Comments Upon the Taxonomy and Typification of Amaranthus torreyi, A. Fimbriatus, and A. Venulosus (Amaranthaceae)

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COMMENTS UPON THE TAXONOMY AND TYPIFICATION OF *AMARANTHUS TORREYI*, *A. FIMBRIATUS*, AND *A. VENULOSUS* (AMARANTHACEAE)

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Abstract: *Amaranthus torreyi* and *A. fimbriatus* are partially sympatric, seemingly weedy species native to the southwestern United States and northwestern Mexico. A taxonomic account of each is provided, along with maps showing their distribution. Lectotypification of *A. venulosus* is provided; the taxon is treated as a form of *A. fimbriatus.*

Keywords: Amaranthaceae, *Amaranthus,* Mexico flora, Texas flora.

Attempts to provide valid names for some of the more difficult elements of the genus *Amaranthus* occurring in Trans-Pecos, Texas, namely *A. torreyi* (A. Gray) Benth. ex S. Watson and *A. fimbriatus* (Torr.) Benth. ex S. Watson, have stimulated the present study.

Reed (1969) was the first to contribute an up-to-date comprehensive treatment of *Amaranthus* for Texas. In that treatment he recognized both *A. torreyi* and *A. fimbriatus,* distinguishing between these by the following couplet:

Tepals of pistillate flowers with entire or crenulate margins; bracts equaling or exceeding the tepals; axillary glomerules mostly equaling or exceeding the petioles ..... 1. *A. torreyi*
Tepals of pistillate flowers with fimbriate margins; bracts half or less as long as the tepals; axillary glomerules mostly equaling or shorter than the petioles ..... 2. *A. fimbriatus*

Reed also provided a full and accurate taxonomic account for the two species, which was largely adopted from Johnston (1944). Correll and Johnston (1970) and Johnston (1990) followed Reed's treatment more or less exactly. The present author (Turner et al., 2003) also retained both species in the *Atlas of the Vascular Plants of Texas,* but experienced much difficulty in assigning herbarium specimens to one or the other taxon based upon the eponymous character concerned, namely fimbriate tepals, which appeared to vary among and within populations. As study of the two species progressed it soon became clear that *Amaranthus venulosus* S. Watson, a weakly differentiated taxon typified by material collected in Arizona, was also part of this complex. Most workers have not accredited *A. venulosus* as occurring in Texas, where it is distinguished from *A. fimbriatus* only by its lack of clearly defined tepal fimbriation (superficially resembling that found in *A. torreyi*). In all other characters (including bract length and shape) *A. venulosus* resembles *A. fimbriatus.* In short, I was unable to distinguish clearly nonfimbriate specimens of *A. fimbriatus* from *A. venulosus.*

In my experience, the best character by which to distinguish *Amaranthus torreyi* from *A. fimbriatus,* as noted in the above couplet, is bract length and shape (longer and lanceolate in *A. torreyi*; shorter and more nearly ovate in *A. fimbriatus*). But the occasional plant will have somewhat intermediate bracts; I take these to be putative hybrids between these taxa (e.g., Arizona: Maricopa Co., *Felger 01-432* (ARIZ).

In an attempt to understand the relationships between these various taxa I borrowed herbarium material, including types, of the various names concerned. The results of this study follow:

1. AMARANTHUS TORREYI (A. Gray) Benth. ex S. Watson, Bot. California 2: 42. 1880. Fig. 1.

Amblogyne torreyi A. Gray, Proc. Amer. Acad. Arts 5: 167. 1861. TYPE: **UNITED STATES.** TEXAS: **Presidio Co.:** Cibolo Creek, east side of Chinati Mts., 14 Aug 1852, *Bigelow 1190* (LECTOTYPE [selected by Reed, 1969]: US; ISOLECTOTYPE: GH!).

Sarratia berlandieri var. *emarginata* Torr., Bot. Mex. Bound. 179. 1859.

