib) (Figure 11) and boat-shaped tips (Figure 10)
   \[ Poa nervosa (56) \]
7. Stems bulbous at base
   \[ Melica spectabilis (39) \]
8. Leaf vernation folded (Figure 3)

9. Sheaths strongly compressed; plant usually found in fields, waste lands, roadsides, on dry soils
   \[ Dactylis glomerata (27) \]
10. Stems without creeping rhizomes

8. Leaf vernation rolled (Figure 2)

11. Leaf blades smooth, devoid of hairs; sheaths usually devoid of hairs; plants usually growing along ditches, waste land, and roadsides, especially near cultivated fields
   \[ Bromus inermis (19) \]

12. Ligules 3.0-3.5 mm. long, rounded to square-tipped (Figure 15)
   \[ Bromus marginatus (21) \]
12. Ligules not exceeding 2 mm. in length
13. Blades not exceeding 5 mm. in width
14. Ligules 1.0-1.5 mm. long, collar-shaped (Figure 16), joined in the front; sheaths usually devoid of hairs. \textit{Schizachne purpurascens} (61)
14. Ligules 1.0-2.0 mm. long, square-tipped (Figure 15), not joined in the front, sheaths usually sparsely covered with long hairs. \textit{Bromus anomalus} (17)
13. Blades 5-10 mm. wide; sheaths conspicuously hairy \textit{Bromus ciliatus} (18)

3. Sheaths open for one-half or more of their length, not forming a tube
15. Leaf blades with median line (light green on either side of midrib) (Figure 11) and boat-shaped tips (Figure 10)
16. Plants annual 2-10 inches (5-25 cm.) tall; sheaths compressed and devoid of hairs \textit{Poa annua} (48)
16. Plants perennial
17. Ligules 2-5 mm. long, usually pointed (Figure 14)
18. Plants short (stems rarely exceeding 12 inches [30 cm.] in height) of higher elevations with one leaf about middle of stem
19. Stems with creeping rhizomes (Figure 1) \textit{Poa arctica} (49)
19. Stems without creeping rhizomes \textit{Poa alpina} (46)
18. Plants not as above
20. Stems in bunches
21. Bunches large; stems 18-48 inches (46-122 cm.) tall, usually bluish in color \textit{Poa canbyi} (50)
21. Bunches small to moderate in size; stems usually not more than 12 inches (30 cm.) tall, but occasionally to 24 inches (61 cm.) tall \textit{Poa secunda} (60)
20. Stems solitary or in small tufts
22. Stems solitary or few in a tuft, 8-16 inches (20-41 cm.) tall; sheaths round; blades 2-3 mm. wide; plants usually found in meadows above timberline \textit{Poa epilis} (52)
22. Stems loosely tufted from a reclining, usually flattened purplish base, 12-32 inches (30-81 cm.) tall; sheaths keeled, often slightly compressed; blades 1-2 mm. wide; plants usually found in meadows and aspen groves at lower elevations \textit{Poa palustris} (57)
17. Ligules usually less than 2 mm. long and not pointed
23. Stems with conspicuous creeping rhizomes (Figure 1) \textit{Poa pratensis} (58)
23. Stems without conspicuous creeping rhizomes
24. Blades threadlike, basal, erect, stiff... Poa cusickii (51)
24. Blades flat, folded, or inrolled (Figure 8) but not threadlike
25. Stems rough, blades very rough, sheaths somewhat rough... Poa fendleriana (53)
25. Stems, blades, and/or sheaths not as above, or at least not all three rough
26. Stems solitary or in small tufts... Poa reflexa (59)
26. Stems not solitary or in small tufts (bunch type)
27. Ligules rudimentary or completely absent... Poa interior (54)
27. Ligules present
28. Stems in large bunches, 24-48 inches (61-122 cm.) tall; ligules to 2.0 mm. long, rounded or square-tipped (Figure 15); plant bluish-green... Poa ampla (47)
28. Stems in small to moderate-size bunches, 16-40 inches (41-102 cm.) tall; ligule about 1 mm. long, collar shaped (Figure 16) Poa juncifolia (55)
15. Leaf blades without median lines (light-green lines on either side of midrib), or, if median lines present, lacking boat-shaped tips
29. Auricles present
30. Stems with creeping rhizomes (Figure 1)
31. Auricles small, sometimes rudimentary on the lower leaves
32. Stems whitish in color; sheaths somewhat rough to the touch Agropyron albicans: (1)
32. Stems greenish; blades with whitish margins that are weakly barbed Agropyron griffithsii (3)
31. Auricles large
33. Blades yellow-green in color; ligules square-tipped (Figure 15) less than 1 mm. long... Agropyron dasystachyum (2)
33. Blades bluish-green in color, stiff, tapering to a sharp point; ligules collar-shaped (Figure 16), less than 0.5 mm. long... Agropyron smithii (6)
30. Stems without conspicuous creeping rhizomes
34. Leaf blades 8-20 mm. wide... Elymus canadensis (31)
34. Leaf blades usually less than 8 mm. wide
35. Auricles long, usually over 2 mm. in length
36. Sheaths and blades inconspicuously hairy; stems 6-30 inches (15-51 cm.) tall, erect to spreading
37. Sheaths often enlarged or inflated (Figure 7); plants on dry soils of low elevations .................................................. *Sitanion hystrix* (62)

37. Sheaths not enlarged or inflated; plants restricted to alpine regions ................................................................. *Agropyron latiglume* (4)

36. Sheaths and blades devoid of hairs; stems erect, 24-49 inches (61-124 cm.) tall .................................................. *Agropyron spicatum* (7)

35. Auricles short, usually not exceeding 1 mm. in length

38. Stems 8-16 inches (20-41 cm.) tall, base of the stem bent, more or less reclining or spreading along the ground; plant usually found at or above timber-line ................................................................. *Agropyron scribneri* (5)

38. Stems erect, 12-50 inches (30-127 cm.) tall

39. Leaf blades stiff and threadlike, bluish in color .................................................. *Festuca idahoensis* (32)

39. Leaf blades flat, 2.0-9.5 mm. wide

40. Leaf blades with narrow whitish margins .................................................. *Agropyron trachycaulum* (9)

40. Leaf blades without whitish margins; collars divided or continuous, tinged red or purple .................................................. *Agropyron subsecundum* (8)

29. Auricles absent

41. Stems with conspicuous creeping rhizomes

42. Plants with sweet fragrance (vanilla); blades a shiny yellow-green on upper surface .................................................. *Hierochloe odorata* (36)

