

CALAMAGROSTIS COAHUILENSIS AND *C. DIVARICATA*  
(POACEAE: POOIDEAE: AGROSTIDINAE),  
TWO NEW SPECIES FROM MÉXICO

Paul M. Peterson and Robert J. Soreng    Jesus Valdés-Reyna

Department of Botany  
National Museum of Natural History  
Smithsonian Institution  
Washington, District of Columbia 20013-7012, U.S.A.  
peterson.paul@nmnh.si.edu; soreng.rob@nmnh.si.edu

Departamento de Botánica  
Universidad Autónoma Agraria "Antonio Narro"  
Buenavista, Saltillo  
Coahuila 25315, MÉXICO  
jvaldes@narro.uaaan.mx

ABSTRACT

*Calamagrostis coahuilensis* P.M. Peterson, Soreng & Valdés-Reyna, sp. nov. and *Calamagrostis divaricata* P.M. Peterson & Soreng, sp. nov., from México are described and illustrated. *Calamagrostis coahuilensis* occurs on calcareous slopes in the mountains of southeastern Coahuila and southwestern Nuevo León; and *C. divaricata* occurs on moist slopes and mossy cliffs of southwestern Durango. *Calamagrostis coahuilensis* is morphologically similar to *C. purpurascens* but differs by having shorter anthers (1–1.2 mm long), nearly smooth ligules, scaberulous rachises, glabrous or minutely antrorsely scabrous sheath summits, and somewhat dense but not spikelike, greenish panicles. *Calamagrostis divaricata* seems morphologically allied to *C. pringlei* but differs by having wider panicles (4–10 cm) with branches reflexed spreading and divaricate, shorter spikelets (3.4–4.3 mm long), shorter glumes (3.4–4.3 mm long) that are both 1-veined, and shorter lemmas (3.8–4.3 mm long) with an awn inserted on upper 1/4 to 1/3.

RESUMEN

Se describen y se ilustran para México *Calamagrostis coahuilensis* P.M. Peterson, Soreng & Valdés-Reyna, sp. nov. y *Calamagrostis divaricata* P.M. Peterson & Soreng, sp. nov. *Calamagrostis coahuilensis* se encuentra en laderas calcáreas en las montañas del sureste del estado de Coahuila y suroeste del estado Nuevo León; y *C. divaricata* se encuentra en laderas húmedas y riscos musgosos del suroeste del estado de Durango. *Calamagrostis coahuilensis* es morfológicamente similar a *C. purpurascens* pero difiere en poseer anteras más cortas (1–1.2 mm largo), ligulas casi lisas, raquis escaberuloso, ápices de las vainas glabros o escasamente con escabrosidad antrorsa, y panículas densas pero no espigadas, de color verdusco. *Calamagrostis divaricata* parece morfológicamente relacionado a *C. pringlei* pero difiere en poseer panículas más amplias (4–10 cm) con ramificaciones reflexas, extendidas y divaricadas, espiguillas más cortas (3.4–4.3 mm largo), glumas más cortas (3.4–4.3 mm largo) ambas uninervadas, y lemas más cortas (3.8–4.3 mm largo) con una arista insertada desde 1/4 hasta 1/3 arriba de la mitad.

*Calamagrostis* is characterized as having single-flowered spikelets, one or three-veined glumes as long or exceeding the floret in length (rarely slightly shorter), non-keeled lemmas that are membranous or cartilaginous (infrequently hyaline), usually with a single dorsally attached awn (rarely awnless), a callus with a crown of hairs, caryopses with short hilum and without apical hairs, and lodicules that are apically membranous (Clayton & Renvoize 1986; Watson &