Amaranthus bigelovii var. *emarginata* (Torr.) Uline & W.L. Bray, Bot. Gaz. (Crawfordsville) 19: 271. 1894. TYPE: **UNITED STATES.** TEXAS: **Brewster Co.:** "Camp Greene," according to Johnston (1944) "somewhere between Lajitas and Boquillas Canyon," Oct 1852, *C. C. Parry 2* (HOLOTYPE: NY).

Amaranthus pringlei S. Watson, Proc. Amer. Acad. Arts 22: 476. 1887. TYPE: **MEXICO.** CHIHUAHUA: hills near Chihuahua, 26 Sep 1886, *C. G. Pringle 795* (HOLOTYPE: GH!; ISOTYPE: LL!).

Amaranthus bigelovii Uline & W.L. Bray, Bot. Gaz. (Crawfordsville) 19: 271. 1894. TYPE: **UNITED STATES.** TEXAS: **Presidio Co.:** Mts. of the Cibilo, 1852, *J. M. Bigelow 1190* (HOLOTYPE: US; ISOTYPE fragment: GH!).

Johnston (1944) first noted the above synonymy and clarified the typification of *A. torreyi.* He correctly noted that the species was based upon specimens assembled by at least three collectors (Bigelow, Parry, and Xantus). He furthered surmised, "The fact that Gray named the species for Torrey and gave great prominence to the Bigelow and Parry specimens treated in Torrey's Botany of the Mexican Boundary shows clearly what he considered the nucleus of his species." Following the suggestions of Johnston (1944), Reed (1969) lectotypified the taxon from among these several collections, as indicated in the above. I have not examined the holotype, but the isotype (GH) consists of an excellent line sketch of the plant, with fragments in an attached packet. Reed annotated the GH specimen as an "isolectotype" in 1968, although by more exacting standards he should have selected the GH specimen as holotype since Gray's description was largely drawn from material housed at Harvard (GH).

REPRESENTATIVE SPECIMENS: **UNITED STATES. ARIZONA. Pima Co.:** 6.5 mi NW of Arivaca, 27 Aug 1988, *McLaughlin 4967* (ARIZ). **Pinal Co.:** Santa Catalina Mts., 27 Sep 1934, *Kearney & Peebles 10280* (ARIZ). **Santa Cruz Co.:** Sonoita State Natural Area, 29 Aug 2000, *McLaughlin 8444* (ARIZ). **CALIFORNIA. San Bernadino Co.:** ca. 5 mi E of Cima, 21 Oct 1977, *Henrickson 16265* (TEX). **NEW MEXICO. Grant Co.:** 18 mi NW of Silver City, 17 Sep 1903, *Metcalfe 720* (ARIZ). **Luna Co.:** 15 Aug 1986, *Columbus 501* (UC). **Sandoval Co.:** Bandelier Natl. Monument, 11 Aug 1957, *Yarnell 90* (UNM). **San Juan Co.:** just NW of Salmon River, 6 Oct 1973, *Bohner 1820* (ARIZ). **Sierra Co.:** Trujillo Cr., 14 Sep 1904, *Metcalfe 1365* (UNM). **TEXAS. Brewster Co.:** College Hill, Alpine, 22 Jul 1940, *Warnock 20932* (TEX). **El Paso Co.:** Franklin Mts., McKelligan Canyon, 3 Sep 1951, *Warnock 10089* (SRSC). **Hudspeth Co.:** Quitman Mts., Sep 1955, *Warnock 13598* (LL, SRSC). **Jeff Davis Co.:** S slopes of Mt. Locke, 13 Aug 1950, *Warnock 9225* (SRSC). **Presidio Co.:** N Chinati Mts., 16 Sep 1963, *Warnock 19206* (SRSC).

