

**TAXONOMIC REVIEW
OF THE *SYMPHYOTRICHUM MORANENSE* GROUP (ASTERACEAE)**

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ABSTRACT

Six species are recognized in the *Symphotrichum moranense* group: *S. moranense* (Kunth) Nesom, *S. hintonii* (Nesom) Nesom, ***Symphotrichum turneri*** (Sundberg & Jones) Nesom, **comb. nov.**, ***Symphotrichum purpurascens*** (Sch. Bip. in Seem.) Nesom, **comb. nov.**, ***Symphotrichum chihuahuense*** Nesom, **sp. nov.**, and ***Symphotrichum bimater*** (Standl. & Steyerm.) Nesom, **comb. nov.** Each is endemic to Mexico, except for *S. bimater*, which occurs in Mexico and Guatemala. A key, brief descriptions, and distribution maps are provided. Lectotypes are designated for *Aster ehrenbergii*, *A. purpurascens*, and *A. trilineatus*.

Aster moranensis and its closest relatives are mostly restricted to Mexico — *Aster bimater* was described as a species of Chiapas and Guatemala, extending the group into Central America. The plants are perennials with short, oblong, sessile leaves, solitary heads, graduate phyllaries, each with a distinctly demarcated, apical green patch and white-indurate base and a chromosome number based on $x=5$. As a previously unrecognized feature, the achenial Zwillingshaare of each of these species are minutely bifurcate at the apex. Variation patterns and nomenclature in the group have not been previously considered in detail in the context of the whole group. Six species are recognized in the treatment here.

Key to species

1. Plants arising from a small woody corm, without rhizomes; stems with bracteate peduncles 3–10 cm long; stems (distally) and/or phyllaries often minutely stipitate-glandular; leaf bases often subclasping.
 2. Stems strigose to short-villous with crinkly, thin-based hairs ***Symphotrichum purpurascens***
 2. Stems hispidulous to hirsute with stiff, thick-based hairs.
 3. Leaves hispid to hispid-hirsute on both surfaces; phyllaries minutely glandular, without other hairs; achenes short-strigose, if glandular then only at the base ***Symphotrichum bimater***
 3. Leaves densely hispidulous (abaxial), sparsely so to glabrate (adaxial); phyllaries densely hispidulous at least on the green portion; achenes glandular over the whole surface, without other hairs ***Symphotrichum chihuahuense***
1. Plants arising from rhizomes, without a corm; stems usually uniformly leafy up to the heads; stems and phyllaries eglandular; leaf bases not subclasping.
 4. Stems, leaf surfaces, and phyllaries completely glabrous; rays consistently blue to purple ***Symphotrichum turneri***
 4. Stems, leaf surfaces, and phyllaries hairy, rays usually white, rarely light blue to lavender.
 5. Stems and phyllaries densely villous with hairs 0.3–1 mm long ***Symphotrichum hintonii***
 5. Stems and phyllaries strigose with closely appressed hairs 0.1–0.5 mm long ***Symphotrichum moranense***

1. SYMPHYOTRICHUM MORANENSE (Kunth) Nesom, *Phytologia* 77: 286. 1994. *Aster moranensis* Kunth, *Nov. Gen. Sp. (folio ed.)* 4: 73. 1820 [1818]. *Diplostephium moranensis* (Kunth) Nees, *Gen. Sp. Aster.*, 198. 1832. *Virgulus moranensis* (Kunth) Reveal & Keener, *Taxon* 30: 650. 1981. **TYPE: MEXICO.** [Hidalgo.] May–Jun 1803, *Humboldt and Bonpland s.n.*

(holotype: P-HBK image!, Fig. 3; Jones also cited a duplicate sheet at B). Protologue: "Crescit rarissime in montibus Mexicanorum inter Cerro Ventoso et fodinam Moran." The P sheet was cited by Jones (1984) as "lectotype;" it has a red "TYPE" printed label.

Aster lima Lindl. in DC., Prodr. 5: 230. 1836. *Virgulus lima* (Lindl. in DC.) Reveal & Keener, Taxon 30: 650. 1981. **TYPE: MEXICO**. The only collection data: "Mexico, Mr. Graham" – "Bentham" also is on the handwritten label (holotype: CGE photo!). Protologue: "29. A. LIMA (Lindl. adn. mss), caule scabro ... foliis scaberrimis ... ♀ in Mexico ex herb. Bentham."