Dallwitz 1992). Worldwide, *Calamagrostis* includes between 230 (Watson & Dallwitz 1992) and 263 (reported by D. Clayton & B. Simon, pers. comm. 2004) species. In North, Central, and South America 131 species are reported in Soreng et al. (2003). In México the following 11 species of *Calamagrostis* are recognized: *C. erectifolia* Hitchc., *C. eriantha* (Kunth) Steud., *C. guatemalensis* Hitchc., *C. intermedia* (J. Presl) Steud., *C. oridzabae* (Rupr. ex E. Fourn.) Beal, *C. pringlei* Scribn. ex Beal, *C. purpurascens* R. Br., *C. rigescens* (J. Presl) Scribn., *C. toluensis* (Kunth) Trin. ex Steud., *C. valida* Sohns [syn.=*C. mcvaughii* Sohns; McVaugh (1983) was the first to select this name as a synonym, see Article 11.5 for equally published species in the Code of Botanical Nomenclature (Greuter et al. 2000)], and *C. vulcanica* Swallen (Chimal 1987; Espejo-Serna et al. 2000).

While collecting grasses and specifically searching for unique forms of *Trisetum* in Durango, México (Finot et al. 2004) in the fall of 2003 the first author gathered a specimen that seemed to be an undescribed species. At first glance this specimen appeared to be two or more flowered but upon closer inspection and under magnification all spikelets contained a single floret. After studying morphologically similar material from México collected by the first author, an additional undescribed species was found in Coahuila. The two new species are clearly members of subfamily Pooideae, tribe Poeae, subtribe Agrostidinae (Soreng et al. 2003, 2004). We describe these two specimens as new species of *Calamagrostis*.

***Calamagrostis coahuilensis*** P.M. Peterson, Soreng & Valdés-Reyna, sp. nov. (Figs. 1, 2). TYPE: MÉXICO. COAHUILA. Sierra Madre Oriental, 32 mi SE of Saltillo and 8 mi SE of Jame on road to Sierra La Viga, 3240 m, 29 Sep 1990, P.M. Peterson, C.R. Annable & J. Valdés-Reyna 10051b (HOLOTYPE: US!).

*A Calamagrosti purpurascens* R.Br. antheris 1–1.2 mm longis, ligulis fere laevigatis, rhachibus scaberulis, vagina apicali glabra vel scabrella antrorse, paniculis aliquantum densis sed non spicace similibus, viridis, recedit.

Caespitose perennial with intravaginal and extravaginal shoot initiation. Culms (22–)40–100 cm tall, erect, glabrous; internodes glabrous. Sheaths 6–28 cm long, shorter than the internodes, glabrous, often fibrous below with age; margins smooth; cataphylls and lower sheaths glabrous; summit glabrous or minutely antrorsely scabrous. Ligules 5–8 mm long, membranous often lacerate, firmer below, nearly smooth, apex obtuse to acute. Blades 8–20 cm long, 2–4 mm wide, flat, apically acuminate, glabrous, scabrous above. Panicles (7–)9–20 cm long, 0.5–1.2 cm wide, contracted, somewhat dense but not spike-like, greenish; rachis scaberulous; inflorescence branches mostly 2–10 cm long below, the branches, ascending and tightly appressed, mostly floriferous near base, one or two per node. Spikelets 5.8–7.2 mm long, 1-flowered, tightly appressed to the branches, dark greenish; pedicels 0.6–4 mm long, ascending, scaberulous; rachilla 2.4–3 mm long, covered with stiff hairs, the hairs 0.5–1 mm long. Glumes 5.8–7.2 mm long, lanceolate, about equal or subequal in length, longer than the

