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THE AWNLESS ANNUAL SPECIES
OF MUHLENBERGIA

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II

THE AWNLESS ANNUAL SPECIES OF MUHLENBERGIA

By JASON R. SWALLEN

IT SOMETIMES happens that essential characters used to separate genera and species remain overlooked for many years. It is evident that this has occurred with the dropseed, *Sporobolus microspermus*, of recent floras and manuals. This species has been considered as rather complex, made up of forms that could not be satisfactorily separated. In a recent study, however, it became apparent that there were four forms of this grass that could be distinguished rather arbitrarily merely on their appearance. On the assumption that there should be definite characters as well, a search was made for them with the result that four well-defined species were segregated, two of which have not been described. The other two are the true *S. microspermus* (Lag.) Hitchc., which is not known from the United States, and *S. minutissimus* (Steud.) Hitchc., the latter having been referred to *S. microspermus* as a synonym.

The lemmas of all the species of this group are 3-nerved and relatively firm, and the caryopses are slender, cylindrical or somewhat dorsally compressed, and usually do not readily fall from the floret. These are characters of *Muhlenbergia*. In *Sporobolus* the lemmas are only 1-nerved, and the caryopses are obovate, usually strongly laterally compressed, and readily drop from the floret. The fact that the lemmas are awnless and the nerves are sometimes not easily seen without a relatively strong lens is probably responsible for their having been retained in *Sporobolus*.

In addition to the species segregated from "*Sporobolus microspermus*," there are four others previously referred to *Sporobolus* that also clearly belong in *Muhlenbergia*. These are *S. annuus* Vasey, *S. shepherdii* Vasey, *S. ramulosus* (H. B. K.) Kunth, and *S. wolfii* Vasey. The last one, described from Twin Lakes, Colo., has been referred to *S. ramulosus* as a synonym. True *S. ramulosus*, described from Mexico, has not been found in the United States.

KEY TO THE SPECIES

- Glumes longer than floret, acuminate..... 1. *M. annua*
Glumes shorter than floret, or, if as long as floret, obtuse.
Pedicels capillary, very flexuous; anthers 1-1.4 mm. long.
Glumes glabrous, as long as or a little shorter than floret. 2. *M. shepherdii*
Glumes long-pilose, usually about half as long as floret... 3. *M. sinuosa*

Pedicels thicker, if filiform, straight and rather stiff; anthers 0.2–0.5 mm. long.

Pedicels relatively stout, at least lateral ones shorter than spikelets; anthers 0.2 mm. long.

Pedicels stiffly and abruptly spreading, at least at maturity; lemma 0.8–0.9 mm. long, glabrous or nearly so; glumes less than half as long as spikelet; caryopsis about 0.5 mm. long. 4. *M. ramulosa*

Pedicels appressed; lemma 1–1.2 mm. long, rather densely pubescent on margins; glumes half or slightly more than half as long as spikelet; caryopsis 0.8–1 mm. long. 5. *M. wolfii*

Pedicels filiform or capillary, elongate, at least much longer than spikelets.

Panicles very diffuse, 4–10 cm. wide, the branches spreading or even reflexed; glumes glabrous; spikelets 1–1.1 mm. long. 6. *M. fragilis*

Panicles narrower, or, if as much as 4 cm. wide, the branches ascending; glumes pilose, at least at tip.

Spikelets 0.8–1 mm. long; glumes obtuse, half as long as floret, glabrous on back, sparsely pilose at tip; lemma glabrous.

7. *M. confusa*

Spikelets 1.2–1.5 mm. long; glumes, at least some of them, acute, sparsely to densely short-pilose at least toward summit; lemma densely short-pubescent along keel and on margins. 8. *M. minutissima*

1. *Muhlenbergia annua* (Vasey) Swallen, comb. nov.

Sporobolus annuus Vasey, Bull. Torrey Club 14: 9. 1887.

Known only from the type collection from Noragachi, Chihuahua, Mexico, *Palmer* 4a in 1885.

2. *Muhlenbergia shepherdii* (Vasey) Swallen, comb. nov.