Almut Jones studied the CGE specimen and obtained a photo (copy at TEX!); she noted (1984, p. 374) that "The taxon is conspecific with and the name goes in synonymy under [*Aster moranensis* Kunth]. The photo is small and the image dark, but the aspect, especially the evenly distributed, non-clasping cauline leaves, indicates that the plant belongs with *A. moranensis* sensu stricto. There is no specimen at BM or K (fide JSTOR Global Plants) that appears to be original material of *Aster lima* and no reference to it, apart from the protologue, apparently has been made in previous literature.

The collector, presumably George John Graham (1803-1878), is known to have collected in 1827-1829 around Mexico City, the mining districts of Tlalpujahua (northwestern Michoacan), and the Real del Monte (near Pachuca in Hidalgo) (Britten 1905).

Aster lindenii Sch. Bip. in Seem., Bot. Voy. Herald, 302. 1856. **TYPE: MEXICO. Veracruz**. Mirador, Feb 1839, *J.J. Linden 1170* (holotype: P image!; isotypes: G-2 sheets images!, GENT image!, K image!). The K specimen is mounted on a sheet with *Galeotti 2303*, collected in Veracruz in 1840. The P sheet was cited by Jones (1984) as lectotype.

Aster ehrenbergii Sch. Bip. in Seem., Bot. Voy. Herald, 302. 1856. **LECTOTYPE** (designated by Jones 1984, p. 375): **MEXICO. [Edo. Mexico?]**. "Mexico, pr. Regle," *C.A. Ehrenberg 791b* (P image!; isolectotype: CGE as cited by Jones 1984). Protologue: "Mexico, C. Ehrenberg! n. 791 et 947 in Herb. Reg. Berol." 791b (P) is mounted on a single sheet with *Ehrenberg 791a* (fragments) and 947 — each of the three has a printed P label: 791a-SYNTYPE, 791b-ISOTYPE, and 947-SYNTYPE. In 1981 A.G. Jones annotated 791b as "isolectotype;" she (Jones 1984) later referred to "791" as the lectotype, without specifying 'a' or 'b' but surely she meant either the whole plant (b) rather than the fragments or else saw the fragments as part of a single 791 mounted on one sheet. *Aster ehrenbergii* is not included in the account by Jones and Hiepkö (1981).

Perennial, producing scale-leaved rhizomes, sometimes with a thickened caudex but without a distinct corm. **Stems** to 9 dm tall, branching in distal half, moderately strigose with thin, short, antrorsely appressed to appressed-ascending hairs, eglandular. **Leaves** narrowly oblong-oblancheolate, entire, often clearly 3-nerved but sometimes weakly so or not at all, ascending, sessile, not clasping, the largest 1–2(–4) cm long, 2–3 mm wide, relatively even-sized or distinctly reduced in size distally but still closely and evenly spaced, surfaces glabrous to sparsely strigose, margins short-ciliate with hairs sharply bent upward. **Heads** solitary on equably leafy stems; involucre 10–14 mm wide; phyllaries strongly graduate and uneven in length, tightly appressed-erect and not spreading or reflexing, spinulose-apiculate, sparsely strigose, eglandular. **Ray florets** 18–25, usually white, coiling. **Achenes** densely strigose, eglandular. **Chromosome numbers** 2n=18? (Michoacan, *Venable & West 1884*, LL—"n=9II BLT 1976"; 2n=20 (Oaxaca, *Cowan 5000*, TEX—"n=10II clearly"). Figures 3 and 4.

Chihuahua, Durango, Sinaloa, Nayarit, Jalisco, Zacatecas, Aguascalientes, Guanajuato, Querétaro, Michoacan, Guerrero, Mexico, Distrito Federal, Morelos, Tlaxcala, Hidalgo, Puebla, San Luis Potosí, Veracruz, Oaxaca; grassland, oak, pine, and open pine-oak woodlands, 1000–2750 m; Oct–Apr. Distribution in Fig. 2.