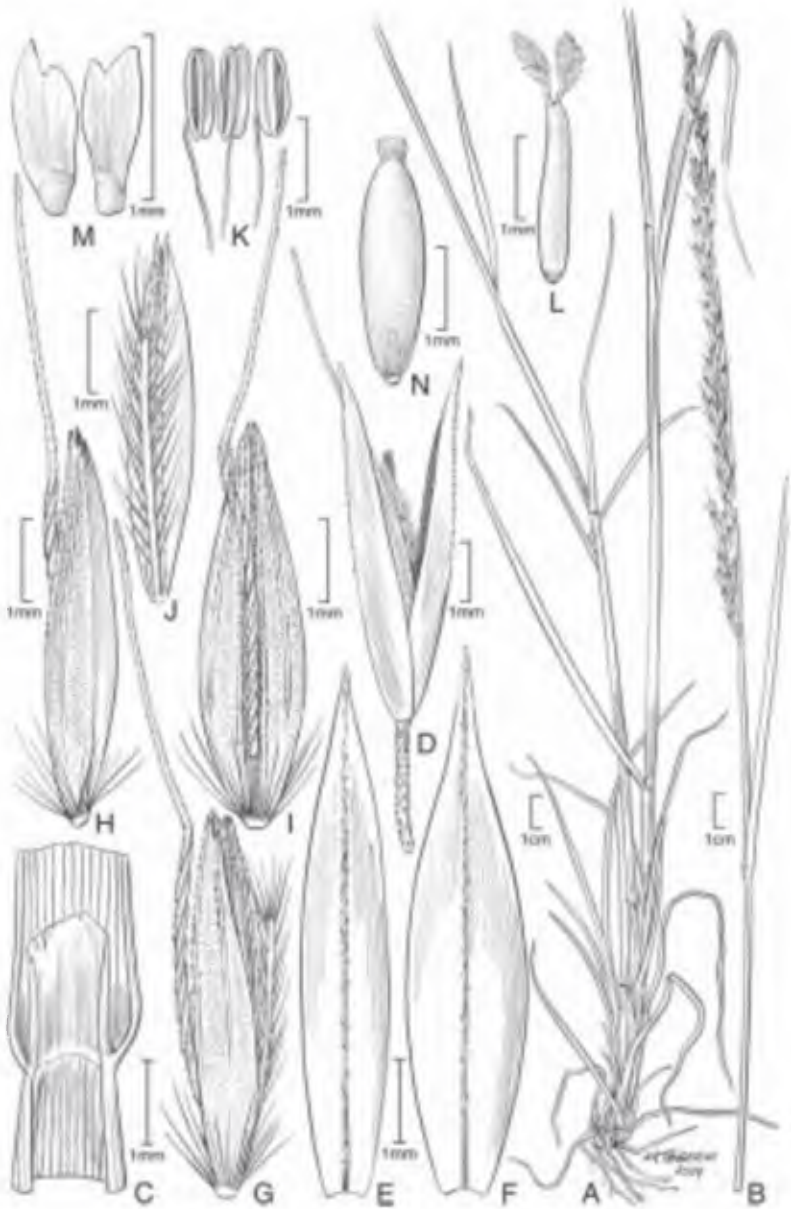


FIG. 1. *Calamagrostis coahuilensis* (Peterson, Annable & Valdés-Reyno 10051b). A. Habit. B. Inflorescence. C. Sheath, ligule, and blade. D. Spikelet. E. Lower glume, dorsal view. F. Upper glume, dorsal view. G. Floret, lateral view. H. Lemma, lateral view. I. Lemma, dorsal view. J. Palea with rachilla, dorsal view. K. Stamens. L. Pistil. M. Lodicules. N. Caryopsis, dorsal view.



FIG. 2. Distribution of *Calamagrostis coahuilensis* and *C. divaricata* in México.

floret, membranous, 1-veined, scaberulous along vein; margins hyaline; apex acute. Lemmas 5–5.7 mm long, lanceolate, membranous, yellowish-green, conspicuously 5-veined near base, scaberulous, awned; apex acute, entire or bifid; awn 8–10 mm long, golden below and purplish above, borne near the base on the lower 1/6, inserted in a groove below and twisted and once-genuiculate above; callus obtuse with white hairs, the hairs 0.8–1.8 mm long. Paleas 5–5.6 mm long, about as long as the lemma, hyaline, 2-veined, the veins scaberulous, green; apex acute, entire. Lodicules ca. 1 mm long, lanceolate, lobed, glabrous. Stamens 3; anthers 1–1.2 mm long, purple. Ovary ca. 0.2 mm long, glabrous; styles 2, separate; stigmas 2, feathery, whitish. Caryopses 2–2.5 mm long, fusiform, light greenish.