Sporobolus shepherdii Vasey, Bull. Torrey Club 14: 8. 1887.

The lemmas are pilose across the back, but the hairs are so fine and closely appressed that they are not easily seen. In most of the specimens the spikelets seem to have stamens only.

Distribution.—Borders of arroyos, rocky cliffs, and pine woods, Chihuahua and Durango, Mexico.

Representative specimens.—CHIHUAHUA: Colonia García, *Lamson-Scribner* 330; Sierra Madre, *Pringle* 1424. DURANGO: Sandi Station, *Pringle* 13635.

3. *Muhlenbergia sinuosa* Swallen, sp. nov.

? *Sporobolus confusus* var. *aberrans* Jones, Contr. West. Bot. 14: 10. 1912.

The type matches the specimens referred to *M. sinuosa*, except that the spikelets have caryopses and small stamens.

Annua; culmi 15–50 cm. alti, geniculati, adscendentes, ramosi, infra nodos strigosi; vaginae internodiis longiores; ligula hyalina, 2–3 mm. longa, lacerata; laminae planae ad 1.5 mm. latae, minute pubescentes; paniculae 14–22 cm. longae, 2–6 cm. latae, ramis adscendentibus; pedicelli elongati capillares, sinuosi; spiculae 1.5–2 mm. longae; glumae obtusae, pilosae, spicula duplo breviores; lemma obtusum in carina et marginibus dense pubescens; palea obtusa, sparse pilosa; antherae 1–1.2 mm. longae.

Annual; culms in dense tufts, 15–50 cm. high, geniculate-ascending, branching at the nodes, strigose below the nodes, otherwise glabrous; sheaths longer than the internodes; ligule hyaline, 2–3 mm. long, lacerate; blades flat, 1–1.5 mm. wide, minutely pubescent on both surfaces, with thickened white midnerve and margins; panicles 14–22 cm. long, 2–6 cm. wide, the scabrous branches ascending; pedicels elongate, capillary, sinuate; spikelets 1.5–2 mm. long; glumes obtuse, about half as long as the spikelet, usually conspicuously pilose, especially near the margins; lemma obtuse, densely silky-pubescent below on the midnerve and margins; palea as long as the lemma, broad, obtuse, sparsely pilose on and between the nerves; stamens 1–1.2 mm. long.

Type in the U. S. National Herbarium, No. 234817, collected on the west side of the San Luis Mountains, Grant County, N. Mex., September 26, 1893, by Edgar A. Mearns (No. 2457).

Distribution.—Canyon walls and borders of marshes, New Mexico and Arizona.

Representative specimens.—NEW MEXICO: Mangas, *J. G. Smith* in 1896; Hillsboro, Sierra County, *Metcalf* 1368; Organ Mountains, *Wooton* 2020; Datil Forest, *Forest Service* 50699; Gila Forest, *Forest Service* 23723, 36188, 36239. ARIZONA: Santa Rita Mountains, *Griffiths & Thornber* 39, *Griffiths* 7243; White Mountains, *Griffiths* 5436; Rincon Mountains, *Neally* 173; Fort Huachuca, *Wilcox* 436; Coconino Forest, *Forest Service* 9272, 41541; Santa Rita Range Reserve, *Forest Service* 45281.

4. *Muhlenbergia ramulosa* (H. B. K.) Swallen, comb. nov.

Vilfa ramulosa H. B. K. Nov. Gen. & Sp. 1: 137. 1815.

Sporobolus ramulosus Kunth, Rév. Gram. 1: 68. 1829.

Distribution.—Woods, open ground, and sandy soil, 8,000–11,000 feet, Mexico to Costa Rica.

Representative specimens.—MORELOS: Tres Marias, *Pringle* 10412. MEXICO: Temascaltepec, *Hinton* 2311, 2318, 2437, 5073; Cima, *Rose & Painter* 8062. GUATEMALA: Santa María, Volcán Agua, *Hitchcock* 9125. COSTA RICA: Volcán Irazú, *Jiménez* 1151.

5. *Muhlenbergia wolffi* (Vasey) Rydb. Bull. Torrey Club 32: 600. 1905.