Outlying collections. Chihuahua. [Mpio. Chínipas]: Sierra Charuco, Rancho Byerly, rocky igneous slopes, pine-oak forest, 5000-5800 ft, 17-25 Apr 1948, *Gentry 8104* (UC). Mpio. de Urique: on the Batopilas to La Cieneguita road, 1.5 km S of jct to Urique, 7.8 air km E of Guapalayna, 14.9 air km

NE of Batopilas, open woodland with pines and oak, white igneous soil, 2045 m, 8 Mar 2017, *Spellenberg 15346* et al. (UNM image!, Fig. 4). **Durango.** Mpio. Mezquital: 32 km al W de Los Charcos por el camino a La Guajolota, bosque de pino-encino, 2040 m, 15 Mar 1985, *Gonzalez et al. 1649* (NY image, TEX). **Sinaloa.** [Mpio. Badiraguato]: Puerto a Tamiapa, steep clay slopes, oak forest, 4500 ft, 5 Mar 1940, *Gentry 5817* (ARIZ, NY image!).

Distinguished by its production of rhizomes, consistently strigose, eglandular vestiture, equably leafy stems, and strongly graduate phyllaries tightly appressed without a spreading or reflexing apex.

2. SYMPHYOTRICHUM HINTONII (Nesom) Nesom, *Phytologia* 77: 283. 1994. *Aster hintonii* Nesom, *Phytologia* 67: 342. 1989. **TYPE: MEXICO. Guerrero.** Distr. Mina: Aguazarca Filo, oak forest, 21 Dec 1937, *G.B. Hinton et al. 11316* (holotype: LL!; isotypes: NY image!, UC!).

Presumably perennial, base not seen. **Stems** 4–8 dm tall, densely hispid-pilose to villous with irregularly spreading to slightly retrorse, thin-walled hairs 0.3–1 mm long, eglandular. **Leaves** oblong-obovate to oblong, 12–32 mm long, 5–11 mm wide, slightly reduced upward, equably distributed to immediately beneath the heads, without a subclasping base. **Heads** solitary; involucre 10–14 mm wide; phyllaries short-villous to hirsute, eglandular, uneven in length and strongly graduate, the green apices often spreading to reflexing. **Rays** 25–30, white, coiling. **Achenes** hairy, eglandular (only immature achenes observed). Figure 5.

Guerrero; oak and oak-pine woods; 1400–2200 m; Nov–Jan. Distribution in Figure 1.

Additional collections examined. **Guerrero.** Mpio. Coyuca de Catalán: El Cundán, aprox. 101 km al SO de Cd. Altamirano a 9 km al NE de El Bálsamo (Puerto del Bálsamo o Filo Mayor), carr. Cd. Altamirano-Zihuatenejo, *Pinus-Quercus* perturbado, ladera de cerro de pendiente pronunciada, 1404 m, 27 Nov 2012, *Soto N. 20391* (MEXU image). **Distr. Galeana:** Teotepec, pine and oak forest, 2200 m, 26 Dec 1937, *Hinton et al. 11148* (LL, NY, UC). [Mpio. San Miguel Totolapan]: 81.5 km NE of Mex Hwy 200 jct in La Salitrera on the way (Mex 134) to Cd. Altamirano, edge of pine and dwarf oaks, 1530 m, 6 Dec 2003, *Yahara T. et al. 2972* (MEXU image, TEX).

Distinct in its equably leafy, densely hispid-pilose to villous stems, lack of glands, and strongly graduate, appressed phyllaries. It is similar to *Symphyotrichum moranense* in aspect and apparently sympatric with it, but the distinct vestiture and geographical coherence of *S. hintonii* support its recognition.

3. SYMPHYOTRICHUM TURNERI (Sundberg & Jones) Nesom, **comb. nov.** *Aster moranensis* var. *turneri* Sundberg & Jones, *Bull. Torrey Bot. Club* 113: 176. 1986. *Symphyotrichum moranense* var. *turneri* (Sundberg & Jones) Nesom, *Phytologia* 77: 287. 1994. **TYPE: MEXICO. Durango.** Mpio. Mezquital: W de Sta. Ma. de Ocotán, a lo largo de margenes de arroyo, vegetacion riparia enmedio de bosque de pino-encino, 16 Oct 1984, *M. Gonzalez 1518* con *S. Acevedo* (holotype: TEX!, Fig. 5).

Perennial, rhizomatous, without a corm. **Stems** glabrous or occasionally with a few, appressed trichomes, leaf surfaces and phyllaries glabrous and not resinous. **Leaves** linear-oblong to linear-lanceolate, 1–3 mm wide, bases not at all subclasping, apices sharp-apiculate, margins evenly ciliate from base to tip with short, stiff, spreading (slightly antrorse-oriented) hairs. **Heads** solitary on equably leaf stems or bracteate peduncles 1.5–5 cm long; involucre 9–15 mm wide; phyllaries strongly unequal in length and imbricate, tightly appressed or sometimes more loosely so and spreading, inner with narrowly lanceolate apices, margins of outer ciliate with short, stiff, spreading hairs. **Rays** 20–27, blue to purple, coiling. **Achenes** strigose, eglandular. Figure 6.

