

## DESCRIPTIONS OF NEW OR NOTEWORTHY GRASSES FROM THE UNITED STATES.

By GEORGE VASEY.

***Stipa hassel* sp. nov.** Culms very slender and wiry, densely tufted, more or less branching below, erect, 12 to 15 inches high; leaves narrowly linear, thread-like, setaceous, not rigid, 4 to 8 inches long, erect; ligule inconspicuous; upper leaf reaching nearly to the panicle; sheaths narrow, close, striate; panicle 2 to 3 inches long, narrow, loose, erect, slender; branches erect, mostly 2 or 3 together, unequal, the longer ones an inch or more in length, naked below, the others flowering to the base; spikelets small; empty glumes narrowly linear-lanceolate, acuminate, about  $2\frac{1}{2}$  lines long, nearly equal, the lower 1-nerved, or indistinctly 3-nerved below, the upper strongly 3-nerved; floral glumes nearly as long as the empty ones, narrow, tapering to the apex, membranaceous (thinner than in most species of the genus), with 3 principal nerves, smooth; stipe short, with a few short hairs; palea one-half as long as its glume, acute; lodicules  $\frac{1}{4}$  to  $\frac{1}{2}$  line long; awn of the floral glume 8 or 9 lines long, bent above the middle, twisted below, nearly smooth; grain oblong, about 1 line long.

Dry ridges near Santa Monica, California. Type specimen collected in 1891 by Dr. H. E. Hasse, for whom it is named. It is nearly related to *Stipa eminens* variety *andersoni* Vasey, which is found in the same region.

***Oryzopsis hendersoni* sp. nov.** Culms densely cespitose, 6 to 8 inches high; leaves crowded at the base, conduplicate, pungent, scabrous, rigid, one-half as long as the culms, lower sheaths rather loose; panicle 2 to 3 inches long, narrow, the branches mostly erect in pairs, the lower 1 to 2 inches long, naked except the 2 to 4 flowers near the apex; spikelets 2 lines long; empty glumes a little longer than the floral ones, broadly oblong, obtuse and toothed at the apex, the lower 3-nerved, the upper 5-nerved, both scarious above the middle; floral glume linear-oblong, nearly 2 lines long, smooth, coriaceous, obscurely 5-nerved, the apex formed of 2 lateral teeth, which appear to be on one side, the caducous, simple, curved awn 5 or 6 lines long, arising between the apical teeth; stamens 3, barbate.

Type specimen collected in Washington by L. F. Henderson, in 1892 (No. 2249). It is similar in appearance to *O. webberi* (Thurb.) Vasey and to small forms of *O. exigua* Thurb., but may be readily distinguished from either by its smooth florets.

***Muhlenbergia filiculmis* sp. nov.** Culms tufted, weakly erect, filiform, 7 to 10 inches high, leafless except near the base; radical leaves numerous, setaceous-filiform, 1 to  $1\frac{1}{2}$  inches long; sheaths very short, the lower ones loose; ligule conspicuous, narrow, 1 line long; panicle spike-like, narrow, 1 to  $1\frac{1}{4}$  inches long, the upper branches short, alternate, the lower ones inserted singly or in twos, naked near the base, each with 3 to 5 spikelets; spikelets small, 1 line or more long, with an awn about  $\frac{1}{4}$  line long; empty glumes very thin, half as long as the floral glumes, the lower one ovate, acute, the upper broadly ovate, with 3 to 5 teeth at the apex; floral glumes oblong-linear, sparsely pubescent below,

3-nerved, with an awn about  $\frac{1}{2}$  line long; palea equaling its glume and nearly as wide.

Type specimen collected by C. S. Sheldon on sandy soil, Ute Pass, Green Mountain Falls, El Paso County, Colorado, at 8,500 feet altitude, August 2, 1892 (No. 321). This species is nearest to *M. gracilis* variety *breviaristata* Vasey, but is more slender, with shorter leaves, shorter glumes, and shorter awns.

**Sporobolus ligulatus** Vasey & Dewey sp. nov. Perennial from a knotted rootstock; culms slender, smooth, simple, 12 to 18 inches high; basal leaves numerous, narrow, 1 line wide, 4 to 12 inches long, flat or convolute, scabrid or nearly smooth; culm leaves 2 or 3; sheaths equaling or exceeding the long internodes, the upper one extending nearly to the panicle; ligule 2 to 4 lines long, lacerate; panicle 4 to 6 inches long, narrow, erect or nodding, dark green; branches mostly single, erect or spreading, hispid, spikelet-bearing nearly to the base,  $\frac{1}{4}$  to  $\frac{3}{4}$  inch long; spikelets  $1\frac{1}{2}$  to 2 lines long, narrow, subterete; empty glumes broadly lance-ovate, obtuse, nerveless, dark green, one-half as long as the floret, the second slightly larger; floral glume lance-oblong, subobtuse, smooth, 3- (or obscurely 5-) nerved; palea like the glume in texture, color, and size, with a narrow, obscure, membranaceous, marginal wing (usually involute) on each side of the apex.

Type specimen in the United States National Herbarium; collected by G. C. Nealley in Limpia Cañon, Presidio County, Texas, September, 1892 (No. 127). It is most nearly related to *S. jonesii* Vasey, but may be readily distinguished by its leafy culm and larger spikelets.

**Calamagrostis arctica** Vasey, Ill. N. A. Gr. ii. 55 (1893). Perennial; culms from a creeping rootstock, decumbent below, 6 to 10 inches high, the base covered with persistent, open, leafless sheaths; radical leaves rather rigid, 2 to 3 inches long, flat, smooth, 2 to 3 lines wide, the 1 or 2 canline leaves with long, loose sheaths, smooth, the blades erect, flat or folded, about 1 inch long; ligule acute, 1 to  $1\frac{1}{2}$  lines long; panicle spike-like, about 1 inch long, rather dense; the short branches spikelet-bearing to the base; spikelets 2 to  $2\frac{1}{2}$  lines long, purplish; empty glumes ovate-lanceolate, attenuate-pointed, scabrous on the keel and nerves, the first 1-nerved, the second 3-nerved; floral glume elliptical-oblong, acutely 4-toothed at the broad apex, 4-nerved, about 2 lines long, the awn from near the base,  $2\frac{1}{2}$  to 3 lines long, and extending conspicuously beyond the empty glumes; palea lanceolate, acuminate, 2-toothed at the apex, about equaling the floral glume; hairs of the callus and pedicel one-fourth as long as the floret.

Type specimen collected by J. M. Macoun, in 1891, at St. Paul Island, Bering Sea (No. 38). It bears some resemblance to *C. montanensis* Scribn., but is readily distinguished by the broader leaves and the short, purple panicle.

**Bouteloua rothrockii** sp. nov. Perennial, culms tufted, 15 to 20 inches high, erect, simple or sparingly branched, leafy nearly or quite to the panicle; leaves narrow, thinly pubescent near the base, 2 to 5 inches long; ligule short, ciliate; panicle 3 to 7 inches long, consisting of 5 to 9, nearly straight, erect, spreading or recurved spikes, which are commonly 1 to  $1\frac{1}{2}$  inches distant, 1 to  $1\frac{1}{2}$  inches long, and 2 lines wide, densely flowered; spikelets (including awns) 2 to  $2\frac{1}{2}$  lines long; empty glumes unequal, oblong, mucronate or acute, the upper about 1 line long, the lower one-half as long; floral glume oblong, 4-lobed to the middle, villous on the nerves below, ciliate on the margins and apex, the awns from the sinuses one-half longer than the glume; palea nearly as long as its glume, wedge-oblong, 4-toothed or lobed above, with the two nerves extended into short awns; sterile pedicel hairy-tufted above, with 2 or 3 imperfect florets, and 3 awns as long as those of the perfect floret.