42. Plants without sweet fragrance; blades not a shiny yellow-green on upper surface

43. Blades 1-2 mm. wide, up to 2 inches (5 cm.) long .................................................. *Muhlenbergia richardsonis* (40)

43. Blades 3-12 mm. wide, over 2 inches (5 cm.) long

44. Stems hollow; ligules 5-6 mm. long, rounded to bluntly pointed .................................................. *Glyceria pauciflora* (34)

44. Stems and ligules not as above

45. Margins of leaf blades strongly barbed .................................................. *Agrostis alba* (10)

45. Margins of leaf blades not strongly barbed .................................................. *Calamagrostis canadensis* (24)

41. Stems without rhizomes, or, if present, they are short and inconspicuous

46. Ligules usually 2 mm. long or longer

47. Stems from a swollen or bulblike base .................................................. *Phleum pratense* (45)
47. Stems not from swollen or bulblike base

48. Sheaths with large cavities in back (Figure 6)

49. Ligules 5-11 mm. long, pointed (Figure 14); vernation folded (Figure 3); blades without whitish margins; plants usually found in bogs, along streams, and in wet meadows. Deschampsia caespitosa (30)

49. Ligules 3-5 mm. long, rounded; vernation rolled (Figure 2); blades with distinct whitish margins; plants usually found in mountain parks on sandy soils. Calamagrostis purpurascens (25)

48. Sheaths without large cavities

50. Ligules sharp-pointed (Figure 14)

51. Sheaths with long ciliate hairs on one margin Oryzopsis hymenoides (43)

51. Sheaths without long hairs on one margin

52. Blades flat, soft, 1-4 mm. wide; plants usually growing in shallow water or wet places. Alopecurus aequalis (15)

52. Blades threadlike, stiffly erect, 1 mm. wide; plants usually found on dry, open ground or open woods Oryzopsis exigua (42)

50. Ligules rounded, collar-shaped (Figure 16), square-tipped (Figure 15), or deeply notched (Figure 17)

53. Vernation folded (Figure 3) Stipa comata (64)

53. Vernation rolled (Figure 2)

54. Ligules square-tipped (Figure 15), 2-6 mm. long, often deeply split; sheaths hairy or rough; blades flat, 1-5 mm. wide. Agrostis exarata (11)

54. Ligules irregularly toothed, 2-4 mm. long; sheaths devoid of hairs and somewhat keeled; blades almost threadlike, 1-3 mm. wide Agrostis scabra (13)

46. Ligules usually less than 2 mm. long

55. Vernation folded (Figure 3)

56. Stems distinctly flattened at the base Andropogon scoparius (16)

56. Stems not flattened at the base

57. Stems bent or reclining at reddish or purplish base; plants usually found in wet mountain meadows and marshes Festuca rubra (33)
57. Stems erect, not bent or reclining; plants usually growing on open, dry soils. Koeleria cristata (38)

55. Vernation rolled (Figure 3)

58. Leaf blades stiff and inrolled

59. Blades threadlike, bluish in color. Festuca idahoensis (32)

59. Blades not as above

60. Nodes few, often purplish; leaf blades constricted at the throat (Figure 13). Stipa columbiana (63)

60. Nodes and leaf blades not as above

61. Ligules 0.5-1.0 mm. long; sheaths round; stems 20-40 inches (51-102 cm.) Stipa richardsonii (66)

61. Ligules 1-2 mm. long; sheaths slightly keeled; stems 11-15 inches (28-38 cm.) tall. Stipa leuermannii (65)

58. Leaf blades flat, folded, or "U" shaped

62. Stems nearly naked (2 or 3 stem sheaths bearing reduced or obsolete blades); collars lacking on basal leaves but present on short culm leaves. Oryzopsis asperifolia (41)

62. Stems not as above

63. Leaf blades no more than 2 mm. wide; stems usually no more than 16 inches (41 cm.) tall

64. Leaf blades usually no more than 1 mm. wide; stems usually no more than 6 inches (15 cm.) tall; lower sheaths scarcely 1 mm. in diameter. Agrostis humilis (12)

64. Leaf blades about 2 mm. wide; stems usually 8-16 inches (20-41 cm.) tall. Agrostis thurberiana (14)

63. Leaf blades 2-8 mm. wide; stems 4-40 inches (10-102 cm.) tall

65. Sheaths inflated (Figure 7) and with broad transparent margins. Phleum alpinum (44)

65. Sheaths not as above

66. Nodes, sheaths, blades, and collars hairy; usually found in moist alpine meadows. Trisetum spicatum (67)

66. Nodes, sheaths, blades, and/or collars not hairy, at least not all four

—27—
67. Stem nodes very dark, devoid of hairs; sheaths thin, often shredded, lowermost rather densely hairy; plant growing in meadows and moist places at various elevations. \textit{Hordeum brachyantherum} (37)

67. Stem nodes and sheaths not as above

68. Blades heavily veined, firm, bluish in color; plant usually found on open rocky slopes. \textit{Hesperochloa kingii} (35)

68. Blades not heavily veined or bluish in color; plant usually found on moist ground at forest margin. \textit{Trisetum wolfii} (68)
VEGETATIVE DESCRIPTIONS

Agropyron—definite auricles; leaf blades flat or rolled inward, usually harsh to the touch; sheaths open; ligules membranous.

(1) Agropyron albicans Scribn. & Smith (Montana wheatgrass). Perennial grass resembling A. dasystachyum (Hook.) Scribn. Stems whitish in color, 16-30 inches (41-76 cm.) tall, with creeping rhizomes; vernation rolled; blades usually rough to the touch, 1-3 mm. wide, flat or rolled inward; ligules short (less than 1 mm. long), collar-shaped; auricles present but small and not clasping the stem. Habitat—commonly found on dry foot hills and dry, south-facing slopes in association with sagebrush, preferring sandy and gravelly soils.

(2) Agropyron dasystachyum (Hook.) Scribn. (Thickspike wheatgrass). Perennial grass similar to A. albicans. Scribn. & Smith. Herbage generally less coarse than other species and yellow-green in color. Stems 16-38 inches (41-97 cm.) tall with creeping rhizomes and thick flower stalks; vernation rolled; sheaths open, round, smooth, veins distinct, white to pinkish below or near ground level; blades 1-3 mm. wide, flat or rolled inward, devoid of hairs on lower surface, with parallel ridges on upper surfaces; ligules less than 1 mm. long, square-tipped; auricles conspicuous and clasping the stem; collar distinct, continuous and often red-tinged. Habitat — commonly found on the deep, dry soils of the high benchlands or on gently sloping to flat areas, preferring sandy and gravelly soils.