Durango; oak and pine-oak woods, llanos, wet pastures, commonly along waterways, 2050–2750 m; Oct–Mar. Distribution in Figure 2.

Additional collections examined. Durango. Mpio. Durango: Arroyo "El Salto," al NW de El Salto, pino-encino, 2490 m, 16 Oct 1982, *Tenorio 2135* (MEXU image!). **Mpio. Mezquital:** 32 mi S of Durango on road to La Flor, small creek bed and N-facing slope, 7200 ft, 25 Dec 1984, *Ayers 521* (TEX); 74 km WNW of Huejuquilla El Alto, Jalisco, near Canoas, Durango, meadows with *Pinus* and *Quercus* on surrounding hills, 2720 m, 22 Oct 1983, *Breedlove 59195* (CAS, NY image, TEX); 2 km al N de La Guajolota, pastizal inundable, 2050 m, 8 Oct 1983, *Fernández N. 1877* (NY image); 22 km al NE de Los Charcos, bosque de encino-pino, 2750 m, 1 Nov 1982, *Gonzalez & Rzedowski 2338* (TEX); 6 km al N de La Guajolota, bosque de encino-pino, llano, 21 Oct 1985, *Solís 491* (TEX); ca. 8 km de San Francisco de Ocotán, Cueva de Violin, cercanías, llano, bosque de encino-pino, 17 Oct 1988, *Solís 1099* (TEX); 39 km al SW de Mezquital, encino-pino, 2520 m, 6 Mar 1985, *Tenorio 8073* (NY image); **Mpio. Súchil:** Reserva de Michilía, Arroyo El Temascal, bosque de encino-pino, 5 Oct 1985, *Alvarado 178* (TEX); Rancho Temazcal, potrero las Alazanas, ladera bosque de encino-pino, 12 Oct 1985, *Alvarado 329* (TEX); San Juan de Michis, potrero Labores, área sobrepastoreada, con *Acacia*, 16 Oct 1985, *Alvarado 346* (NY image); Rancho la Peña, Arroyo El Taray, bosque de encino-pino, 25 Nov 1985, *Alvarado 643* (TEX); Rancho La Peña (El Bebedero), bosque de *Quercus*, 7 Oct 1982, *Gonzalez E. 1130* (TEX).

Symphyotrichum turneri is tightly coherent in geography — all collections are from southeastern Durango. Typical *S. moranense* grows in the same area (see citation, Mpio. Mezquital). As in *S. moranense*, plants of *S. turneri* are rhizomatous, without a corm, and the phyllaries are strongly unequal in length. The latter is distinct in its consistently blue ligules, narrower and mostly more loosely appressed phyllaries, glabrous stems and leaf surfaces, and spreading-ciliate leaf margins.

4. SYMPHYOTRICHUM PURPURASCENS (Sch. Bip. in Seem.) Nesom, **comb. nov.** *Aster purpurascens* Sch. Bip. in Seem., Bot. Voy. Herald, 303. 1856. **LECTOTYPE** (designated here): **MEXICO. Hidalgo.** Prov. Real del Monte, C.A. *Ehrenberg 474* (P image!, Figs. 7 and 8). **Protologue:** "C. Ehrenberg! n. 474 in Herb. Reg. Berol." A handwritten label on the P sheet by J.H. Beaman in 1963 notes that "This probably should be designated as the lectotype, since the holotype in Berlin was almost certainly destroyed." Annotated by A.G. Jones in 1983 as "? ISOTYPE or LECTOTYPE, as designated by Beaman of *Aster purpurascens* ... = *A. moranensis* ... ," but the choice apparently was never effected by publication. *Aster purpurascens* is not included in the account by Jones and Hiepko (1981).

Aster trilineatus Sch. Bip. ex Klatt, Leopoldina 20: 91. 1884. *Symphyotrichum trilineatum* (Sch. Bip. ex Klatt) Nesom, Phytologia 77: 293. 1994. **LECTOTYPE** (designated here): **MEXICO. Oaxaca.** [Distr. Ixtlán, Mpio. Santiago Laxopa]: Lachopa, Jun 1842, *F.M. Liebmann 519/11004* (C 10006960 image!, Fig. 9; isolectotypes: C 10006961 image!, P image!). **Protologue:** "leg. Liebmann Nr. 519. Herb. Hort. Bot. Hafn." without specifying which sheet. C 10006960 was labeled by Scott Sundberg in 1986 as "lectotype," C 10006961 as "isolectotype," but the choice apparently was never effected by publication.