MEXICO. BAJA CALIFORNIA SUR: 9 mi E of La Paz, 25 Nov 1959, *Wiggins 15614* (TEX). **BAJA CALIFORNIA:** 4.2 km S of El Arco, 11 Nov 1947, *Carter 1931* (UC). **CHIHUAHUA:** NE side of Cuchillo Parado, 21 Oct 1972, *Wendt* et al. *9802* (LL). **COAHUILA:** vicinity of San Jose, SE base of Sierra de Las Cruces, 5 Sep 1940, *Johnston & Muller 982* (LL). **SAN LUIS POTOSI:** region of San Luis Potosi, 1878, *Parry & Palmer 7861/2* (GH). **SONORA:** Isla San Estaban, 5 Apr 1963. *Felger 7085* (TEX).

2. AMARANTHUS FIMBRIATUS (Torr.) Benth. ex S. Watson, Bot. California 2: 42. 1880. Fig. 2.

Sarratia berlandieri var. *fimbriata* Torr., Bot. Mex. Bound. 179. 1858. TYPE: **UNITED**

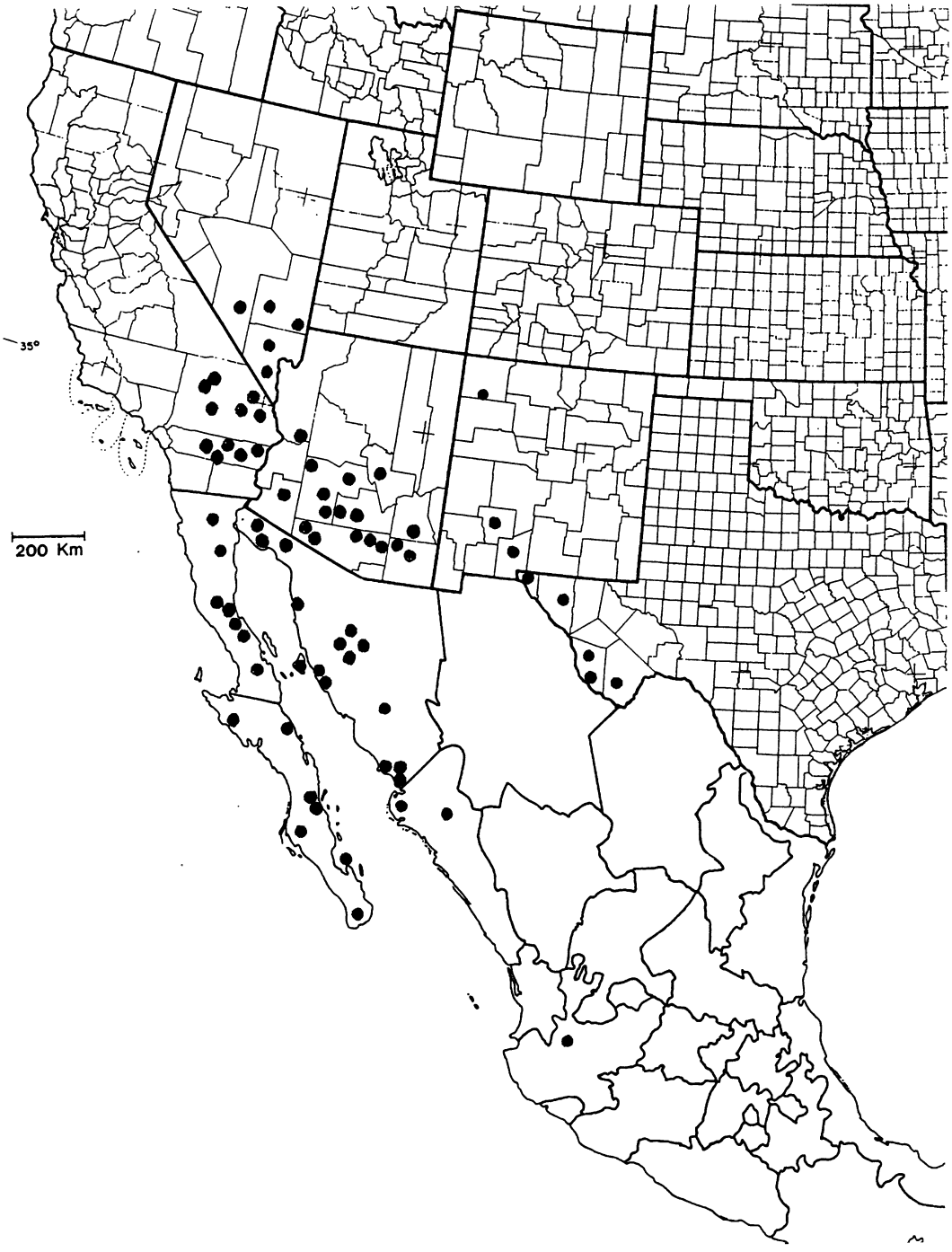

FIG. 1. Distribution of *Amaranthus torreyi.*

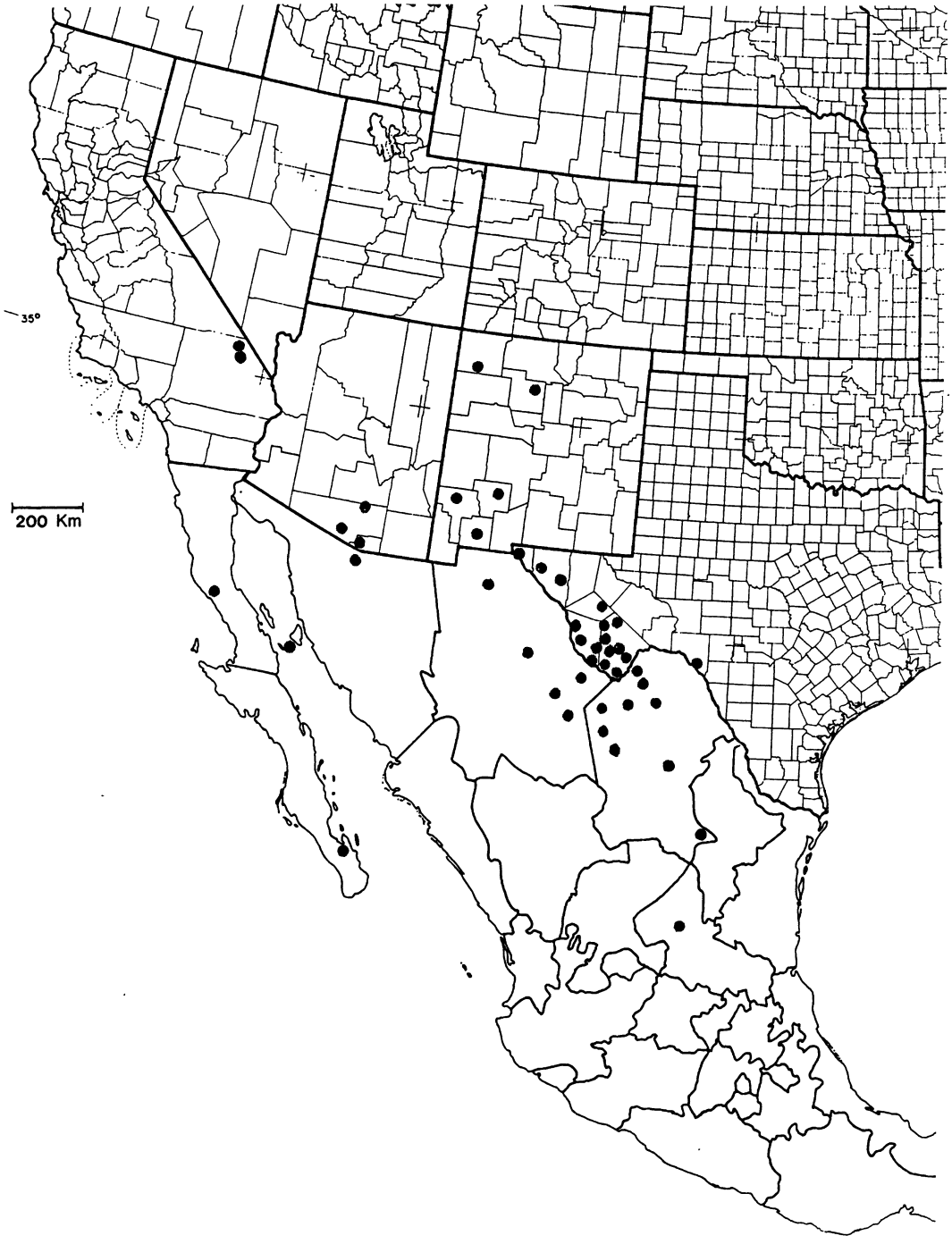

FIG. 2. Distribution of *Amaranthus fimbriatus.*