(3) Agropyron griffithsii Scribn. & Smith (Griffiths wheatgrass). Perennial. Stems devoid of hairs, 16-32 inches (41-81 cm.) tall, with creeping rhizomes; vernation rolled; sheaths open, devoid of hairs, nearly round; blades flat or rolled inward, 1-3 mm. wide, fairly clear whitish margin that is weakly barbed; ligules 0.5-1.0 mm. long, collar-shaped; auricles small, often rudimentary, especially on lower leaves. Habitat—similar habitat to A. albicans except more common to the west- and north-facing slopes where the soil is not quite as dry.

(4) Agropyron latiglume (Scribn. & Smith) Rydb. (Pubescent slender wheatgrass). Perennial similar to A. trachycaulum except that it is hairy. Stems loosely tufted, curved or abruptly bent at the base, 8-20 inches (20-51 cm.) tall, without creeping rhizomes; nodes devoid of hairs or with short hairs below the nodes; vernation rolled; sheaths inconspicuously hairy, open; blades numerous, 3-5 mm. wide, flat, and inconspicuously hairy on both surfaces; ligule short (approximately 0.5 mm. long), collar-shaped. Auricles small. Habitat—alpine region, rare in Wyoming (only three localities known).

(5) Agropyron scribneri Vasey (Scribner wheatgrass). Perennial. Stems 8-16 inches (20-41 cm.) tall, more or less reclining or spreading
along the ground, often abruptly bent, without creeping rhizomes; vernation rolled; sheaths open, round, usually covered with short hairs, sometimes devoid of hairs; blades mostly basal, rather rigid, flat or rolled inward, 2-5 mm. wide, hairy on both surfaces, margin a narrow whitish band, the 2- or 3-stem blades are usually less than 2 inches (5 cm.) long and 1-3 mm. wide; ligule usually less than 1 mm. long (approximately 0.6 mm.), collar-shaped; auricles small, usually less than 1 mm. long. Habitat—alpine slopes, mountain tops, and drier sites above timberline.

(6) Agropyron smithii Rydb. (Blue-stem wheatgrass). Perennial. Blue-green in color and devoid of hair. Stems rigid, erect, 12-30 inches (30-76 cm.) tall, with strong, extensively creeping rhizomes; nodes enlarged, darker than the stem; vernation rolled; sheaths open, smooth, devoid of hairs; blades flat or rolled inward, stiff, rough to the touch, about 2.5 mm. wide, tapering to a sharp point, margin finely barbed, nerves conspicuously raised on upper surface; ligule short (less than 0.5 mm. long), collar-shaped; auricles rather large. Habitat—open plains and hillsides. Commonly found on low benchlands to swales and on alkaline soil.

(7) Agropyron spicatum (Pursh) Scribn. & Smith (Bearded bluebunch wheatgrass). Perennial. Often bluish in color. Erect, dry herbage conspicuously curled and twisted. Stems slender, erect, 24-46 inches (61-117 cm.) tall, smooth and devoid of hairs, without creeping rhizomes; nodes hairy; vernation rolled; sheaths open, never hairy, round, veins indistinct, often red to purple below ground; blades flat or rolled inward, 1-3 mm. wide, devoid of hairs on lower surface, with or without hairs on the upper surface, upper surface prominently veined; ligule short (less than 1 mm. long), collar-shaped or square-tipped; auricles long, clasping the stem, usually reddish-tinged; collar usually reddish-tinged. Habitat—found on various sites at the lower elevations throughout Wyoming.

(8) Agropyron subsecundum (Link) Hitch. (Bearded wheatgrass). Perennial. Stems erect, 20-42 (51-107 cm.) tall, smooth, without creeping rhizomes; vernation rolled; sheaths open, usually devoid of hairs; blades flat, rather broad (3-8 mm. wide), green or bluish in color; ligule short (approximately 0.5 mm. long), collar-shaped; auricles short; collar continuous or divided by midrib, usually tinged red or purple. Habitat—commonly found in the forest or forest margin, or on moist slopes on light, sandy soils.

(9) Agropyron trachycalum (Link) Malte (Slender wheatgrass). Perennial. Often in large bunches. Stems erect, 20-50 inches (51-127 cm.) tall, without creeping rhizomes; vernation rolled; sheaths open, round, usually devoid of hairs or lower ones sometimes hairy; blades flat or rolled inward, 2-8 mm. wide, whitish margin is narrow and slightly barbed; ligule 0.5-1.0 mm. long, collar-shaped; auricles small and often rudimentary. Habitat—open hillsides, meadows, and open aspen groves of moderate elevations. Preferring light, sandy soils. Rarely found in shaded areas.
Agrostis—the vegetative characters of this genus are variable, but they are usually rather fine-leaved plants of medium size.

(10) Agrostis alba L. (Redtop). Perennial. Stems erect or curved at the base, 18-48 inches (46-122 cm.) tall, with strong, creeping rhizomes; vernation rolled; sheaths open, oval and somewhat keeled, devoid of hairs; blades 3-8 mm. wide (mostly 4-5 mm.), flat or slightly keeled, nerves raised on upper surface, margin rather strongly barbed; ligule rather variable to 4 mm. long, rounded, margins somewhat toothed, often deeply split; auricles absent. Habitat—subalpine meadows and along streams. Commonly found in the shade of willows.

(11) Agrostis exarata Trin. (Spike bentgrass). Perennial. Stems erect, 4-40 inches tall, (10-102 cm.), without creeping rhizomes; vernation rolled; sheaths open, usually hairy or rough; blades erect, flat, 1-8 mm. wide, mostly basal; ligule 2-6 mm. long, square-tipped, often deeply split; auricles absent. Habitat—meadows and moist soils, commonly under cultivation.

(12) Agrostis humilis Vasey (Alpine bentgrass). Perennial. Stems low, tufted, usually no more than 6 inches (15 cm.) tall, without creeping rhizomes; vernation rolled; sheaths open, lacking hairs, lower sheaths scarcely 1 mm. in diameter; blades mostly basal, flat or folded, usually no more than 1 mm. wide, somewhat rough to the touch on upper surface, usually only one blade on each stem; ligules 1-2 mm. long; auricles absent. Habitat—subalpine meadows and along streams. Commonly found on alkaline soils.