Vilfa minima Vasey, U. S. Dept. Agr. Monthly Rep. 1874: 155. 1874. Not

V. minima Trin. ex Steud. 1854.

Sporobolus wolffi Vasey, Bull. Torrey Club 10: 52. 1883.

Sporobolus racemosus Vasey, Bull. Torrey Club 14: 9. 1887.

Distribution.—Borders of marshes, pinelands, dry sandy or rocky soil, and cinder slopes, Colorado, New Mexico, Arizona, and Chihuahua.

COLORADO: Clyde, *Silveus* in 1935. NEW MEXICO: Grant County, *Rusby* 440; Santa Fe Forest, *Forest Service* 38763. ARIZONA: Rincon Mountains, *Bloomer* 3365; Santa Catalina Mountains, *Griffiths* 7112;

San Francisco Peak, *Leiberg* 5962; Apache Forest, *Forest Service* 16103. CHIHUAHUA: *Sánchez*, *Hitchcock* 7661; Sierra Madre, *Pringle* 1425.

6. *Muhlenbergia fragilis* Swallen, sp. nov.

Annual; culmi erecti vel adscendentes, 10–30 cm. alti, ramosi, infra nodos strigosi; vaginae internodiis longiores, scaberulae, marginibus hyalinis; ligula 1–3 mm. longa, hyalina, decurrens; laminae usque ad 6 cm. longae, 1.5 mm. latae, scaberulae; paniculae 10–20 cm. longae, 4–10 cm. latae, ramis gracilibus patentibus vel reflexis; pedicelli capillares recti divergentes, 2–10 mm. longi; spiculae 1–1.1 mm. longae; glumae obtusae vel subacutae, glabrae, spicula $1/2$ – $1/4$ breviores; lemma obtusum, glabrum vel in carina et marginibus dense sericeum; palea obtusa in nervis minute pilosa; antherae ca. 0.4 mm. longae.

Annual; culms erect or geniculate ascending, 10–30 cm. high, freely branching at the lower nodes, strigose below the nodes, otherwise glabrous; sheaths longer than the internodes, scaberulous, with thin hyaline margins; ligule 1–3 mm. long, thin, hyaline, decurrent; blades as much as 6 cm. long, 1.5 mm. wide, scaberulous, with prominent, white, thickened midnerve and margins; panicles very diffuse, more than half the length of the culm, 4–10 cm. wide, the numerous usually solitary slender branches becoming stiffly spreading or even reflexed, with a pulvinus in the axils, the branchlets divergent; pedicels capillary but usually straight, divergent, mostly 2–5 mm., or sometimes as much as 10 mm. long; spikelets 1–1.1 mm. long; glumes half to three-fourths as long as the spikelet, obtuse or subacute, glabrous; lemma obtuse, glabrous or densely silky-pubescent on the keel and margins; palea as long as the lemma, sparsely and minutely pilose on the nerves; anthers about 0.4 mm. long; caryopsis elliptic, 0.7 mm. long, somewhat dorsally compressed, reddish brown.

Type in the U. S. National Herbarium, No. 1829290, collected at Sunny Glen, west of Alpine, Brewster County, Tex., September 29, 1935, by Barton H. Warnock (No. 235).

Distribution.—Moist sandy soil and rocky hills, western Texas, New Mexico, Arizona, south to central Mexico.

Representative specimens.—TEXAS: Presidio County, *Nealley* 145; Mount Livermore, *Hinckley* 526. NEW MEXICO: Dona Ana County, *Hitchcock* 3788; Animas Valley, *Mearns* 2490. ARIZONA: Santa Rita Mountains, *Silveus* 3467; Santa Cruz County, *Hitchcock* 3686, 3788; Prescott, *Griffiths* 7342; Santa Catalina Mountains, *Kearney & Peebles* 10347; Tonto Forest, *Forest Service* 87357; Coronado Forest, *Forest Service* 41684, 49616; Coconino Forest, *Forest Service* 9260. SONORA: Nogales, *Wiggins* 6224; Cucurpe, *Wiggins* 7163. CHIHUAHUA: Southwestern Chihuahua, *Palmer* 76; Chihuahua, *Hitch-*

cock 7783, *Pringle* 482. COAHUILA: San Antonio de los Alamos, *I. M. Johnston* 8244; Aribabi, *Harvey* 1658. AGUASCALIENTES: Aguascalientes, *Hitchcock* 7472. MORELOS: Xochitepec, *Lyonnet* 2613.