*Phenology*.—Flowering in late August, September, and early October.

*Distribution*.—*Calamagrostis coahuilensis* is known from the mountains of Coahuila and Nuevo León growing on calcareous slopes with *Abies mexicana* Martínez, *Pinus culminicola* Andresen & Beaman, *P. hartwegii* Lindl., *Hesperostipa spartea* (Trin.) Barkworth, *Poa ruprechtii* Peyr., *Holodiscus discolor* (Pursh) Maxim., *Quercus greggii* (A. DC.) Trel., and scattered *Populustremuloides* Michx.

Additional specimens examined (PARATYPES): **MÉXICO. Coahuila:** municipio de Arteaga, near summit of Coahuilon, SE of San Antonio de Las Alazanas and SE of Saltillo, 3120 m, 17 Oct 1989, P.M. Peterson, J. Valdés-Reyna & J.A. Villareal 8399 (ANSM, US); 29 Aug 1986, J.A. McDonald (TEX). **Nuevo León:** municipio de Galeana, Cerro el Potosí, 3600 m, 3 Aug 1989, A. García-Arévalo 66 (ANSM, CIIDIR); cumbre de Cerro Potosí, ca. Galeana, 29 Aug 1986, J.A. McDonald (TEX); Ladera S, 26 Jul 1985, J.A. McDonald (TEX); J. Ochoa-Guillemard 983 (COCA).

***Calamagrostis divaricata*** P.M. Peterson & Soreng, sp. nov. (Figs. 2, 3). TYPE: MÉXICO. DURANGO. Sierra Madre Occidental, ca. 3 mi S of Hwy 40 at Mexiquillo, Arroyo Paso Resbaloso (23°42'46.2"N-105°39'45.1"W), 2520 m, 14 Sep 2003, P.M. Peterson, M.S. González-Elizondo & G. Teña-González 17774 (HOLOTYPE: US!; ISOTYPES: ANSM!, CIIDIR!, MO!, RSA!, US!).

A *Calamagrosti pringlei* Scribn. ex Beal paniculis 4–10 cm latis, ramis reflexis, effusis et divaricatis, spiculis 3.4–4.3 mm longis, glumis 3.4–4.3 mm longis, univenis, lemmatibus 3.8–4.3 mm longis, arista inserta supera 1/4–1/3, recedit.

Loosely caespitose perennial with short rhizomes and extravaginal shoot initiation. Culms 52–96 cm tall, erect to slightly decumbent near base, glabrous; internodes glabrous. Sheaths 8–20 cm long, shorter or longer than the internodes, glabrous; margins smooth; cataphylls and lower sheaths glabrous; summit glabrous. Ligules 2–3.6 mm long, membranous often lacerate, decurrent below; apex truncate, ciliolate. Blades 15–60 cm long, 1–3 mm wide, flat or involute, apically acuminate, glabrous, scabrous above. Panicles 9–16 cm long, 4–10 cm wide, ovate, open, lax, sparsely flowered, greenish; rachis scaberulous; inflorescence branches mostly 2–8 cm long below, the branches delicate, ascending and spreading, naked near base, whorled; lower inflorescence nodes with 3–6 branches. Spikelets 3.4–4.3 mm long, 1-flowered, spreading from the branches, yellowish-green; pedicels 1–5 mm long, ascending to reflexed and





FIG. 3. *Calamagrostis divaricata* (Peterson, González-Elizondo & Teña-González 17774). A. Habit. B. Inflorescence. C. Sheath, ligule, and blade. D. Spikelet. E. Lower glume, dorsal view. F. Upper Glume, dorsal view. G. Lemma, dorsal view. H. Lemma, ventral view. I. Palea with rachilla, dorsal view. J. Palea, dorsal view. K. Stamens and pistil. L. Gynoecium, mature. M. Lodicules.