STATES. TEXAS: El Paso Co.: Rio Grande Valley, near El Paso, 11 Oct 1849, *C. Wright, field no., 1294* (LECTOTYPE [designated here]: GH!)

Torrey, in his protologue, cited two collections: "On the Gila river; *Schott.* (No. 582, *Wright*)." The Schott collection (without number or date) was said to be the type by Kearney and Peebles (1951). I have not examined this material. *Wright 582* is a distribution number and includes two elements that bear Wright's field numbers *1294* and *784.* According to information provided by I. M. Johnston on the lectotype itself, *Wright 1294* was collected in El Paso Co., Texas, as indicated, while *Wright 784* was obtained in Val Verde Co., Texas.

Sarratia berlandieri var. *denticulatus* Torr., Bot. Mex. Bound. 179. 1858.

Amaranthus fimbriatus var. *denticulatus* (Torr.) Uline & W. L. Bray, Bot. Gaz. (Crawfordsville) 19: 270. 1894. TYPE: **MEXICO. SONORA**: Santa Cruz, 25 Sep 1851, *G. Thurber s.n.* (HOLOTYPE: GH!).

Amaranthus venulosus S. Watson, Proc. Amer. Acad. Arts 17: 376. 1882. TYPE: **UNITED STATES. ARIZONA**: **Cochise Co.**, Apache Pass, 1881, (LECTOTYPE [selected here]: *J. G. Lemon 491* (GH!).

In his protologue Watson cited three specimens: *Lemon 491* (the lectotype); *Lemon 490,* from Rucker Valley Arizona, a relatively immature sprig; and *Thurber s.n.*, from Santa Cruz, Sonora, Mexico, this represented only by fragments in an attached envelope. All three of these collections are mounted on the same sheet. The lectotype is a mature specimen described by its author as having rather erose "sepals twice longer than the single small ovate acute bracts, becoming thickened at the rather narrow base, broadly rounded above, entire or emarginate or somewhat denticulate, and marked with green, seed 1/3 of a line long."