Type specimens collected at Cottonwood, Arizona, by Dr. J. T. Rothrock, in 1874 (No. 347), and distributed with Pringle's Arizona collection of 1884 as *B. polystachya* variety *major* Vasey. It is also found in New Mexico and northwestern

Mexico. It is readily distinguished from *B. polystachys* Benth. and *B. microstachys* (Fourn.) Vasey by its perennial, upright habit and the longer spikelets. All the lobes and the awns of the floral glumes are much larger than in *B. polystachys*, and the lateral lobes are larger than in *B. microstachys*.

**Sieglingia wrightii** sp. nov. Dioecious; culms erect or decumbent, from strong, creeping rhizomes, simple or branching, 1½ to 2 feet high, leafy, rather stout; leaves of culm 5 to 8, those of the fertile culms 6 to 12 inches long, 2 to 3 lines wide, attenuate; lower sheaths shorter than the internodes, loose, smooth, the upper one near the panicle and equaling or exceeding it; pistillate panicle 5 to 8 inches long, linear-oblong, the branches mostly single, appressed, or the lower ones somewhat spreading, 2 inches long, spikelet-bearing throughout, somewhat spike-like, simple or compound at the base; spikelets large, 5 to 8 lines long, compact, nearly terete, 5- to 7-flowered, florets closely imbricated; empty glumes nearly equal, ovate-lanceolate, membranaceous, the lower 3-nerved, the upper 3- to 5-nerved, 4 to 5 lines long; floral glumes ovate, acute, slightly mucronate or entire, 4 to 5 lines long, rounded on the back, 3- to 5-nerved, coriaceous, with a broad, scarious margin; palet slightly shorter than its glume, thick, cartilaginous, curved, broad at the base, narrowed above, the nerves wing-margined and ciliate-scabrous; styles 2, thick, protruding from the apex of the infolded palet; ovary not matured in the specimens seen; staminate plants as seen mostly smaller, with shorter and narrower panicles, shorter, compressed spikelets, and thinner glumes, the palet membranaceous.

It was first collected in Texas or New Mexico by C. Wright and is No. 2038 of his collection, distributed as *Tricuspis albescens* Munro, from which it is very different. It has since been collected (in 1891 and 1892) in Presidio County, Texas, in two distinct localities by Mr. G. C. Nealley; one of the localities furnishing staminate plants and the other pistillate. It is the only dioecious species known in the genus, and differs from the usual generic characters in wanting the lateral teeth of the floral glumes and the pubescent lateral nerves and callus, and in the very large cylindrical spikelets and large florets. Still its affinities seem to be with the genus. The staminate form has been described as *Poa texana* Vasey, Contr. Nat. Herb. ii. 60 (1890).

**Eragrostis orcuttiana** sp. nov. Apparently annual, culms 2 to 3 feet high, nearly simple, or branching below, smooth, rather stout; leaves flat or becoming somewhat involute, 3 to 6 inches long, 2 to 3 lines wide, acuminate, scabrous on the margins; sheaths shorter than the internodes, smooth; ligule very short, ciliate; panicle spreading, 7 to 11 inches long, when expanded triangular in outline; general rachis smooth, without hairs at the axils; branches scattered or the lower sometimes somewhat verticillate, subdivided nearly to the base, compound, very floriferous; spikelets lead-colored, on capillary pedicels mostly shorter than themselves, narrowly linear, about 3 lines long, 7- to 9-flowered; empty glumes purplish, lanceolate, acute, shorter than the floral glumes, which are about 1 line long, acute, the lateral nerves prominent; palet slightly shorter than the glume, narrow, 2-toothed at the apex, finely scabrous on the keel.

Type specimen collected at San Diego, California, by C. R. Orcutt, in 1885 (No. 1313), and others at San Bernardino, California, by S. B. Parish. Well distinguished by its large, many-flowered panicle and slender spikelets. It is most nearly related to *E. mexicana* Link.

**Melica inflata** sp. nov. Culms bulbous at the base, rarely caespitose, 3 to 6 feet high, erect, terete, smooth, and leafy; leaves 6 to 10 inches long, 1 to 2 lines wide; ligule conspicuous, lacerate; panicle 6 to 10 inches long, the branches distant, the lower in pairs, one short and few-flowered, erect, the other 1 to 3 inches long, naked below, bearing 2 to 4 spikelets and spreading; spikelets oblong, 6 to 9 lines long, cylindrical at first (?), 6- to 8-flowered, the florets closely imbricated; empty glumes oblong, subacute, the lower 3- to 5-, the upper 5- to 7-nerved;

floral glumes oblong-lanceolate, scabrous, about 4 lines long, subacute, the middle nerve shortly excurrent; palea one-third shorter, obovate-oblong, somewhat scabrous, ciliate above.

This is very nearly the description of Bolander under *M. poaeoides* variety *inflata* (Proc. Cal. Acad. iv. 101, 1869), and corresponds to his specimen numbered 6121, as referred to by him. It appears to be a good species, but was apparently overlooked by Dr. Thurber. His specimens were collected in the Yosemite Valley in 1856, and are the only ones I have seen except a few collected by Mr. J. G. Lemmon in 1889, near Mount Shasta, in northern California.

**Poa arida** sp. nov. Culms from a creeping rootstock, 1 to 2 feet high, rather rigid, smooth, with 2 or 3 short, rigid, erect leaves  $\frac{1}{2}$  to 2 inches long, or sometimes almost wanting; radical leaves 3 to 6 inches long, rigid, erect, flat, or becoming involute, pungently pointed, striate; ligule conspicuous, acute; sheaths of culm long, somewhat scabrous; panicle linear or oblong-linear, 3 to 6 inches long, rather dense, the rachis scabrous, or smooth near the base, branches mostly in twos or threes, erect or appressed, the lower  $\frac{1}{2}$  to  $1\frac{1}{2}$  inches long, spikelet-bearing nearly to the base; spikelets short-pedicel, rather crowded, 3 to  $3\frac{1}{2}$  lines long, ovate-lanceolate, 5- to 9-flowered; empty glumes nearly equal,  $1\frac{1}{2}$  to 2 lines long, nearly as long as the adjacent floral glumes, or shorter in few-flowered spikelets, membranaceous, rounded on the back, broadly ovate, subacute, obscurely 3-nerved, slightly scabrous, scabrous-margined; floral glumes oblong, rounded, obtuse,  $1\frac{1}{2}$  to 2 lines long, scarcely compressed, pubescent on the back below the upper third, villous on the keel and marginal nerves near the base, scarious at the apex, obscurely 5-nerved; palea as long as its glume, sparsely pubescent on the keels and back; grain lance-oblong slightly triquetrous, about  $\frac{1}{2}$  line long.

Type specimen collected by G. R. Vasey at Socorro, New Mexico, in 1881; other specimens collected in Utah, Colorado, Kansas, and northward to British America. This is *P. andina* Nutt., in Herb. Phila. Acad., fide F. Lamson-Scribner, but Nuttall's manuscript name is preoccupied by a Chilean species, *P. andina* Trin. It may be distinguished from *Poa fendleriana* (Steud.) Vasey by the smaller spikelets, smaller florets, and the pubescence between the nerves of the floral glumes.