spreading, scaberulous; rachilla 1.6–1.9 mm long, covered with stiff hairs, the hairs up to 1.5 mm long. Glumes 3.4–4.3 mm long, lanceolate, about equal in length, shorter or longer than the floret, membranous, 1-veined, scaberulous along vein; margins hyaline; apex acute to acuminate. Lemmas 3.8–4.3 mm long, lanceolate, membranous, yellowish-green, 5-veined, scaberulous, awned; apex acute, entire; awn 4–6 mm long, yellowish, borne on the upper 1/3 or 1/4, straight or twisted and once-geniculate; callus obtuse with short white hairs, the hairs 0.2–1 mm long. Paleas 3.8–4.4 mm long, as long or slightly longer than the lemma, hyaline, 2-veined, the veins scaberulous, green; apex acute, entire. Lodicules 0.7–0.8 mm long, lanceolate, lobed, glabrous. Stamens 3; anthers 1.8–2.2 mm long, yellow. Ovary 0.2–0.4 mm long, glabrous; styles 2, separate; stigmas 2, feathery, whitish. Caryopses 1.8–2.5 mm long, fusiform, light brownish.

*Phenology*.—Flowering in September.

*Distribution*.—*Calamagrostis divaricata* is known only from the type locality growing on moist slopes and mossy cliffs with *Pinus cooperi* C.E. Blanco, *P. durangensis* Martínez, *P. ayacahuite* C. Ehrenb. ex Schldl., *Quercus sideroxyla* Bonpl., *Arbutus occidentalis* McVaugh & Rosatti, *Cupressus arizonica* Greene, and *Muhlenbergia alamosae* Vasey.

## DISCUSSION

*Calamagrostis coahuilensis* remained undetected by biologists for almost 19 years. The first collections of this species were apparently made by McDonald in 1985 from the Cumbre de Cerro Potosí. All specimens that we have seen from Coahuila and Nuevo León that were previously determined as *C. purpurascens* or *C. pringlei* are *C. coahuilensis*. Therefore, *C. purpurascens* is not found in México. *Calamagrostis coahuilensis* is morphologically similar to *C. purpurascens*, but can be separated from the latter by having anthers that are shorter (1–1.2 mm long), ligules that are nearly smooth, a scaberulous rachis, sheath summits that are glabrous or minutely antrorsely scabrous, and greenish panicles that are somewhat dense but not spikelike (Table 1). Populations of *C. coahuilensis* are separated from the closest known locality of *C. purpurascens* in the Sangre de Cristo Mountains, Taos County, New México (Allred 1993) by over 800 mi. McDonald (1990) and Garcia-Arevalo and González-Elizondo (1991) first reported *C. purpurascens* from Coahuila and Nuevo León, México. Apparently, Manuel González-Ledesma, John Reeder, and Charlotte Reeder identified the grasses for McDonald (1990) since they appear in the acknowledgements for having reviewed that family. This is not surprising since in most characteristics the range of variation in *C. coahuilensis* overlaps that of *C. purpurascens*. An adequate illustration (Ochoa 983) of the new species appears in Beetle's (1987) treatment of the grasses of México, although he referred to it as *C. pringlei*.

It is surprising that *C. divaricata* is known only from a single, recent collection since it occurs near a rather heavily used tourist destination. *Calamagrostis divaricata* seems morphologically allied to *C. pringlei* and can be differentiated from the latter by having wider panicles (4–10 cm) with branches reflexed spreading and divaricate, shorter spikelets (3.4–4.3 mm long), shorter glumes (3.4–4.3 mm long) that are both 1-veined, and shorter lemmas (3.8–4.3 mm long) with an awn inserted on upper 1/4 to 1/3 (Table 1).