REPRESENTATIVE SPECIMENS: **UNITED STATES. ARIZONA. Gila Co.:** Tonto Natl. Forest, 9 Sep 1959, *Pase 1085* (ARIZ). **Graham Co.:** 16 mi S of Safford, 21 Oct 1946, *Gould & Haskell 3991* (UC). **Maricopa Co.:** Tempe, 15 Aug 1992, *Landrum 7737* (ARIZ). **Mohave Co.:** ca. 1/4 mi NW of Mohave-Yavapai Co. line, 23 Oct 1976, *Thompson & Van Devender s.n.* (ARIZ). **Pima Co.:** Tucson, Univ. of Arizona Campus, 22 Aug 1903, *Thornber 22* (ARIZ, UC). **Yuma Co.:** Cabeza Prieta Nat'l. Wildlife Refuge, 28 Nov 2001, *Felger 01-573* (ARIZ). **CALIFORNIA. San Bernardino Co.:** ca. 25 mi W of 29 Palms, 22 Oct 1997, *Henrickson 22229* (TEX). **Riverside Co.:** foothills of Chuckwalla Mts., 26 Oct 1999, *Steinmann 1419* (ARIZ). **NEW MEXICO. Dona Ana Co.:** Las Cruces, near Airport, 9 Sep 1981, *Fletcher 5655* (UNM). **Socorro Co.:** T55, R2E, Sec. 15, 5 Sep 1982, *Mcintosh 1225* (NMU). **NEVADA. Clark Co.:** 3 mi SE of Henderson, 7 Dec 1951, *Guillion 123* (UC). **Lincoln Co.:** 18 mi SSE of Carp, 25 Sep 1951, *Guillion 102* (UC). **Nye Co.:** along Orange Road, 3.5 mi N of junction with Pahute Mesa Road, 18 Aug 1968, *Reveal 1845* (TEX). **TEXAS. Brewster Co.:** 4.1 mi W of hwy 118 along dirt road to Hen Egg Mt., 5 Nov 2002, *Turner 22-402* (TEX). **El Paso Co.:** Rio Grande Valley, near El Paso, 11 Oct 1849, *Wright 1294* (GH). **Hudspeth Co.:** ca. 3.5 mi N of Acala, 31 Oct 1962, *Correll 26582* (GH). **Presidio Co.:** 3.5 mi SE of Presidio, 26 Oct 1938, *Cory 31132* (GH, SRSC, TEX). **Val Verde Co.:** Devils River bottoms, 11 Oct 1849, *Wright 784* [distributed as *Wright 582*] (GH). **UTAH. Washington Co.:** St. George, 1875, *Palmer s.n.* (GH).

MEXICO. BAJA CALIFORNIA SUR: Cape St. Lucas, Aug 1859, *Xantus 99* (GH). **BAJA CALIFIFORNIA:** S of Magdalena Bay, 22 Nov 1946, *Wiggins 11474* (GH); 20 mi S of Catavina, 27 Oct 1946, *Wiggins 11289* (GH). **MICHOACAN:** Mpio. Apatzingan, 2 Aug 1940, *Leavenworth 433* (GH). **SINALOA:** near Labradas, 20 Sep 1925, *Ferris & Mexia 5226* (GH); near Bahia Topolobampo, 26–30 Sep 1954, *Gentry 14350* (LL). **SONORA:** MacDougal Crater, Pinacate region, 4 Oct 1964, *Felger 10714* (GH); S of Huatabampito, 4 Sep 1989, *Sanders 9248* (TEX); Punto Cirio, near Libertad, 25 Nov 1977, *Van Devender s.n.* (GH).

AMARANTHUS VENULOSUS, ADDITIONAL COMMENTS

Except for the less than fimbriate sepals, *Amaranthus venulosus* matches *A. fimbriatus* quite nicely and I find little hesitation in treating this as a sporadic form of that species. Indeed, both Uline and Bray (1894) and Kearney and Peebles (1951) included *A. venulosus* under the fabric of *A. fimbriatus,* but recognized it at the varietal

level (*A. f.* var. *denticulatus* [the earliest name at the variety level]). In their submergence, Uline and Bray noted that *A. venulosus* "agrees with *A. fimbriatus* except that the broadly dilated lamina of the sepals is not fimbriate, but entire or emarginate, and conspicuously marked by branching green veins."

Forms referable to *Amaranthus venulosus* are found throughout the range of *A. fimbriatus* and need not be enumerated here, but it seems worth noting that occasional specimens will contain collections of both taxa on the same sheet (e.g., United States: Arizona. Maricopa Co., *Felger 02-349,* ARIZ [2 of 5 specimens are venulose forms], Mexico: Isla Tiburon, *Felger 8926,* ARIZ [at least 3 of the 7 specimens are venulose forms]).

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