**Poa bigelovii** Vasey & Scribn. sp. nov. Annual; culms 6 inches to 2 feet high, weak when elongated, smooth; leaves short in arid situations, in moist ones 2 to 4 inches long, flat, 1 to 2 lines wide; ligule thin, membranaceous; panicle long and narrow, 2 to 6 inches long; branches rather distant, the lower in twos or threes, erect, spikelet-bearing mostly to the base; spikelets 3- to 5-flowered, 2 to 3 lines long, broadly oblong, compressed; empty glumes nearly as long as the floral ones, acute; floral glumes  $1\frac{1}{2}$  to 2 lines long, oblong, subacute, villous on the keel and marginal nerves to the middle or above, sparingly webby at the base; palea one-third shorter than the glume.

Type specimen collected by A. Fendler in New Mexico in 1847 (No. 931). It is found in the arid districts from Texas to Lower California and northward to Colorado and Utah, springing up abundantly after the summer rains. It differs from *Poa annua* L. in the narrow panicle and the presence of a web at the base of the florets. In a few instances it has been distributed as *Poa annua* variety *stricta* Vasey. The name *P. bigelovii*, without description, is given in Vasey, Deser. Cat. Gr. 81 (1885).

**Poa confinis** Vasey, Ill. N. A. Gr. ii. 75 (1893). Apparently dioecious; culms from a slender creeping rootstock, 5 to 10 inches high; leaves convolute, filiform-setaceous, those of the numerous radical tufts mostly equaling the culm, smooth, those of the culm similar, 1 to 4 inches long; ligule short, oblong, entire; the lower sheaths very loose; panicle oblong, 1 to 2 inches long, confined, the branches mostly short, erect, and appressed, the lower ones sometimes an inch long,

mostly in twos or threes, nearly smooth; spikelets 2 to nearly 3 lines long, 3- to 5-flowered; empty glumes ovate, acute, the upper as long as the floral ones, the lower one-fourth shorter; floral glumes ovate-lanceolate,  $1\frac{1}{2}$  lines long, subacute, prominently 5-nerved, roughish pubescent, apex and upper part of margins scarious, sparsely hairy at the base.

Type specimen collected by T. J. Howell on the sandy ocean beach at Tillamook Bay, Oregon, in 1872 (No. 69). Other specimens have been collected on sandy shores of Columbia River, Oregon; Kitsap County, Washington; Vancouver Island; and Alaska. This has been taken for *Poa abbreviata* R. Br., which is a truly Arctic grass, 3 to 4 inches high, with the outer glumes longer, the floral glumes silky pubescent below and woolly-tufted at the base. I had an opportunity of studying the types of that species in the British Museum, and was satisfied of its difference from our plant.

**Poa cusickii** sp. nov. Culms densely tufted, 12 to 18 inches high, smooth, rather slender, erect, with 2 distant, very short leaves, the lower one near the base; radical leaves numerous, filiform,  $\frac{1}{2}$  line or less in width, not rigid, 3 to 5 inches long; cauline leaves 2 to 3, distant, with long sheaths and short (1 to 3 inches), erect, narrow blades; ligule thin, scarious, decurrent, about 2 lines long, subacute; panicle purple or green, oblong-pyramidal, 2 to 3 inches long, open, erect, branches short above, gradually longer below, the lower ones 1 to  $1\frac{1}{2}$  inches long, in twos or rarely threes, unequal, filiform, erect-spreading, spikelet-bearing above the middle; spikelets 4 to 5 lines long, 3- to 5-flowered; empty glumes about 2 lines long, little more than one-half as long as the adjacent florets, acute, the upper 3-nerved, broadly scarious-margined; floral glumes  $2\frac{1}{2}$  to 3 lines long, lanceolate, acute, scarious at the apex, 5-nerved, finely scabrous-puberulent, not pubescent or webby at the base; palea nearly as long as its glume.

Type specimen collected by W. C. Cusick in Oregon in 1885 (No. 1219); other specimens collected in Oregon by Thomas Howell (No. 183); at Fossil Station, Wyoming, by G. W. Letterman (No. 137); also in Idaho by J. H. Sandberg. It approaches closely to *P. filifolia* Vasey, but has shorter leaves and a smaller, denser panicle.

**Poa filifolia** sp. nov. Culms densely clustered, from a slender rootstock, erect, slender, 16 to 24 inches high, with 2 or 3 distant, narrow, short-bladed leaves; radical leaves abundant, filiform, 6 to 10 inches long, flaccid, erect; leaves of the culm 2 to 3, distant, with long sheaths, and short (1 to 3 inches), erect, filiform blades; ligule less than 1 line long, acute; panicle loose and flexuous, 3 to 4 inches long; branches capillary, scabrous, rather distant, the lower in twos or threes, unequal, the longer about  $1\frac{1}{2}$  inches long, with few spikelets near the extremity, naked below; spikelets compressed, 3 to 5 lines long, rather loosely 5- to 7-flowered, on filiform pedicels; empty glumes nearly equal, one-third shorter than the adjacent florets, lance-ovate, acute, broadly scarious-margined; floral glumes  $2\frac{1}{2}$  to 3 lines long, lance-oblong, subacute, scarious at the apex, minutely scabrid throughout, slightly more so on the keel, intermediate nerves rather indistinct; palea nearly equaling the glume, scabrous on the keels.

Type specimen collected by J. H. Sandberg on rocky banks of Hatwai Creek, Nez Perces County, Idaho, in 1892 (No. 138); also collected by Dr. Sandberg on basaltic slopes on Clearwater River, near Lewiston, Idaho (No. 86).

**Poa flexuosa robusta** var. nov. Culms  $2\frac{1}{2}$  to 3 feet high, with 4 or 5 leaves, slightly compressed below; the two or three leaves near the base 2 to 4 inches long, 2 to 3 lines wide, sheaths shorter than the internodes, the upper leaves 4 to 6 inches long, with long sheaths; ligule membranaceous, 1 to 2 lines long, obtuse; panicle large, 8 to 10 inches long, erect, with about 8 distant pairs of spreading branches, which are capillary, naked below the middle, sparingly branched and flowering above; spikelets  $2\frac{1}{2}$  to  $3\frac{1}{2}$  lines long, 3- to 5-flowered;

empty glumes about one-third shorter than the adjacent florets; floral glumes subacute, about 2 lines long, pubescent below and on the keel, with a thin web of hairs at the base.

Type specimen collected by George Vasey at an altitude of 8,000 to 9,000 feet in the mountains of Colorado in 1868 (No. 673); other specimens collected by M. E. Jones near Georgetown, Colorado. The spikelets are generally larger than in the typical eastern plant. It differs otherwise in the webby hairs at the base of the florets, and in the erect, not nodding panicle.

**Poa gracillima** sp. nov. Culms densely tufted, 15 to 20 inches high, erect or ascending from the base, smooth; radical leaves mostly fine, flaccid, and spreading, 2 to 5 inches long; leaves of the culm 1 to 2 inches long, slender; panicle 3 to 4 inches long, open, ovate or pyramidal, erect; branches spreading, the lower in twos or threes or even fives, at 5 or 6 nodes, and single near the apex, the lower ones 1 to 2 inches long, capillary, naked below, rather few-flowered near the extremity; spikelets 3 to 4 lines long, about 5-flowered, the florets somewhat distant; empty glumes ovate-lanceolate, acute, unequal, shorter than the adjacent florets; floral glumes  $1\frac{1}{2}$  to 2 lines long, obtuse or subobtuse, oblong to oblong-lanceolate, purplish, scarious at the apex, not much compressed, distinctly 5-nerved, sparsely puberulent, scabrous or pubescent on keel and nerves below, or nearly smooth.