(13) Agrostis scabra Willd. (Winter bentgrass). Perennial. Stems slender, 10-50 inches (25-127 cm.) tall, without creeping rhizomes; vernation weakly rolled; sheaths open, round, somewhat keeled, lacking hairs; blades narrow, almost threadlike, 0.6-2 mm. wide, margin somewhat barbed; ligule 2-4 mm. long, margin irregularly toothed; auricles absent. Habitat—commonly found on moist, well-drained, open ground and along the edges of mountain meadows.

(14) Agrostis thurberiana Hitchc. (Thurber bentgrass). Perennial. Stems slender, erect, in small tufts, 8-16 inches (20-41 cm.) tall, sometimes more or less spreading at the base, devoid of hairs, without creeping rhizomes; vernation rolled; sheaths open, devoid of hairs; blades mostly basal (appearing crowded at the base), flat, about 2 mm. wide; ligules 1-2 mm. long; auricles absent. Habitat—commonly found in the shade of willows in subalpine meadows or along streams.
Alopecurus—low or moderately tall perennials (rarely annuals) with flat blades, usually occupying moist and wet areas.

(15) Alopecurus aequalis Sobol. (Shortawn foxtail). Perennial. Stems erect or spreading, 12-24 inches (30-61 cm.) tall, without creeping rhizomes, but the clumps often large as a result of free rooting and branching from the lower nodes; lower nodes purplish in color; vernation rolled; sheaths open, devoid of hairs, nearly round, somewhat keeled near collar; blades flat, soft, usually light green in color, 1.4 mm. wide, margin weakly barbed, nerves distinctly raised on upper surface, little raised below except for the midrib; ligule 2.5 mm. long, pointed, margins not toothed; auricles absent. Habitat—in shallow water or wet places bordering mountain streams and lakes of various elevations.

Andropogon—plants with tall, tufted stems that are flattened at the base.

(16) Andropogon scoparius Michx. (Little bluestem). Perennial. Stems up to 42 inches (107 cm.) tall, in bunches, flattened at the base, often reddish brown or purple in color, short rhizomes sometimes present; vernation folded; sheaths open, definitely keeled, devoid of hairs or nearly so; blades flat, 3-6 mm. wide, hairless or nearly so, frequently turning reddish in late summer; ligule 1.0-1.5 mm. long, collar-shaped to rounded in center; auricles absent; collars sparsely covered with long hairs. Habitat—generally restricted in Wyoming to the calcareous soils of the eastern prairies and yellow pine woods of low elevations.

Bromus—plants with leaf blades that are characteristically broad, and usually with constrictions in the width. The edges of the sheath are grown together, forming a tube around the stem.

(17) Bromus anomalus Rupr. ex. Fourn. (Nodding brome). Perennial. Stems slender 11-22 inches (28-56 cm.) tall, without creeping rhizomes; nodes hairy; sheaths closed, usually sparsely covered with long hairs; blades flat, 2-4 mm. wide, rough to the touch; ligules 1-2 mm. long, square-tipped; auricles absent. Habitat—moist open woods.

(18) Bromus ciliatus L. (Fringed brome). Perennial. Stems slender, devoid of hairs, 24-45 inches tall (61-114 cm.), without creeping rhizomes; nodes dark, sometimes with hairs; vernation rolled; sheaths closed, nearly round, conspicuously hairy; blades flat, 5-10 mm. wide, margins rough; ligules 0.5-1.0 mm. long, collar-shaped, margins slightly toothed; auricles absent or sometimes rudimentary. Habitat—moist woods and rocky slopes.

(19) Bromus inermis Leyss. (Smooth...
brome). Perennial introduced from Europe. Very similar to *B. pumpellianus* Scribn. Stems erect and leafy, 18-42 inches (46-107 cm.) tall, with long creeping rhizomes forming dense sod; vernation rolled; sheaths round to oval, closed for most of its length, smooth and usually devoid of hairs; blades smooth, flat, 5-12 mm. wide, devoid of hairs, veins not conspicuous but midrib keeled on the lower surface, margin rough to the touch; ligules 1.5-2.0 mm. long, collar-shaped; auricles absent or rudimentary. Habitat—commonly found in disturbed areas along ditches, trails, roadides, and cultivated fields, and in meadows to tree line.

(20) *Bromus japonicus* Thurb. (Japanese brome). Annual. Stems 8-24 inches (20-61 cm.) tall, without creeping rhizomes; vernation rolled; sheaths round, closed for one-half or more of its length, densely hairy; blades hairy, 3-8 mm. wide; ligules 1.2 mm. long, collar-shaped to pointed in the center, margin toothed; auricles absent. Habitat—annual weed in disturbed areas.

(21) *Bromus marginalus* Ness (Mountain brome). Biennial or mostly perennial. Stems erect, 18-36 inches (46-91 cm.) tall, without creeping rhizomes; vernation rolled; sheaths closed, conspicuously covered with long hairs; blades flat, hairy, 5-12 mm. wide; ligules 3.0-3.5 mm. long, rounded to square-tipped, auricles absent. Habitat—usually found in open aspen woods and disturbed places of the foothills.

(22) *Bromus pumpellianus* Scribn. (Pumpelly brome). Perennial. Stems 12-36 inches (30-91 cm.) tall, with creeping rhizomes; vernation rolled; sheaths closed, usually with hairs; blades rather short, 5-10 mm. wide, devoid of hairs on lower surface, rough or somewhat hairy on upper surface; ligules 0.5-1.0 mm. long, square-tipped, firm; small auricles present. Habitat—commonly found in high mountain meadows and grassy slopes.

(23) *Bromus tectorum* L. (Cheatgrass brome). Annual. Stems slender, from a few inches to 24 inches (61 cm.) tall, without creeping rhizomes; vernation rolled; sheaths round and weakly keeled, closed, densely hairy, heavily veined (the veins pinkish below ground); blades 3-7 mm. wide, hairy on both surfaces and margin; ligules 2-3 mm. long, rounded in the center and with long pointed teeth; collar narrow, hairy, continuous. Habitat—usually found as an annual weed along roadsides, disturbed areas, and invading pastures and ranges.

*Calamagrostis*—usually moderately tall perennial grasses, mostly with creeping rhizomes.