In some of the specimens the lemmas are entirely glabrous, while in the rest they are densely pubescent on the keel and margins. The nerves of the lemma are faint but quite evident under a lens.

7. *Muhlenbergia confusa* (Fourn.) Swallen, comb. nov.

Milium microspermum Lag. Gen. & Sp. Nov. 2. 1816. Not *Muhlenbergia microsperma* Kunth, 1829.

Vilfa confusa Fourn. Mex. Pl. 2: 101. 1886.

Sporobolus confuses Vasey, Bull. Torrey Club 15: 293. 1888.

Sporobolus microspermus Hitchc. Journ. Washington Acad. Sci. 23: 453. 1933.

Culms very slender, delicate, mostly 8–20 cm. high; spikelets 0.8–1 mm. long with obtuse or subacute glumes half as long as the spikelet, glabrous on the back, sparsely ciliate on the margins at the tip; lemmas glabrous.

Distribution.—Woods and stream banks, Mexico and Guatemala.

Representative specimens.—PUEBLO: Pueblo, *Arsène* 48. MÉXICO: Salto de Agua, *Purpus* 1635, *Pringle* 13998, *Schaffner* 192. GUATEMALA: Quiché, *Archer* 3858; Volcán Agua, *Hitchcock* 9130.

8. *Muhlenbergia minutissima* (Steud.) Swallen, comb. nov.

Agrostis minutissima Steud. Syn. Pl. Glum. 1: 171. 1854.

Sporobolus minutissimus Hitchc. Proc. Biol. Soc. Washington 41: 161. 1928.

Differs from *M. confusa* in having spikelets 1.2–1.5 mm. long, the glumes pilose on the back, two-thirds as long as the spikelet, at least some of them acute, and lemma pubescent along the midnerve and on the margins below.

Distribution.—Moist sandy or rocky soil, along streams and in meadows and open woods, Montana to Washington south to northern Mexico.

Representative specimens.—TEXAS: Davis Mountains, Jeff Davis County, *Palmer* 30736, 32017. MONTANA: Melrose, *Rydberg* 2291. WYOMING: Torrington, Laramie County, *Nelson* 8286; Laramie River, Albany County, *Nelson* 446. IDAHO: St. Anthony, *Merrill & Wilcox* 434. WASHINGTON: Parker Bottom, Yakima County, *Elmer* 1076. OREGON: Elgin, *Shear* 1740. COLORADO: Alamosa, Conejos County, *Shear* 868; Gunnison, Gunnison County, *Clements* 245; Pike Forest, Forest Service 58172, 88276; Rio Grande Forest, Forest Service 89313. NEVADA: Truckee River bottom, *Watson* 1278. NEW MEXICO: Carson Forest, Forest Service 36863, 39124; Datil Forest, Forest Service 23811, 23839, 41767; Lincoln Forest, Forest Service 41558. ARIZONA: Santa Catalina Mountains, *Shreve* 5391; Flagstaff, *Hitchcock* 13211; *Silveus* 3348; Coconino Forest, Forest Service 39494, 74981; Apache Forest, Forest Service 16090, 16104; Sitgreaves Forest, Forest Service

19054. CALIFORNIA: Mono Lake, *Bolander* 6096; Yosemite Valley, *Abrams* 4669. CHIHUAHUA: Miñaca, *Hitchcock* 7767, *Pennell* 18981. DURANGO: El Salto, *Pennell* 18517. JALISCO: La Junta, *Orcutt* 5472; Guadalajara, *Hitchcock* 7276, 7309. MICHOACÁN: Coalcomán, *Hinton* 15340.

Typically, the lemma is quite awnless, but occasionally there is a very short awn or mucro, indicating a relationship with *M. texana* and a transition from the awnless to the awned species of *Muhlenbergia*.