Oregon and Washington to Idaho and Wyoming. Type specimen collected by W. N. Suksdorf on Mt. Adams, Washington, in 1882 (No. 33). There is considerable variation in this species, especially as to the spread of the panicle, some forms having a rather narrow, nodding panicle and approaching *Poa tenuifolia* Nutt.

**Poa grayana** sp. nov. Culms loosely tufted, stoloniferous, 12 to 15 inches high, smooth; radical leaves 6 to 8 inches long, narrow, becoming involute, rather stiff; culm leaves about 3, 1 to 3 inches long, erect; ligule membranaceous, 1 or 2 lines long, obtuse; panicle 3 to 4 inches long, loose, drooping; the lower branches in pairs, rather distant,  $1\frac{1}{2}$  to 2 inches long, spikelet-bearing near the apex, filiform and naked below; the few spikelets rather crowded near the ends of the branches, 3- to 5-flowered, about 3 lines long, purplish; empty glumes 2 lines long, nearly equaling or rarely exceeding the adjacent florets, broad, acute, smooth, scarious-margined; floral glumes lanceolate, subacute, mostly less than 2 lines long, the upper part scarious and smooth, the lower part villose-pubescent, with no webby hairs at the base.

Type specimen collected by H. N. Patterson, near Grays Peak, Colorado, in 1885 (No. 14).

**Poa hispidula** sp. nov. Culms 15 to 18 inches high, stout, smooth, 2- or 3-leaved; leaves flat or becoming involute toward the apex, rigid, erect, 3 to 4 inches long, 1 to 2 lines wide; sheaths mostly shorter than the internodes, striate, smooth; ligule 1 to 2 lines long; panicle lance-oblong, 4 to 6 inches long, rather close, branches erect, mostly in threes or twos, the lower ones  $1\frac{1}{2}$  to 3 inches long, somewhat scabrous, naked below, rather densely flowered above; spikelets large, about 3 lines long, about 3-flowered, on short pedicels; empty glumes lanceolate, acute, little shorter than the floral glumes, the upper ones 3-nerved, hispid on the keel; floral glumes villous on the keel and lateral nerves, sparsely pubescent between, 2 lines long, scarious at the subacute apex, marginal nerves prominent, with copious webby hairs at the base.

Type specimen collected at Shumagin Island, Alaska, in 1871-72, by M. W. Harrington; others at Copts Bay, Unalaska, by Dr. A. Kellogg; and on Bering Island, in 1891, by J. M. Macoun.

**Poa howelli** Vasey & Scribn. in Vasey, Ill. N. A. Gr. ii. 78 (1893). Culms tufted,  $1\frac{1}{2}$  to 2 feet high, leafy; leaves nearly equidistant, 2 to 3 inches long, 2 lines wide, about equaling the internodes, acute; sheaths striate, slightly scabrous; ligule 2 lines

long, thinly membranaceous; panicle long and narrow, 4 to 7 inches long, loose, the branches scabrous, subappressed or spreading during flowering, the lower branches in threes or fives, unequal, 1 to 3 or 4 inches long, the longest naked for the lower third or half, the shorter flowering nearly to the base; the spikelets small, rather crowded, 3- or 4-flowered, 2 lines long; empty glumes narrow, acute, smooth; floral glumes ovate-oblong, subacute,  $1\frac{1}{2}$  lines long, herbaceous and distinctly 5-nerved nearly to the apex, sparsely pubescent all over, and thinly webbed at the base; palea one-fourth shorter than the glume, finely pubescent on the keels.

Type specimen collected in fir forests near Portland, Oregon, by T. J. Howell in 1881 (No. 25); also found in California, Washington, and Vancouver Island. It differs from *P. trivialis* L. in its weaker culms, longer panicle, and pubescent floral glumes.

Variety *microsperma* var. nov. Culms more slender, leaves narrower, panicle looser, its branches more capillary, and the spikelets smaller, about  $1\frac{1}{2}$  lines long.

Type specimen collected by C. L. Anderson at Santa Cruz, California, in 1888 (No. 99); other specimens collected in Washington.

**Poa kelloggii** Vasey, Ill. N. A. Gr. ii. 79 (1893). Culms 2 to 3 feet high, from a long rootstock; lower leaves 6 to 12 inches long, 2 to 3 lines wide, rather numerous, the upper gradually shorter, thickish, rather rigid; ligule short, lacerate; panicle pyramidal, open, 5 to 6 inches long; branches mostly in twos at the rather distant nodes, slightly scabrous, the lower ones 2 to 3 inches long, erect-spreading, naked below the middle; spikelets rather few on the slender subdivisions, about 3-flowered, 3 to 4 lines long; empty glumes narrow, acute, unequal; floral glumes ovate-lanceolate, acute, prominently 5-nerved,  $2\frac{1}{2}$  lines long, smooth, with a narrow, webby tuft at the base; palea slightly shorter than the glume; internode of rachilla smooth, about 1 line long. The base of the culm has the appearance of growing in swampy or wet soil.

Type specimen collected by H. N. Bolander in California in 1868 (No. 4705). It has the aspect of *P. alsodes* Gray, but with larger and less pubescent florets.

**Poa laevis** sp. nov. Apparently annual; culms tufted, pale, slender, erect, smooth, 2 to 3 feet high, with two or three distant leaves; radical leaves slender, narrow, 6 to 8 inches long, those of the culm shorter; ligule acute; sheaths smooth; panicle more or less elongated, narrow, rather loose, 5 to 8 inches long, sometimes interrupted below, erect; branches erect or appressed, mostly spikelet-bearing to the base, the lower in twos or threes, unequal, the longest 1 to 2 inches long; the spikelets linear, appressed and very short-pedicelled, 3 to 5 lines long, about 5-flowered; empty glumes nearly equal, linear-lanceolate, about as long as the lower florets, acute, thin, pale, and scarious, except on the minutely scabrous midrib; floral glumes 2 to  $2\frac{1}{2}$  lines long, linear-oblong, subacute, rounded on the back, 5-nerved, minutely scabrous, slightly pubescent on the keel and marginal nerves near the base, the apex scarious and yellowish-tinged, in age somewhat erose; palea equaling its glume, scabrous on the keels.

Type specimen collected by F. Lamson-Scribner in Montana in 1883. Other specimens have been collected in the Rocky Mountains from Arizona and Colorado to Montana and British America.

**Poa lettermani** sp. nov. Dwarf, densely tufted, culms 2 to 4 inches high; leaves mostly radical, flat, 1 to 2 inches long,  $\frac{1}{4}$  to 1 line wide, the lower sheaths wide and loose; ligule rather conspicuous, acute; cauline leaves 1 or 2, about 1 inch long; panicle  $\frac{1}{4}$  to 1 inch long, oblong, rather dense; branches mostly in twos, short, erect, with 1 to 3 spikelets each; spikelets  $1\frac{1}{2}$  to 2 lines long, 2- to 4-flowered, purplish; empty glumes nearly as long as the spikelet, exceeding the adjacent florets, oblong-lanceolate, acute, nearly equal, smooth; floral glumes 1 to  $1\frac{1}{2}$  lines long, ovate-oblong, acute or subobtuse, obscurely nerved, smooth,

scarious at the apex; palet nearly equaling the glume, acutely 2-toothed at the acuminate apex.