(24) *Calamagrostis canadensis* (Michx.) Beauv. (Bluejoint reedgrass). Perennial. Stems erect in small tufts, 24-48 inches (61-122 cm.) tall, with numerous creeping rhizomes; vernation rolled; sheaths nearly round, slightly keeled, open, devoid of hairs; blades flat, 4-8 mm. wide, numerous, harsh to the touch on both surfaces, often bluish in color; ligules about 3

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mm. long, occasionally to 5 mm., rounded in center, margin irregularly toothed; auricles absent. Habitat—usually found along streams at any elevation.

(25) Calamagrostis purpurascens R. Br. (Purple pinegrass). Perennial. Stems erect, 18-48 inches (46-122 cm.) tall, sometimes with short rhizomes; vernation loosely rolled; sheaths nearly round, open, with cavities (appears to fit very loosely to the stem, leaving air pockets or cavities), old sheaths persistent; blades 2-4 mm. wide, nerves conspicuous on upper surface, midrib conspicuous on lower surface, margin with definite whitish band; ligules 3-5 mm. long, rounded in the center; auricles absent. Habitat—open woods or mountain parks, preferring sandy soils.

Catabrosa—aquatic perennials with creeping bases and soft, flat leaves.

(26) Catabrosa aquatica (L.) Beauv. (Brookgrass). Perennial. Stems 3-15 inches (8-38 cm.) tall, devoid of hairs, with creeping stem bases that root at the nodes; vernation folded; sheaths oval to elliptical, closed for most of its length, devoid of hairs; blades short, 2-8 mm. wide, flat, abruptly pointed, devoid of hairs, margin minutely barbed; ligules 5-6 mm. long, rounded to pointed; auricles absent. Habitat—marsh ground along streams and springs in the mountains.

Dactylis—perennial, with flat blades and compressed stem bases.

(27) Dactylis glomerata L. (Orchardgrass). Perennial. Stems erect, 12-48 inches (30-122 cm.) tall, devoid of hairs, rarely with short, creeping rhizomes; vernation folded; sheaths strongly compressed, keeled, edges united below into a closed tube for most of its length but open for a greater length than in Bromus or Glyceria, usually rough to the touch and devoid of hairs; blades flat, long, 2-12 mm. wide, devoid of hairs, sharp-pointed, pale green in color, nerves inconspicuous except for midrib; ligules 3-6 mm. long, rounded, often split; auricles absent; collar broad, prominent, yellow in color. Habitat—often found along roadsides and cultivated areas.

Danthonia—perennial grasses with ligules composed mostly or entirely of hairs, and the stems break at the lower nodes.

(28) Danthonia intermedia Vasey (Timber danthonia). Tufted perennial. Stems 5-20 inches (13-51 cm.) tall, without creeping rhizomes; vernation folded; sheaths open, oval, keeled, devoid of hairs except for long hairs in the throat; blades flat, soft, hairy, 2.0-4.5 mm. wide, margin with conspicuous, finely barbed, whitish band; ligules composed almost entirely of hairs, 0.5-1.0 mm. long; auricles absent; collar with long hairs at margin and lower edge on outside. Habitat—native mountain meadows of high elevations, and moist, open, lodgepole timber.
(29) *Danthonia unispicata* (Thurb.) Munro (Onespike danthonia). Perennial. Stems in dense spreading tufts, 6-10 inches (15-25 cm.) tall, without creeping rhizomes; sheaths with long, soft hairs, open; blades 2.5 mm. wide, with long, soft hairs; ligules short (usually about 0.5 mm. long), almost entirely of hairs; auricles absent. Habitat—open, disturbed ground on dry or rocky soils in or near lodgepole forests.

*Deschampsia*—low or moderately tall grasses with no distinct vegetative characters.

(30) *Deschampsia caespitosa* (L.) Beauv. (Tufted hairgrass). Perennial. Stems in dense tufts, 24-48 inches (61-122 cm.) tall, without creeping rhizomes; lower nodes usually straw-colored; vernation folded; sheaths open, oval, somewhat keeled, rather large cavities (loose air pockets) in back, straw-colored, persistent, shedding; blades 1.5-4.0 mm. wide, usually folded, somewhat stiff, margin rough; ligules 5-11 mm. long, pointed, hairy; auricles absent. Habitat—bogs and wet mountain meadows.

*Elymus*—erect, usually rather tall, perennial bunchgrass, coarse and harsh to the touch.

(31) *Elymus canadensis* L. (Canada wildrye). Perennial. Stems erect, 30-54 inches (76-137 cm.) tall, green or often bluish, lacking rhizomes or sometimes with very short rhizomes; vernation rolled; sheaths open, round, usually devoid of hairs; blades flat, 8-20 mm. wide, somewhat rough on upper surface, midrib conspicuous, margin finely toothed; ligules 0.5-1.0 mm. long, collar-shaped; auricles quite large and clasping the stem. Habitat—river banks and open ground, usually on sandy soils in the foothills.

*Festuca*—plants with usually narrow or rolled blades, sometimes with auricles as in the tribe Hordeae.

(32) *Festuca idahoensis* Elmer (Idaho fescue). Perennial. Stems densely tufted in large bunches, 12-36 inches (30-91 cm.) tall, without creeping rhizomes; sheaths smooth, open, round; blades numerous, mostly basal, threadlike (rolled inward tightly), rough to the touch, bluish color; ligules 0.5-1.0 mm. long, collar-shaped; auricles usually present, small and not clasping the stem. Habitat—native mountain meadows and moist parks of higher elevations.

(33) *Festuca rubra* L. (Red fescue). Perennial. Stems 12-36 inches (30-91 cm.) tall, bent or reclining at the reddish or purplish base, rhizomes usually absent or short; vernation folded; sheaths open, round, usually with short hairs, brown, fibrous; blades smooth, 1.5-2.5 mm. wide, soft, folded or involuted, margin weakly barbed; ligules
short (approximately 0.5 mm. long), collar-shaped but longer on the sides, margins not toothed or barbed; auricles absent; collar narrow, indistinct, devoid of hairs. Habitat—rare in Wyoming. Usually found in mountain meadows and marshes.

**Glyceria**—usually tall, aquatic or marsh perennials, with creeping and rooting bases or with creeping rhizomes.

(34) *Glyceria pauciflora* Presl. (Weak mannagrass). Perennial. Stems slender, erect from a reclining base, 12-36 inches (30-91 cm.) tall, hollow, devoid of hairs, with creeping rhizomes; vernation rolled; sheaths open, round, usually smooth; blades thin, flat, 4-12 mm. wide, nerves inconspicuous on lower surface (except midrib) but raised and rough to the touch on upper surface; ligules 5-6 mm. long, rounded to bluntly pointed, often splitting; auricles absent. Habitat—often found growing in shallow water, wet meadows, and marshes.