The infrageneric classification of *Calamagrostis* has not been critically tested, and it is not usually discussed for the New World, other than the acceptance of the segregate genus *Deyeuxia* by some South American taxonomists (Rúgolo de Agrasar 1978, 1998; Villavicencio 1995). The genus (including *Deyeuxia*) is divided into at least four subgenera with many sections, subsections, and series (Rozhevits & Shishkin 1963; Tzvelev 1976; Wasiljew 1960). All of these Russian agrostologists placed *C. purpurascens* in *Calamagrostis* sect. *Deyeuxia* (Clarion ex P. Beauv) Rchb., and Wasiljew (whose classification was world-wide in scope) placed *C. pringlei* in the same section. Several infrageneric taxa were accepted for the New World (Soreng et al. 2003). Based on callus hair length (1/2 or less the lemma length), lemmas membranous, and presence of a well-developed rachilla extension, both of the new species appear to belong in

TABLE 1. Salient features comparing *Calamagrostis coahuilensis*, *C. divaricata*, *C. pringlei*, *C. purpurascens*, and *C. valida*.

Characters	<i>C. coahuilensis</i>	<i>C. divaricata</i>	<i>C. pringle</i>	<i>C. purpurascens</i>	<i>C. valida</i>
Cataphylls & lower leaf sheath abaxial surface	glabrous	glabrous	densely hirtellous	glabrous or scaberulous	glabrous
Leaf sheath summit abaxial surface	glabrous or minutely antrorsely scaberous	glabrous	glabrous	glabrous or minutely retrorse-Strigulose	Densely hirtellous
Leaf blade & ligule adaxial surface	glabrous or nearly smooth	glabrous	glabrous	scaberous	sparsely hirtellous
Inflorescence width	0.5–1.2 cm	4–10 cm	2–4 cm	0.8–1.5 cm	(1.5–)4–10 cm
Inflorescence branches, arrangement & spikelet placement	ascending and closely appressed; $\pm$ floriferous to base	4–10 cm ascending, reflexed spreading to divaricate; not floriferous to base	2–4 cm ascending, loosely appressed or spreading; not floriferous to base	0.8–1.5 cm ascending and closely appressed, spike-like; +floriferous to base	ascending, appressed to base spreading; $\pm$ floriferous to base
Spikelet length	5.8–7.2 mm	3.4–4.3 mm	(4.5–)5–5.8 mm	5–9 mm	4–6.5 mm
Spikelet color	greenish	yellowish-green	pale green to purplish	yellowish-purple	yellowish-purple
rachilla length	2.4–3 mm	1.6–1.9 mm	1.5–2 mm	1.8–3 mm	1.5–2 mm
rachilla hair length	0.5–1 mm	0.8–1.5 mm	1–2 mm	1–2 mm	2–3 mm
Glumes length	5.8–7.2 mm	3.4–4.3 mm	(4.5–)5–5.8 mm	5–9 mm	3.4–6.5 mm
Upper glume, number of veins	one	one	three	one	(one) three
Lemma length	5–5.7 mm	3.8–4.3 mm	4.5–5 mm	4–7 mm	3.4–5 mm
Lemma surface	smooth	scaberulous	scaberulous	scaberulous	smooth
Lemma veins, aspect	conspicuous	inconspicuous	inconspicuous	inconspicuous	inconsp./conspicuous
Lemma awn insertion	base, lower 1/6	upper 1/4 to 1/3	lower 1/3 to middle	lower 1/6 to 1/3	near middle
Lemma apex	entire or bifid with age	entire	entire	bifid	two or four setae or teeth (prolongation of veins)
Callus hair length	0.8–1.8 mm	0.2–1 mm	0.2–1 mm	0.7–2 mm, occasionally absent	1.3–2.8(–3.5) mm
Anther length	1–1.2 mm	1.8–2.2 mm	2.2–2.4 mm	1.5–3.5 mm	1.4–2.2 mm
Anther color	purple	yellow	yellowish-purple	purple or yellow	yellow or purple



*Calamagrostis* subgen. *Deyeuxia* sect. *Deyeuxia*. A key for separating the two new species from other species of *Calamagrostis* in northern México (Chihuahua, Coahuila, Durango, Nuevo León, Sinaloa, and Tamaulipas) follows.