Type specimen collected by G. W. Letterman on Grays Peak, Colorado, in 1885 (No. 7): also collected in the type locality at 11,000 to 14,000 feet by H. N. Patterson, J. H. Wibbe, and M. E. Jones; and on Mount Rainier, Washington, at 9,000 feet altitude, by C. V. Piper. Well distinguished by the long empty glumes (longer than the floral ones), and the perfectly smooth floral glumes.

**Poa lucida** sp. nov. Perennial; culms tufted,  $1\frac{1}{2}$  to 2 feet high, smooth; radical leaves 5 to 7 inches long, 1 to 2 lines wide, those of the culm about 3, 2 to 3 inches long; ligule white, membranaceous, 2 lines long, decurrent; upper sheaths long, smooth; panicle 4 to 6 inches long, narrow, 1 inch wide to half as wide or less, the branches mostly in twos or threes, the lower ones 1 to 2 inches long, erect or appressed, naked near the base; spikelets 3 to 4 lines long, 3- or 4-flowered, shining, pale green; empty glumes oblong, abruptly acute, unequal,  $1\frac{1}{2}$  to 2 lines long, smooth, not much compressed, scarious at the apex and margins; floral glumes 2 lines long, linear-oblong, obtuse, rounded at the back, sparsely and minutely scabrous, slightly pubescent near the base of the keel and lateral nerves, scarious at the apex, 5-nerved; palet nearly equaling its glume.

Type specimen collected on mountain sides near Georgetown, Colorado, by H. N. Patterson in 1885 (No. 73). Other specimens collected near Graymont and Calloway Hill, Colorado, at altitudes of from 7,000 to 11,000 feet.

**Poa nervosa** (Hook.) Vasey, Ill. N. A. Gr. ii. 81 (1893). Culms  $1\frac{1}{2}$  to  $2\frac{1}{2}$  feet high, rather slender, smooth; radical leaves narrowly linear, 6 to 10 inches long, those of the culm about 3, rather distant, erect, flat, 1 to 3 inches long, 1 to 2 lines wide; panicle 2 to 5 inches long; branches spreading or erect-spreading, the lower 2 to 5 together, filiform, naked below, few-flowered near the extremity, or the panicle often smaller and less spreading; spikelets 3- to 8-flowered, on pedicels of their own length or shorter, flattish, the florets usually rather distant on the slender (sometimes flexuous) rachilla, 2 to  $2\frac{1}{2}$  lines long; floral glumes linear-lanceolate, prominently 5-nerved, minutely scabrous on the nerves, otherwise nearly smooth; palet about equaling its glume.

The type of this species is described and figured as *Festuca nervosa* in Hooker, Fl. Bor. Amer. ii. 251 (1840), and is an unusually loose-flowered form. This form was re-collected in 1871 near Portland, Oregon, by Elihu Hall, and Dr. Gray, in his determination of Hall's collection (Proc. Amer. Acad. viii. 409), referred it to *Poa stenantha* Trin., from which it really differs in many respects, as shown by specimens from the St. Petersburg herbarium and by many corresponding specimens since collected in Alaska. Dr. Gray also thought it probable that this was *Poa leptocoma* Trin., and Grisebach (Flora Rossica, iv. 373) places *Poa leptocoma* Trin. under *Poa stenantha* Trin. as a variety; but from descriptions and typical specimens from the herbarium of St. Petersburg I am convinced that both of those species are different from *Poa nervosa* (*Festuca nervosa* Hook.). The species as above described occurs in northern California, Oregon, Washington, Idaho, and Montana.

**Poa occidentalis** sp. nov. Culms slenderly rooted, 2 to  $2\frac{1}{2}$  feet high, somewhat compressed, leafy; leaves 5 to 6 on the culm, the lower ones 2 to 3 inches long, the others longer, the upper one 5 or 6 inches long and sheathing the base of the panicle; sheaths flattened, scabrous, mostly much longer than the internodes; ligule rather conspicuous, obtuse or subacute, scabrous on the outside; panicle large and loose, 6 to 12 inches long; branches distant, mostly in threes or the lower sometimes in fives, and 4 to 6 inches long, erect, becoming spreading, capillary, scabrous near the extremities, naked below the middle, the spikelets closely racemed and short-pedicled on the slender subdivisions; spikelets mostly 3-flowered, 2 to 3 lines long, light green; empty glumes acute, scarious-margined, unequal, the upper 3-nerved and scabrous on the keel, about one-fourth shorter than the adja-

cent floret; floral glumes oblong lanceolate,  $1\frac{1}{2}$  to 2 lines long, 5-nerved, the intermediate nerves less distinct, slightly pubescent below and on the keel, sparingly villose or webbed at the base.

Type specimen collected at Las Vegas, New Mexico, by G. R. Vasey, in 1881; also collected near Albuquerque, New Mexico, by M. E. Jones, and in Utah by L. F. Ward. This species has been mentioned, without description, as *P. trivialis* variety *occidentalis* (Vasey, Descr. Cat. Gr. 85, 1885).

**Poa orcuttiana** Vasey, West Am. Sci. iii. 165 (1887). Culms cespitose, about 2 feet high, terete, scabrous; radical leaves numerous, narrow, flaccid, about 6 inches long, scabrous; culm leaves 2 to 4 inches long, attenuate at the apex and like the sheaths scabrous, upper sheath long; ligule membranaceous, about 2 lines long, acute, becoming lacerate; nodes smooth; panicle 4 to 6 inches long, lax; branches somewhat appressed, the lower in threes, 1 to 3 inches long, the lower third part or more naked, numerous flowered above; spikelets very short-pedicel, linear-oblong, 5- to 9-flowered, 4 to 6 lines long; empty glumes nearly equal,  $1\frac{1}{2}$  lines long, acute or acuminate, the upper 3-nerved, scarious-margined; floral glumes oblong, erose at the subacute apex, flattish on the back, scabrous, about 2 lines long, subcoriaceous, scarious tipped, slightly pubescent, below, 5-nerved; palea as long as its glume, acute, ciliate-scabrous on the keels.

Type specimen collected in Chollas Valley, near San Diego, California, by C. R. Orcutt, in 1884 (No. 1070); also found near Vallecito, northern Lower California, by C. R. Orcutt (No. 1440). The linear spikelets with rigid glumes give the panicle the appearance of an *Atropis*.

**Poa pattersoni** sp. nov. Culms low, densely tufted, 5 to 6 inches high, naked above, slender; radical leaves numerous, 2 to 3 inches long, very narrow, flat or conduplicate, smooth, lower sheaths loose; the culm leaves  $\frac{1}{2}$  to 2 inches long; panicle dense, oblong, weakly erect or nodding; branches subappressed, mostly in twos, unequal,  $\frac{1}{2}$  inch long or less, bearing 1 to 4 nearly sessile spikelets; spikelets 2 to 3 lines long, 2- to 3-flowered; empty glumes nearly as long as the floral ones, narrowly ovate-lanceolate, acute; floral glumes 2 lines long, purplish, acute, pubescent on the lateral nerves and keel below the middle, but not webbed; intermediate nerves very indistinct; palea three-fourths as long as the glume, pubescent on the keels.