**Hesperochloa**—Densely tufted plants with firm, narrow, flat or loosely inrolled blades, rhizomes present or absent.

(35) *Hesperochloa kingii* (S. Wats.) Rydb. (Spikefescue). Perennial. Stems erect in large bunches, 12-36 inches (30-91 cm.) tall, occasionally with short rhizomes; vernation rolled; sheaths round, open, smooth, heavily veined, old sheaths persistent and red-brown in color; blades firm, flat, 3-6 mm. wide, heavily veined, margin finely barbed, often bluish green in color; ligules 1.0-1.5 mm. long, collar-shaped, usually split; auricles absent. Habitat—open rocky mountain slopes.

**Hierochloe**—perennial, erect, slender, sweet-smelling grasses.

(36) *Hierochloë odorata* (L.) Beauv. (Sweetgrass). Perennial grass with distinct odor of vanilla. Stems smooth, devoid of hairs, 12-24 inches (30-61 cm.) tall, with slender, creeping rhizomes; vernation rolled; sheaths nearly round, open, very thick with definite cavities (loosely attached to the stem, leaving air spaces), devoid of hairs, nerves rather prominent; blades flat, 2-5 mm. wide, devoid of hairs, midrib rather prominent on upper surface, stem blades short; ligules about 2 mm. long, round in the center; auricles absent, but small rudiments present at base of collars; collars with short hairs on outside. Habitat—meadows and moist places.
Hordeum—annual or perennial grasses of varying heights; blades flat and usually harsh to the touch.

(37) *Hordeum brachyantherum* Nevski (Meadow barley). Perennial grass with rather scant herbage. Stems erect or spreading, 4-20 inches (10-51 cm.) tall; nodes very dark and devoid of hairs; sheaths thin, often shredded, lowermost rather densely hairy; blades flat, harsh to the touch, 3-8 mm. wide, usually devoid of hairs; ligules 0.5-1.0 mm. long, collar-shaped to rounded; auricles absent; collars distinct, split by midrib, usually devoid of hairs. Habitat—meadows and moist places.

Koeleria—slender annuals or perennials of various heights, with narrow blades.

(38) *Koeleria cristata* (L.) Pers. (Prairie junegrass). Perennial bunchgrass. Stems erect, slender, 6-24 inches (15-61 cm.) tall, hairy below the panicle, without creeping rhizomes; vernation folded; sheaths open, round, at least the lower covered with hairs; blades flat, 1-3 mm. wide, slightly constricted at the base, nerves raised on upper surface, tip abruptly pointed; ligules 0.5-1.0 mm. long, collar-shaped; auricles absent; collar narrow to medium, yellow-green in color. Habitat—prairies and open woods, usually on sandy or rocky soils. Scattered throughout Wyoming except in low alkaline flats.

Melica—rather tall perennials, base of stem often swollen into a bulb-like structure; sheaths closed, forming a tube; blades usually flat.

(39) *Melica spectabilis* Scribn. (Showy oniongrass). Perennial. Stems 12-36 inches (30-91 cm.) tall, smooth, bulbous at base, with creeping rhizomes; nodes very dark, smooth; sheaths closed forming a tube, hairy; blades flat, 2-5 mm. wide; ligules 1-2 mm. long, square-tipped, deeply toothed; auricles absent. Habitat—rocky or open woods and sagebrush flats.

Muhlenbergia—perennial or rarely annual grasses of various heights and forms, usually not robust.

(40) *Muhlenbergia richardsonis* (Trin.) Rydb. (Mat muhly). Short, mat-forming perennial. Stems wiry, erect or bent at the base, 3-20 inches (8-51 cm.) tall, roughened by minute knots, with numerous hard, creeping rhizomes; nodes turning brown with maturity; vernation rolled; sheaths open, round, devoid of hairs; veins distinct; blades short (up to 2 inches (5 cm.) long, tightly rolled or flat, 1-2 mm. wide, devoid of hairs, greyish-green in color; ligules 2-3 mm. long, rounded; auricles absent; collar narrow, continuous, devoid of hairs. Habitat—dry or usually moist meadows, often on alkaline soils.
Oryzopsis—mostly slender perennials with flat or often involuted blades.

(41) Oryzopsis asperifolia Michx. (Roughleaf ricegrass). Perennial. Stems tufted, 8-24 inches (20-61 cm.) tall, nearly naked (the 2- or 3-stem sheaths bearing reduced or obsolete blades), without creeping rhizomes; vernation rolled; sheaths open, round, devoid of hairs, lower ones short and purplish; blades “U” shaped to flat, erect, stiff, basal blades 3-8 mm. wide, stem blades 2-3 mm. wide, nerves raised on upper surface, margin and upper surface rough to the touch; ligules 0.3-0.5 mm. long, collar-shaped (somewhat longer at the sides); auricles absent; collars apparently lacking on basal leaves, present on short culm leaves. Habitat—lodgepole pine belt and dry banks, preferring well-drained soils.

(42) Oryzopsis exigua Thurb. (Little ricegrass). Perennial, resembling O. asperifolia. Stems densely tufted, stiffly erect, 8-24 inches (20-61 cm.) tall, numerous innovations, without creeping rhizomes; vernation rolled;

Phleum—mostly perennials with flat blades. No definite vegetative characters.

(44) Phleum alpinum L. (Alpine timothy). Perennial, smaller than P. pratense. Stems tufted from a somewhat creeping base, 8-20 inches (20-51 cm.) tall, base not swollen, without creeping rhizomes; nodes devoid of hairs; vernation rolled; sheaths open, round, devoid of hairs, with broad, transparent margins and cavities in the back; blades flat, 4-8 mm. wide (mostly about 5 mm.), devoid of hairs, rough on margins only, light green to bluish in color; ligules to 2 mm. long, rounded in the center; auricles absent. Habitat—meadows and wet places in the high mountains.

(45) Phleum pratense L. (Timothy). Perennial. Stems smooth, erect from a swollen or bulblike base, 12-48 inches (30-122 cm.) tall, if rhizomes present they are very inconspicuous; vernation rolled; sheaths open, lacking hairs;
blades short, rough, flat, 4-8 mm. wide; ligules 2-3 mm. long, rounded in center; auricles absent; collar broad, continuous. Habitat—roadsides, fields, disturbed areas, irrigated valleys, and along streams in the foothills.