Perennial, without scale-leaved rhizomes. **Stems** sparsely strigose with thin hairs to short-villous, commonly sparsely to densely stipitate-glandular distally. **Leaves** narrowly oblong to oblong-lanceolate, the largest 8–30 mm long, 1–3 mm wide, mostly even-sized up to the peduncles, 1- or 3-nerved, sessile, base often subclasping, surfaces glabrous to strigose or sparsely to short-villous, sometimes (uncommonly) stipitate-glandular, margins entire, ciliate with thin, sharply upward-bent hairs. **Heads** on bracteate peduncles 3–12 cm long, solitary or in a loose, corymboid capitulescence; involucre (8–)10–14 mm wide; phyllaries weakly imbricate, weakly unequal in length, strigose-hirsute to strigose, often glandular, distal half (green patch) usually spreading or reflexing. **Rays** white, 20–25, coiling. **Achenes** sparsely strigose, glandular or eglandular. **Chromosome number** $2n=10$ (Guatemala, *King 3423*, as cited below). Figures 7–10.

Nuevo León, Tamaulipas, San Luis Potosí, Guanajuato, Hidalgo, Tlaxcala, Puebla, Distrito Federal, Mexico, Guerrero, Oaxaca, Chiapas, Guatemala (Dept. Huehuetenango); open woods with various mixtures of pine and oak, rarely grassy flats, 1500–2850 m; all year. Distribution in Figure 1.

At least some populations of *Symphyotrichum purpurascens* in the area of Picacho San Onofre (Sierra Peña Nevada), Nuevo León, include plants with typically strigose stems and leaves as well as plants with short-villous to hirsute vestiture similar to that of *S. bimater* (e.g., *Villarreal 4896*, TEX; *Wells & Nesom 411*, TEX). Two stems collected from a single plant (*Nesom 7103*, TEX; Fig. 10) have hirsute stems and leaves. From around La Encantada just north of Picacho San Onofre, *Patterson 5853* (TEX) and *Patterson 5860* (TEX) have strigose vestiture, while *Patterson 5890* (TEX) has hirsute vestiture.

One plant of *Symphyotrichum purpurascens* from a San Luis Potosí collection has achenes densely stipitate-glandular without other hairs; another plant on the same sheet has achenes sparsely strigose and stipitate-glandular (NW of Guadalucazar, just SE of Realjo, *Breedlove 63349*, TEX).

A few plants from Edo. Mexico on the north and east sides of Distrito Federal are rhizomatous but otherwise show morphology of *Symphyotrichum purpurascens*. These seem likely to be hybrids with *S. moranense*: Mpio. Texcoco, *Ventura 841* and *1316* (MEXU images); Mpio. Tepotzotlán, *Rzedowski 31448* (ASU image); Mpio. Ixtapaluca, *Rzedowski 34805* (MEXU image).

Outlying collections. GUATEMALA. Dept. Huehuetenango. Ca. 6 mi S of Huehuetenango, hills along Natl. Rte 9N, 18 Jul 1960, *King 3423*, voucher for chromosome count of $n=5$ (TEX, UC); Salcaja, near Quezaltenango, 7500 ft, 1 Jul 1963, *Nickerson s.n.* (TEX).

5. SYMPHYOTRICHUM CHIHUAHUENSE Nesom, **sp. nov.** **TYPE: MEXICO. Chihuahua.** [Mpio. Namiquipa]: Culebra Mts., 18 Aug 1936, *H. LeSueur 981* (holotype: TEX!, Fig. 11; isotypes: GH!, TEX!).

Similar to *Symphyotrichum purpurascens* in its cormose, non-rhizomatous base, cauline leaves with subclasping base, white rays, glandular stems and achenes, and long-caudate inner phyllaries but distinct in its few-bracteate peduncles 3–6(–8) cm long, evenly hispidulous stems, leaves (abaxially; glabrous adaxially), and phyllaries, and achenes with no vestiture except short viscid hairs.