Mountains of Colorado, near Grays Peak, 11,000 to 14,000 feet altitude; type specimen collected by H. N. Paterson in 1885 (No. 154). Similar to *Poa pringlei* Scribn., but with smaller spikelets and floral glumes pubescent. It differs from *Poa laxa* Haenke in the denser panicle, larger spikelets, and narrower glumes.

**Poa pringlei** Scribn. in herb. Culms tufted, 5 to 10 inches high from a rootstock, decumbent at base, then erect, slender, wiry, with about 2 leaves, the uppermost not reaching the middle; leaves mostly radical, 1 to 2 inches long, convolute, rigid, recurved; those of the culm with a very short or nearly obsolete blade; sheaths striate; ligule conspicuous, 2 lines long; panicle  $\frac{1}{2}$  to 1 inch long, compact, oblong, the few branches mostly in pairs, appressed, and with one or two spikelets each; spikelets very short-pedicel, large for the plant, 3 lines long, mostly 2-flowered, oblong, turgid, purplish; empty glumes thin, membranaceous, ovate-lanceolate, nearly as long as the floral glumes, which are about 3 lines long, oblong-lanceolate, subacute, scarious at the apex, smooth, obscurely 5-nerved; palea a little shorter, acutely 2-toothed, broader at the base, scabrous on the keels.

Type specimen collected by C. G. Pringle near the headwaters of the Sacramento River, California, at 8,000 feet altitude, in 1882; a larger form collected by C. F. Sonne on Mount Stanford, in 1888; and a third form, with longer leaves (2 to 4 inches), by Mr. Suksdorf, on Mount Adams, Washington, in 1882, and on high mountains of southeastern Oregon, by Mr. Cusick, in 1885.

***Poa reflexa* Vasey & Scribn. sp. nov.** Culms 10 to 20 inches high, slender, erect, smooth, including the rachis and branches; leaves of the culm about 3, narrow or rather broad, acute, erect, 2 to 3 inches long; sheaths long, smooth, shorter than the internodes; ligule 1 line long, obtuse; panicle 2 to 4 inches long, pyramidal, with about 6 nodes; the branches capillary, rather distant, the lower ones 2 to 3 inches long, smooth, spreading and becoming reflexed, naked, spikelet-bearing near the ends; spikelets 2- or 3-flowered,  $1\frac{1}{2}$  to 2 lines long; empty glumes lanceolate, acute, smooth, slightly shorter than the adjacent florets; floral glumes ovate-lanceolate, acute or subacute, obscurely nerved, pubescent on the midnerve and lateral nerves, with a narrow tuft of hairs at the base; palea pubescent on the keels.

Type specimen collected by G. W. Letterman on Kelso Mountain, near Torrey Peak, Colorado, in 1885. It grows at high altitudes on margins of streams, usually in wet, sandy or gravelly soil. Rocky Mountains, Colorado, northward to Montana, Washington, and British America. The long, smooth, reflexed capillary branches are characteristic of this species, and distinguish it from *Poa arctica* R. Br. with which it has been confused. A small form of *P. reflexa* is represented in Vasey, Ill. N. A. Gr. ii. Fig. 4, Pl. 71. The name without description appears in Vasey, Descr. Cat. Gr. 83 (1885).

***Poa sandbergii* sp. nov.** Culms tufted, 10 to 16 inches long, slender, upper portion naked, the lower portion bearing about 2 sheaths with very short blades; leaves mostly radical, 2 to 4 inches long, very narrowly linear, those of the culm about 2, the blade 1 inch long or less; ligule about 1 line long; panicle  $1\frac{1}{2}$  to 3 inches long, sometimes very narrow, or less than 1 inch wide, the branches ascending nearly smooth, the lower in twos or threes, unequal, the longer one 1 to 2 inches long, spikelet-bearing above the middle; spikelets short-pedicelated, 2- to 4-flowered about 3 lines long, often purplish; empty glumes lanceolate, subacute, about two-thirds as long as the adjacent florets; floral glumes linear-oblong, obtuse nearly 2 lines long, sparsely pubescent or puberulent, somewhat villose near the base but not webbed, scarious at the apex; palea equaling its glume, pubescent on the keels; internode of rachilla puberulent,  $\frac{1}{4}$  line long.

Collected by J. H. Sandberg near Lewiston, Idaho, in 1892 (No. 164). Also found by other collectors in Washington and California. It approaches some forms of *Poa tenuifolia* Nutt., from which it may be distinguished by its smaller spikelets, shorter florets, and more pubescent floral glumes.

***Poa sheldoni* sp. nov.** Culms from a creeping rootstock, rather rigid, 8 to 10 inches high, smooth, having 3 or 4 leaves 1 to 2 inches long, rigid, erect, or somewhat curved; ligule short, acute; sheaths longer than the internodes, smooth, striate; radical leaves 2 to 3 inches long, rigid, conduplicate, curved; panicle narrow,  $1\frac{1}{2}$  to 3 inches long, with 5 or 6 nodes; branches mostly in twos, erect, each with usually about 2 spikelets, the lower branches about 1 to  $1\frac{1}{2}$  inches long, flowering above the middle; spikelets mostly short-pedicelated, large for the panicle, erect, about 3 lines long, 3- to 4-flowered; empty glumes oblong-lanceolate,  $1\frac{1}{2}$  to nearly 2 lines long, membranaceous, abruptly acute, smooth; floral glumes 2 lines long, oblong-lanceolate, subobtuse, 5-nerved, with a short pubescence near the base, scarious at the apex and margins; palea ciliate-pubescent on the keels, nearly equaling the glume.

Type specimen collected in wet, sandy soil, along Cottonwood Creek, Buena Vista, Colorado, at 8,000 feet altitude, by C. S. Sheldon, July 4, 1892 (No. 615). This species approaches very closely some small forms of *Poa arida* Vasey, but may be distinguished by the less pubescent floral glumes.

***Poa tracyi* sp. nov.** Culms 2 to  $2\frac{1}{4}$  feet high, rather stout, erect, slightly compressed; lower leaves short, 2 to 3 inches long, increasing in length above, the upper 4 to 5 inches long, erect, rather thick, acute, smooth; sheaths striate, smooth; ligule short, obtuse; panicle 6 to 10 inches long, 1 to 2 inches wide,

loose, the rather distant branches capillary, flexuous, erect-spreading, the lower in threes or fives, the upper in twos, at the 8 to 12 nodes of the smooth erect axis, 1 to 3 inches long, spikelet-bearing above the middle; spikelets somewhat clustered, on short pedicels, loosely 3- to 4-flowered, about  $2\frac{1}{2}$  lines long; empty glumes oblong, subacute, smooth; floral glumes nearly 2 lines long, linear-oblong, obtuse, scarious at the apex, prominently 5-nerved, upper part somewhat scabrous, lower half white-pubescent, thinly webbed at the base; the whole plant grayish in color.

Type specimen collected on mountain sides at Raton, New Mexico, at an altitude of 7,000 or 8,000 feet, by S. M. Tracy, in 1887. It somewhat resembles *Poa reflexa* Vasey & Scribn., but is larger, with longer panicle, larger spikelets, and larger floral glumes.