**Poa**—annuals or usually perennials, slender, blades ending in a boat-shaped tip and the midrib on the upper surface usually appears to be bordered by a light-green line (median line) on either side, the rest of the blade being inconspicuously nerved.

(46) *Poa alpina* L. (Alpine bluegrass). Perennial. Stems erect, rather stout, 4-12 inches (10-30 cm.) tall, without creeping rhizomes; vernation folded; sheaths open, oval to elliptical, devoid of hairs, with broad, transparent margins; blades short, flat, 2-6 mm. wide, devoid of hairs, midrib raised on lower surface, uppermost leaf about middle of stem; ligule 2-3 mm. long (sometimes longer on upper leaves), round to pointed, margin not toothed; auricles absent. Habitat—mountain meadows of high elevations and alpine regions.

(47) *Poa ampla* Merr. (Big bluegrass). Large, robust perennial forming large bunches, often bluish in color. Stems 24-48 inches (61-122 cm.) tall, bluish-green in color, without creeping rhizomes; sheaths open, smooth; blades green to bluish in color, 1-3 mm. wide; ligules short (up to 2 mm. long), rounded; auricles absent. Habitat—meadows and moist, open ground, often found on alkaline soils.

(48) *Poa annua* L. (Annual bluegrass). Annual. Stems flattened, 2-10 inches (5-25 cm.) tall, tufted, spreading, sometimes rooting at lower nodes, rhizomes rare and very short; vernation folded; sheaths open, flattened, somewhat keeled, devoid of hairs, veins indistinct; blades soft, flat, short, 1-4 mm. wide, somewhat keeled, usually not very abundant; ligules 1.2-2.5 mm. long, rounded in the middle or sometimes pointed; auricles absent; collars devoid of hairs. Habitat—lawns, pastures, and disturbed moist areas.

(49) *Poa arctica* R. Br. (Arctic bluegrass). Perennial. Stems loosely tufted, 4-6 inches (10-15 cm.) tall, from a reclining base, with creeping rhizomes; vernation folded; sheaths open, elliptical, usually devoid of hairs; blades mostly basal, flat, 2-4 mm. wide, one short blade about the middle of the stem; ligules 1.5-4.0 mm. long, pointed, margin not toothed; auricles absent. Habitat—rare grass usually found in meadows above timberline.

(50) *Poa canbyi* (Scribn.) Piper (Canby bluegrass). Perennial. Stems in large bunches, erect, stout, 18-48 inches (46-122 cm.) tall, usually bluish in color, without creeping rhizomes; vernation folded; sheaths open, often compressed at the throat, usually devoid of hairs; blades smooth, flat or folded, 1-3 mm. wide, rough on upper surface, green to bluish in color; ligules 2-5 mm. long, sharply pointed; auricles absent. Habitat—meadows or open ground, often on sandy or dry soils at middle elevations.
(51) *Poa cusickii* Vasey (Cusick bluegrass). Perennial. Stems in dense tufts, 8-24 inches (20-61 cm.) tall, often straw-colored, without creeping rhizomes; sheaths open, smooth; blades mostly basal, erect, stiff, threadlike, 1 mm. wide or less, rough to the touch, usually only one blade noticeable on the stem; ligules short, 0.5-2.0 mm. long, collar-shaped, margin not toothed; auricles absent. Habitat—open, dry woods, rocky hills, and exposed slopes.

(52) *Poa epilis* Scribn. (Skyline bluegrass). Perennial. Stems solitary or few in a tuft, erect, 8-16 inches (20-41 cm.) tall, devoid of hairs, without creeping rhizomes; sheaths open, round, smooth; blades flat, 2-3 mm. wide, smooth except for rough margins, about 3 blades per stem, mature basal leaves may be folded or inrolled; ligules 2.5-3.5 mm. long, pointed, and the margin usually not toothed; auricles absent. Habitat—dry hills, plains, and meadows, commonly found on alkaline soils at lower elevations than *P. ampla*.

(53) *Poa fendleriana* (Steud.) Vasey (Muttongrass). Perennial. Stems erect, 6-24 inches (15-61 cm.) tall, rough below the panicle, rhizomes very rarely present and, if present, not conspicuous; vernation folded; sheaths open, oval, and somewhat rough; blades mostly basal, firm and stiff, folded or inrolled, 1-2 mm. wide, very rough; ligules less than 1 mm. long, usually collar-shaped but often pointed in the center; auricles absent. Habitat—open, dry woods and rocky hills.

(54) *Poa interior* Rydb. (Inland bluegrass). Perennial. Stems rather stiff, 8-20 inches (20-51 cm.) tall, from a densely tufted, erect base, devoid of hairs, sometimes rough; vernation folded; sheaths open, round, or slightly keeled; blades stiff, flat, 1-2 mm. wide; ligules usually less than 1 mm. long; auricles absent. Habitat—grassy slopes, open woods, and rocky knolls.

(55) *Poa juncifolia* Scribn. (Alkali bluegrass). Pale-green perennial. Stems erect, 16-40 inches tall (41-102 cm.), pale green, without creeping rhizomes; sheaths open, smooth, devoid of hairs; blades smooth, inrolled, rather stiff, less than 1 mm. wide when folded; ligules short, about 1 mm. long; auricles absent. Habitat—dry hills, plains, and meadows, commonly found on alkaline soils at lower elevations than *P. ampla*.

(56) *Poa nervosa* (Hook.) Vasey (Wheeler bluegrass). Perennial. Stems erect, 12-24 inches (30-61 cm.) tall, with conspicuous creeping rhizomes; vernation folded; sheaths closed for over one-half the length on the stem leaves but inclined to split, upper sheaths usually devoid of hairs, lower ones hairy and often purplish in color; blades flat, somewhat inrolled, 2-4 mm. wide, margins hairy near collar; ligules 1-2 mm. long, collar-shaped, sometimes pointed; auricles absent. Habitat—open woods at various elevations.

(57) *Poa palustris* L. (Fowl bluegrass). Perennial. Stems loosely tufted from a reclining, usually flattened, purplish base, 12-32 inches (30-81 cm.) tall, devoid of hairs; vernation folded; sheaths open, keeled, often slightly compressed; blades flat to inrolled 1-2 mm. wide, not stiff; ligules variable, usually 3-5 mm. long on stem.
leaves or only 1 mm. long on basal leaves; auricles absent. Habitat—moist meadows, aspen groves, and hillsides.