#### KEY TO THE SPECIES OF *CALAMAGROSTIS* IN NORTHERN MÉXICO

1. Panicles 0.5–1.5 cm wide, contracted, densely flowered; lemma awn inserted at base or on lower 1/6 to near lower 1/4; anthers 1–1.2 mm long \_\_\_\_\_ ***Calamagrostis coahuilensis***
1. Panicles 1.5–10 cm wide, narrow to open and loosely flowered; lemma awn inserted from lower 1/3, middle, and upper 1/4; anthers 1.4–2.4 mm long.
  2. Lemma apex with two or four setae or teeth (prolongation of veins); callus hairs 1.3–2.8 mm long; rachilla hairs 2–3 mm long; leaf blade, ligule, and summit of sheath sparsely hirtellous \_\_\_\_\_ ***Calamagrostis valida***
  2. Lemma apex entire and without setae or teeth; callus hairs 0.2–1 mm long; rachilla hairs 0.8–2 mm long; leaf blade, ligule, and summit of sheath glabrous.
    3. Upper glume 3-veined; spikelets (4.5) 5–5.8 mm long; lemmas 4.5–5 mm long, awn inserted on lower 1/3 to middle; panicles 2–4 cm wide, the branches loosely appressed or spreading but not divaricate \_\_\_\_\_ ***Calamagrostis pringlei***
    3. Upper glume 1-veined; spikelets 3.4–4.3 mm long; lemmas 3.8–4.3 mm long, awn inserted on upper 1/3 to 1/4; panicles 4–10 cm wide, the branches reflexed spreading, divaricate \_\_\_\_\_ ***Calamagrostis divaricata***

#### ACKNOWLEDGMENTS

We wish to thank the Smithsonian Institutions, National Museum of Natural History, Biodiversity and Inventory Program, and Research Opportunities Fund for supporting the fieldwork. Appreciation is extended to Alice R. Tangerini for providing the illustrations; Susan J. Pennington for preparing the distribution map; Alain Touwaide and Dan Nicolson for correcting the Latin diagnoses; Kelly Allred and Rich Spellenberg for checking the distribution records in New Mexico; and Teresa Mejia-Saulés for finding inconsistencies in the manuscript.

#### REFERENCES

- ALLRED, K.W. 1993. A field guide to the grasses of New Mexico. Department of Agricultural Communications, College of Agriculture and Home Economics, New Mexico State University, Las Cruces.
- BEETLE, A.A., E. MANRIQUE FORCECK, C.V. JARAMILLO LUQUE, M.P. GUERRERO SÁNCHEZ, J.A. MIRANDA SÁNCHEZ, C.I. NÚÑEZ TANCREDI, y C.A. CHIMAL HERNÁNDEZ. 1987. Las Gramíneas de México, Tomo II. 344 p. COTECOCA, S.A.R.H., México, D.F., México.
- CHIMAL HERNÁNDEZ, C.A. 1987. *Calamagrostis* Adans. In: A.A. Beetle, E. Manrique Forceck, C.V. Jaramillo Luque, M.P. Guerrero Sánchez, J.A. Miranda Sánchez, C.I. Núñez Tancredi, y C.A. Chimal Hernández. 1987. Las Gramíneas de México. Tomo II. COTECOCA, S.A.R.H. México, D.F. Pp. 161–172.
- CLAYTON, W.D. and S.A. RENOUIZE. 1986. Genera graminum: grasses of the World. Her Majesty's Stationary Office, London.
- ESPEJO-SERNA, A., A.R. LÓPEZ-FERRARI, and J. VALDÉS-REYNA. 2000. *Poaceae*. In: A. Espejo Serna and