**Festuca ambigua** sp. nov. Perennial; culms 2 to 3 feet high, stout, the base clothed with numerous rather rigid leaves, 6 to 8 inches long, 1 to 2 lines wide, flat or becoming somewhat involute; the culm with about 4 leaves, the upper of which is 3 to 4 inches long, and the lower 6 to 8 inches, attenuate-pointed, smoothish, 2 lines wide, flat or becoming involute, the sheaths scabrous, longer than the internodes; ligule nearly obsolete; panicle 6 to 8 inches long, its nodes distinct; branches rather capillary, spreading and flexuous, rather one-sided, chiefly in pairs, the longer one (3 to 4 inches long) spikelet-bearing from the middle or below, the shorter one (1 to 2 inches) subdivided near the base, somewhat scabrous; spikelets purplish, loosely 3- to 4-flowered, the florets rather distant and spreading, the rachilla roughish pubescent, disarticulating at a point midway between the florets; empty glumes narrowly lanceolate, acute, the upper obscurely 3-nerved, 2 lines long, the lower little more than one-half as long; floral glumes 3 to 4 lines long, narrowly lanceolate, obscurely 5-nerved, sparsely scabrous, acuminate with 2 small, unequal teeth, awn 4 to 6 lines long; palea equaling its glume, bidentate and slightly ciliate at the apex.

Type specimen collected by T. J. Howell, in Oregon, in 1881 (No. 19); also collected in California by Kellogg and Harford (No. 1116), and at Santa Cruz, in 1888, by C. L. Anderson. A stout and rather handsome grass, the upper sheath about 10 inches long. The panicle is loose and drooping, and the long awns conspicuous.

**Festuca arizonica** sp. nov. Culms tufted, firm, erect, about 2 feet high; leaves very numerous at the base, 3 to 5 on the culm, stiff, filiform-setaceous, scabrous-margined, the upper 2 or 3 with long sheaths, and blades 6 to 10 inches long, the upper one equaling or exceeding the panicle; ligule short, blunt, with prominent auricles; panicle narrow, 3 to 5 inches long; branches alternate, erect and appressed; the lower 2 to 3 inches long, subdivided from below the middle; spikelets about 5 lines long, appressed to the branches, lance-linear or oblong-linear, on very short pedicels, 4- to 5-flowered; empty glumes unequal, the first about 2 lines long, linear, 1-nerved; the second  $2\frac{1}{2}$  to 3 lines long, acute or subobtuse, 3-nerved, scarious margined; floral glumes 3 to  $3\frac{1}{2}$  lines long, thick, acuminate, with an awn  $\frac{1}{2}$  to 1 line long, rather obscurely 5-nerved, rounded on the back below, slightly scabrous or nearly smooth; palea equaling its glume, obtuse, minutely scabrous on the keels.

Type specimen collected by S. M. Tracy near Flagstaff, Arizona, in 1887 (No. 118). Other specimens have been collected at various points in Arizona, New Mexico, and Colorado. Well marked by its long, setaceous leaves, narrow panicles, and pale, ashy color. It grows in pine woods, is commonly called "pine grass," and is said to be much sought by cattle.

**Festuca californica** sp. nov. Culms 3 to 4 feet high, thick and stout, smooth, crowded below with leafless sheaths; radical leaves numerous, one-half as long as the culm, scabrous, rigid, flat or becoming involute; those of the culm 2 or 3, the upper 3 to 6 inches long; sheaths long, striate, more or less scabrous; ligule a villous

ring, the outer side and auricles also villous, or sometimes the ligule short, membranaceous, and not villous; panicle 6 to 12 inches long, spreading; branches mostly in pairs, the lower ones 3 to 5 inches long, capillary, the lower half or two-thirds naked, above with 3 to 6 large spikelets on pedicels as long to twice as long as themselves; the spikelets 6 to 9 lines long, about 5-flowered, compressed, the florets rather distant; empty glumes ovate-lanceolate, acute, the lower one-third shorter than the upper, which is more than 3 lines long and 3-nerved; floral glumes about 5 lines long, 5- to 7-nerved, minutely punctulate, scabrous, acute, narrowly scarious-margined, slightly pubescent at the apex, terminated with an awn 1 line long or less; palet about as long as its glume, acute, bifid at the apex; internode of rachilla thinly pubescent, 1 line long.

Type specimen collected on hills about Oakland, California, by H. N. Bolander, in 1862 (No. 1505); also collected in Oregon by T. J. Howell (Nos. 20 and 23). This species is described by Thurber as *Festuca scabrella* in Wats. Bot. Cal. ii. 318 (1880). It differs from Torrey's species in its much larger size, open panicle, and larger florets.

***Festuca fratercula*** Rupt. Bull. Acad. Roy. Brux. ix. 326 (1842). Perennial; culms 2 to 3 feet high; leaves 6 to 8 inches long, 2 to 3 lines wide, flat, acuminate; sheaths shorter than the internodes; ligule nearly obsolete; panicle 4 to 6 inches long, spreading, nodding; lower branches in pairs, subdivided above the middle; spikelets mostly 3-flowered; empty glumes very unequal, the lower one small and one-half as long as the upper, which is lanceolate, 3-nerved, smooth, and more than 2 lines long; floral glumes 3 lines long, 3-nerved, nearly smooth, acuminate, usually terminating in a very short ( $\frac{1}{4}$  line), weak awn; palet as long as its glume, scarious, minutely scabrous.

Collected in 1891 in the Rincon Mountains, Arizona, by G. C. Nealley (No. 177). I refer this with much doubt to the *F. fratercula* of Ruprecht, as cited by Fournier (Mex. Pl. ii, 124), but have seen no authentic specimens.

***Festuca jonesii*** sp. nov. Culms variable, from slender to stout, 2 to 3½ feet high, smooth, leafy; leaves of culm 3 to 5, flat, 5 to 12 inches long, 2 to 4 lines wide, attenuate; sheaths shorter than the internodes; ligule short, obtuse; panicle ample, very open, 6 to 12 inches long, the branches mostly in pairs at the 5 to 8 distant nodes, slender, flexuous, 3 to 6 inches long, spreading, when old sometimes reflexed, divided near the middle; spikelets numerous, about  $\frac{1}{4}$  inch long including the awns, 3- to 5-flowered; empty glumes narrowly lanceolate, unequal, the upper 2 to 2½ lines long, the lower one-third shorter, both attenuate; floral glume about 2½ lines long, lanceolate-acuminate, 3-nerved, minutely scabrous, terminated with a slender awn longer than the glume; palet equaling its glume, with 2 narrow teeth at the apex.

Type specimen collected by M. E. Jones in southern Utah in 1880. Other specimens have been collected from Utah and Idaho to the coast of California and Washington. It has sometimes been distributed as *Festuca occidentalis* Hook. Conspicuous from its spreading panicle, and long, often wide, flaccid leaves.

***Festuca scabrella major*** var. nov. Culms closely tufted, stout, 2 to 3 feet high, rather rigid; radical leaves numerous, one-half as long as the culm, erect, rigid, scabrous, narrow, conduplicate or involute, many at the base breaking early from their sheaths; ligule very short, truncate, ciliate; panicle 5 to 9 inches long, narrow, loose, the branches mostly in rather distant pairs, erect, the lower 2 to 3 inches long, branching near the middle, with a few large, turgid spikelets 5 to 6 lines long, 2- to 4-flowered; empty glumes thin, membranaceous, the lower nearly 3 lines long, 1-nerved, the upper broader, 3-nerved below, nearly 4 lines long, both acute; floral glumes nearly 4 lines long, scabrous, punctulate, attenuate, acute, much thicker than the empty glumes, 5-nerved; palet one-fifth shorter than its glume, scabrous on the keels and near the bifid tip; internode of rachilla  $\frac{1}{4}$  line long, hispidulous.