(58) *Poa pratensis* L. (Kentucky bluegrass). Perennial. Stems erect, slightly flattened, 12-36 inches (30-91 cm.) tall, with slender, branching rhizomes; vernation folded; sheaths open, smooth, definitely compressed, somewhat keeled at the base; blades dark green, soft, flat or folded, 2-4 mm. wide; ligules 0.5-1.0 mm. long, collar-shaped, margin not toothed; auricles absent; collar narrow, devoid of hairs, continuous or divided by midrib. Habitat—moist, open woods and meadows.

(59) *Poa reflexa* Vasey & Scribn. (Nodding bluegrass). Perennial. Stems erect, devoid of hairs, solitary or in small tufts, 8-16 inches (20-41 cm.) tall, without creeping rhizomes; sheaths open, devoid of hairs; blades rather short, flat, 1-4 mm. wide, devoid of hairs; ligules 1-2 mm. long (occasionally to 3 mm.) rounded, toothed; auricles absent; collar divided by midrib. Habitat—shaded locations on high mountain slopes and meadows.

(60) *Poa secunda* Presl. (Sandberg bluegrass). Perennial. Stems erect, from short basal foliage, usually no more than 12 inches (30 cm.) tall, but occasionally up to 24 inches (61 cm.) tall; vernation rolled; sheaths open, round, devoid of hairs, white to reddish below ground, veins distinct; blades rather short, soft, flat, folded or rolled inward, 1-3 mm. wide, yellow-green to green in color, margins slightly barbed; ligules prominent 2-4 mm. long, pointed, margin not toothed; auricles absent; collars narrow, distinct, continuous or divided. Habitat—dry plains, open woods, or rocky slopes of all elevations.

**Schizachne**—rather tall perennials, with sheaths closed to the top of the ligule; ligule membranous and joined in the front.

(61) *Schizachne purpurascens* (Torr.) Swallen (False melic). Perennial. Stems erect from a loosely tufted, spreading base, 24-36 inches (61-91 cm.) tall, devoid of hairs and without creeping rhizomes; sheaths open, devoid of hairs; vernation rolled; sheaths closed, rounded to oval, usually devoid of hairs, nerves distinct; blades flat, 2-5 mm. wide, nerves inconspicuous except midrib keeled on lower surface, constricted at the base; ligules 1.0-1.5 mm. long, collar-shaped, joined in front, margin finely toothed; auricles absent. Habitat—rare. Rocky woods and along streams in the mountains.

**Sitanion**—exceedingly variable tufted perennials with no definite vegetative characters for this genus.

(62) *Sitanion hystrix* (Nutt.) J. G. Smith (Bottlebrush squirreltail). Perennial. Stems erect to spreading from rather loose tufts, 6-18 inches (15-46 cm.) tall, bright green in color, without creeping rhizomes; vernation rolled; sheaths open, round, the upper often inflated; blades flat or inrolled,
2.5 mm. wide, nerves somewhat raised on upper surface, midrib conspicuous on lower surface; ligules short, 0.6-1.0 mm. long, collar-shaped, margin somewhat irregular; auricles usually long and narrow, sometimes rudimentary or entirely absent on some leaves. Habitat—usually not abundant but found on open, dry, rocky slopes on gravelly soils or in saline or alkaline areas.

*Stipa*—tufted perennials usually with narrow, inrolled leaves.

(63) *Stipa columbiana* Macoun (Subalpine needlegrass). Perennial. Stems erect, mostly 12-24 inches (30-61 cm.) tall, devoid of hairs, without creeping rhizomes; nodes few, often purplish; vernation rolled; sheaths open, round, may enclose part of seedhead; blades stiff, 1.2 mm. wide, devoid of hairs, inrolled, rough to the touch, slightly constricted at the throat, shiny yellow-green on lower surface; ligules 1-2 mm. long, square-tipped; auricles absent. Habitat—dry plains, meadows, and open woods at medium to high altitudes.

(64) *Stipa comata* Trin. & Rupr. (Needleandthread). Perennial. Stems tufted, erect, 12-36 inches (30-91 cm.) tall, devoid of hairs, without creeping rhizomes; nodes hairy; vernation folded; sheaths open, rounded to oval, devoid of hairs; blades rough to the touch, flat or inrolled, 1-2 mm. wide; ligules thin, 3-4 mm. long, usually split or widely notched on top; auricles absent; collars broad, continuous, usually devoid of hairs. Habitat—prairies and dry hills of lower elevations, often on sandy soils.

(65) *Stipa lettermanii* Vasey (Letterman needlegrass). Perennial, similar to *S. columbiana*, only smaller. Stems in large tufts, 11-15 inches (28-38 cm.) tall; vernation rolled; sheaths open, rounded and slightly keeled, devoid of hairs; blades about 0.5 mm. wide when rolled, inrolled and thread-like; ligule 0.5-1.5 mm. long, collar-shaped, margin finely toothed; auricles absent. Habitat—open ground, dry hills, and dry sagebrush flats.

(66) *Stipa richardsonii* Link (Richardson needlegrass). Perennial. Stems tufted, erect, 20-40 inches (51-102 cm.) tall, devoid of hairs and rough below the panicle, without creeping rhizomes; sheaths open, devoid of hairs or lower sometimes with hair; blades mostly basal, stiff, inrolled, less than 2 mm. wide; ligule 1 mm. long or less, collar-shaped; auricles absent; collar usually devoid of hairs but occasionally with a few hairs. Habitat—bottom lands, wooded slopes, and mature pine woods at various elevations.
Trisetum—annual or perennial plants, usually without rhizomes, blades flat or somewhat inrolled, sheaths open, ligules membranous.

(67) Trisetum spicatum (L.) Richt. (Spike trisetum). Perennial. Stems densely tufted, erect, 5-20 inches (13-51 cm.) tall, without creeping rhizomes; nodes usually hairy; vernation rolled; sheaths split but overlapping for over one-half the length, hairy, round; blades flat or loosely inrolled, 2-5 mm. wide, usually hairy on both surfaces; ligules 1-2 mm. long, collar-shaped; auricles absent; collar hairy. Habitat—common in moist mountain and alpine meadows.

(68) Trisetum wolfii Vasey (Wolfs trisetum). Perennial. Stems loosely tufted, 20-40 inches (51-102 cm.) tall, usually lacking rhizomes but sometimes with short rhizomes; sheaths rough, open, rarely hairy; blades flat, rough, 2-5 mm. wide, rarely hairy on upper surface; ligule 1-2 mm. long, rounded; auricles absent. Habitat—moist ground at forest margin.
SELECTED BIBLIOGRAPHY


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