- A.R. López-Ferrari, eds. Las Monocotylidóneas Mexicanas: una sinopsis florística, Partes IX–XI. Consejo Nacional de la Flora de México, A.C., Universidad Autónoma Metropolitana-Izapalapa, y Comisión Nacional para el conocimiento y uso de la Biodiversidad, México, D.F. Pp. 10:7–236.
- FINOT, V.L., P.M. PETERSON, R.J. SORENG, and F.O. ZULOAGA. 2004. A revision of *Trisetum*, *Peyritschia*, and *Sphenopholis* (Poaceae: Pooideae: Aveninae) in México and Central America. *Ann. Missouri Bot. Gard.* 91:1–30.
- GARCIA-AREVALO, A. and S. GONZÁLEZ-ELIZONDO. 1991. Flora y vegetación de la cima del Cerro Potosí, Nuevo León, México. *Acta Bot. Mex.* 13:53–74.
- GREUTER, W.J. MCNEILL, F.R. BARRIE, H.M. BURDET, V. DEMOULIN, T.S. FILGUEIRAS, D.H. NICOLSON, P.C. SILVA, J.E. SKOG, P. TREHANE, N.J. TURLAND, and D.L. HAWKSWORTH. 2000. International code of botanical nomenclature (Saint Luis Code). Koeltz Scientific Books, Königstein, Germany.
- MCDONALD, J.A. 1990. The alpine-subalpine flora of northeastern México. *Sida* 14:21–28.
- MCVAUGH, R. 1983. Flora Novo-Galiciana. A descriptive account of the vascular plants of western México. Gramineae. 14: 1–436. University of Michigan Press, Ann Arbor.
- ROZHEVITS, R.YU. and B.K. SHISHKIN. 1963 (1934). Flora of the U.S.S.R. vol. II, XXIV. Gramineae Juss. National Science Foundation, Washington, D.C. Pp. 152–184.
- RÚGULO DE AGRASAR, Z.E. 1978. Las especies patagónicas del género *Deyeuxia* Clar. (Gramineae) de la Argentina y de Chile. *Darwiniana* 21:417–453.
- RÚGULO DE AGRASAR, Z.E. 1998. *Deyeuxia*. In: S.A. Renvoize, Gramíneas de Bolivia. The Royal Botanic Gardens, Kew. Pp. 181–235.
- SOEING, R.J., P.M. PETERSON, G. DAVIDSE, E.J. JUDZIEWICZ, F.O. ZULOAGA, T.S. FILGUEIRAS, and O. MORRONE. 2003. Catalogue of New World grasses (Poaceae): IV: subfamily Pooideae. *Contr. U.S. Natl. Herb.* 48:1–730.
- SOEING, R.J., G. DAVIDSE, P.M. PETERSON, F.O. ZULOAGA, E.J. JUDZIEWICZ, T.S. FILGUEIRAS, and O. MORRONE. 2004. Catalogue of New World grasses (Poaceae). <http://mobot.mobot.org/W3T/Search/nwgc.html> and Classification of New World Grasses. <http://mobot.mobot.org/W3T/Search/nwgclass.html>
- TZVELEV, N.N. 1983 (1976). Grasses of the Soviet Union (Zlaki SSSR), part II. Oxonian Press, New Delhi, India.
- VILLAVICENCIO, X. 1995. Revision der gattung *Deyeuxia* in Bolivien. 1–304. Ph.D. Thesis, Freien Universität Berlin, Berlin.
- WASILIEW, W.N. 1960. Das system der gattung *Calamagrostis* Roth. *Feddes Repert.* 63(31): 229–251.
- WATSON, L. and M.J. DALLWITZ. 1992. The grass genera of the World. C.A.B. International, Wallingford, U.K.