Type specimen collected by W. N. Suksdorf on prairies, Spokane County, Washington, in 1884 (No. 118); also collected in the Cascade Mountains, Washington, by G. R. Vasey in 1883 and 1889. It is said to be the common "bunch grass" of eastern Washington.

**Festuca viridula** Vasey, Ill. N. A. Gr. ii. 93 (1893). Culms 2 to 3 feet high, erect, rather slender, terete, smooth, naked above; radical leaves numerous, narrow, almost filiform, half as long as the culms, smooth; culm leaves 2 or 3; sheaths long, but shorter than the internodes; ligule a short, ciliate ring; blade 1 line wide or less, 2 or 3 inches long; panicle 4 to 6 inches long, open, of about 6 joints; branches erect, becoming spreading, few-flowered, the lower ones in twos,  $1\frac{1}{2}$  to  $3\frac{1}{2}$  inches long, capillary, naked below, and with but few (2 to 4) spikelets above; spikelets pale or purplish, 4- to 5-flowered, on short, slender pedicels; empty glumes unequal, the lower about 2 and upper nearly 3 lines long, and broader; floral glumes about 4 lines long, with a distinct callus at the base, linear-lanceolate, often denticulate near the acute or mucronate apex, minutely punctate-scabrous, or nearly smooth, rather indistinctly 5-nerved; palea equaling its glume, minutely ciliate at the obtuse apex.

Type specimen collected by W. N. Suksdorf on Mt. Adams, at 3,000 to 6,000 feet altitude, in 1882; other specimens collected in the Cascade Mountains, Oregon, and the Sierra Nevada, California. This is the *Festuca gracillima* of Thurber in Wats. Bot. Cal. ii. 318, but not of Hooker. The latter has a coarse culm, rigid, involute leaves, larger spikelets, and longer awns, and is a native of the southern hemisphere.

**Agropyrum caninum** (L.) R. & S. Syst. Veg. ii. 756 (1817). Culms  $1\frac{1}{2}$  to 3 feet high, usually rather weak; spikes 3 to 6 inches long, usually rather flexuous and sometimes nodding, rather lax; spikelets, 3- to 5-flowered; empty glumes 5-nerved, extending into an awn 1 to 5 lines long; floral glumes 4 to 5 lines long, extended into an awn as long to twice as long.

Mountains of New England, Lake Superior region, and westward on high plains and mountains.

Our specimens are usually much larger and with longer and thicker spikes than the European ones; the awns varying much in length, some of them straight, others recurved-spreading, approaching *A. divergens* Nees. Many specimens also have a stiff, erect panicle.

Variety *unilaterale*. *A. unilaterale* Cassidy, Bull. Col. Agric. Exp. Sta. 12. 63 (1890). Culms usually much stouter, with rigid, erect spikes, the spikelets more or less one-sided on the rachis.

Type specimen collected by F. Lamson-Scribner in Montana in 1883 (No. 422).

In the Rocky Mountains from Colorado to British Columbia, as high as 8,000 feet altitude, and eastward on the high plains to central Nebraska and western Minnesota

**Agropyrum violaceum** (Hornem.) Lange, Consp. Fl. Gr. 155 (1880). Culms 1 to  $1\frac{1}{2}$  feet high; several from a common rootstock, or densely tufted, erect; leaves 4 to 6 inches long,  $1\frac{1}{2}$  to 2 lines wide, tapering from near the base, somewhat scabrous; ligule very short or obsolete, sheaths smooth; spike 2 to 4 inches long, dense or sometimes lax, erect, tinged with purple or violet; spikelets 3- to 5- or 7-flowered; empty glumes 5 to 6 lines long, oblong or elliptical-lanceolate, terminating in a short cusp or sometimes in an awn as long as itself, conspicuously 5-nerved, usually with a narrow, scarious margin; floral glumes 4 to 5 lines long without the awn, 5-nerved, sparsely pubescent or scabrous on the nerves, terminating in an awn  $\frac{1}{2}$  to 3 lines long; palea nearly as long as its glume, scabrous on the keels; internode of rachilla clavate, minutely pubescent,  $\frac{1}{2}$  to 1 line long.

As will be inferred from the description, there is considerable variation in this species. The typical plant is always either alpine or found in high latitudes, especially in the Rocky Mountains, the White Mountains, or the Arctic regions. The Norwegian specimens are shorter than ours, with less dense spikes.

Variety *major* var. nov. Culms 2 to 3 feet high, rather slender; leaves longer than in the type, scabrous; spikes 4 to 9 inches long, erect, rather dense, but often slender; glumes mucronate or short-awned.

Type specimen collected in Oregon by W. C. Cusick in 1884 (No. 1134). Other specimens have been collected in the Rocky Mountains at lower altitudes than the species; also in the White Mountains and on the high plains of the West, and of British Columbia. Some specimens seem to run into *A. caninum* (L.) R. & S. Most of these plants look very different from the type; some have been distributed as *A. caninum* (L.) R. & S. and some as *A. tenerum* Vasey.

***Elymus ambiguus*** Vasey & Scribn. sp. nov. Culms densely tufted, rigid, erect, leafy, about 3 feet high; leaves of radical tufts 1 to 1½ feet long, narrow and involute; leaves of the culm about 4, erect, rigid, 6 to 10 inches long; sheaths long, ligule very short; spikes 3 to 5 inches long, erect, rather densely flowered, rachis scabrous, usually with 2 spikelets at each joint, sometimes with single ones at the top and bottom of the spike; spikelets mostly twice as long as the joints of the rachis, 5- to 9-flowered, 6 to 9 lines long; empty glumes aristiform, about ½ line wide at the base, rigid, about 6 lines long, scabrous; floral glumes 5 to 6 lines long, terminating in 2 small, unequal teeth and a stiff awn 1 to 2 lines long, obscurely 5-nerved, puberulent or scabrous above; palea as long as its glume, bidentate at the apex; grain about 3½ lines long.

Type specimen collected by George Vasey at Pen Gulch, Colorado, in 1884. Other specimens have been collected at Fort Garland and Empire City, Colorado, and in Montana.

***Elymus glaucus tenuis*** var. nov. (*E. sibiricus* Thurb. in Wats. Bot. Cal. ii. 326, non L.; *E. Americanus* Vasey & Scribn. in herb.) Culms 1½ to 3 feet high, rather slender; leaves usually narrow, 1 to 3 lines wide, 4 to 6 inches long, smooth or pubescent; spikes 3 to 6 inches long, narrow, with about 2 or sometimes but 1 spikelet at each joint; spikelets about 3-flowered, slightly exceeding the internodes, appressed; empty glumes narrowly lance-ovate, about 4 lines long, acuminate, 3-nerved; floral glumes 4 to 5 lines long, obscurely nerved, often purple, with a slender, divergent awn as long as the glume.

Type specimen collected by John Macoun on Vancouver Island in 1887 (No. 3); other specimens collected from British Columbia to Lower California and eastward to Arizona and Utah. Chiefly distinguished from the type by its narrower leaves and its weaker and fewer-flowered spikes. *E. sibiricus* L., to which Dr. Thurber referred our plant, is larger, with a more lax, bending spike, having larger spikelets and much more diverging and longer awns.