Perennial, arising from a woody corm, without rhizomes. **Stems** 20–35 cm tall, sparsely to moderately and evenly hispidulous to hirsute with spreading to antrorse, sharp-pointed hairs, stipitate-glandular distally. **Leaves** oblong-lanceolate to lanceolate or narrowly elliptic, mostly 10–20 mm long, 1–4 mm wide, densely hispidulous abaxially, sparsely so to glabrate adaxially, base subclasping, apex sharp-apiculate, margins regularly ciliate with stiff, sharp-pointed, antrorse-ascending hairs. **Heads** on bracteate peduncles 3–8 cm long; involucre 7–12 mm wide, inner phyllaries 5–8 mm long; phyllaries slightly uneven in length, weakly imbricate, at least the green portion densely hispidulous, eglandular or minutely stipitate-glandular, distal half (green patch) usually spreading or reflexing. **Rays** 18–24, white, coiling. **Achenes** with short viscid hairs over all the surface, without other hairs except near the apex, mature size not seen. Figure 11.

Chihuahua, Durango; grassland, oak-pine woods; ca. 1800–2500 m; Jun–Sep. Distribution in Figure 1.

Additional collections examined. Chihuahua. [Mpio. Chihuahua]: Plains at the base of the Sierra Madre, Sep 1887, *Pringle 1538* (GH). [Mpio. Guerrero]: Distr. Guerrero, Arroyo Ancho, dry plateau above the Arroyo, 4 Jun 1929, *Mexia 2588* (UC). [Mpio. Ignacio Zaragoza]: Culebra Mts, 18 Aug 1936, *LeSueur 981* (GH, LL, TEX). [Mpio. Madera]: Chuchuchupa, 16 Jun 1891, *Hartman 702* (GH, US). **Durango.** [Mpio. Durango]: 6 km N of Hwy 40 at El Soldado along side road to Otinapa, flat ridge with *Pinus*, *Quercus*, *Juniperus*, and *Arctostaphylos*, 2130 m, 25 Aug 1986, *Breedlove 63148* (MEXU image, TEX).

There is a apparent geographic disjunction between the Chihuahua and Durango populations, but the Durango plants are a close match for those in Chihuahua.

6. SYMPHYOTRICHUM BIMATER (Standl. & Steyererm.) Nesom, **comb. nov.** *Aster bimater* Standl. & Steyererm., Publ. Field Mus. Nat. Hist., Bot. Ser. 23(3): 141. 1944. *Virgulus bimater* (Standl. & Steyererm.) Reveal & Keener, Taxon 30: 650. 1981. **TYPE: MEXICO. Chiapas.** [Mpio. Cintalpa]: Hillsides near Hacienda Monserrate, May 1927, C.A. Purpus 12091 (holotype: F image!).

Perennial, arising from fibrous-rooted corms, without rhizomes. **Stems** erect 12–18 inches tall, branches ascending at least from midstem, stems sparsely to moderately hirsute to hirsute-villous to hispid or hispid-hirsute with spreading to slightly deflexed hairs, sparsely but evenly stipitate-glandular. **Leaves** narrowly oblong to linear-lanceolate, 1- or 3-nerved, proximal mostly 15–30 mm x 2–4 mm, abruptly becoming much smaller or mixed with much smaller, 3–7 mm x 1–2 mm, sessile, base sometimes subclasping, both surfaces eglandular or sparsely stipitate-glandular, densely and evenly hispid to hispid-hirsute with thick-based, sharp-pointed hairs, margins entire, spreading-ciliate with thick-based hairs. **Heads** on few-bracteate peduncles 3–7 cm long, essentially solitary in a loose cluster; involucre 8–10 mm wide 5–6 mm high; phyllaries weakly imbricate, weakly unequal in length, minutely stipitate-glandular, without other hairs. distal half (green patch) usually spreading or reflexing. **Rays** 16–25, white, coiling. **Achenes** oblong-fusiform, 2.5–3 mm long, 6–8-nerved, sparsely short-strigose, minutely stipitate-glandular basally.

Oaxaca, Chiapas, and Guatemala (Huehuetenango: see Standley & Steyermark 1944, Pruski 2018); pine-oak woods, sometimes mixed with *Liquidambar*, *Nyssa*, *Acacia*, *Arbutus*, and others, ravines, steep slopes, grassy openings; 1000–2150 m; May–Dec. Distribution in Figure 1.

Symphyotrichum bimater is similar in habit and general aspect to *S. purpurascens* (without rhizomes, glandular, long peduncles, subclasping leaf bases, phyllaries weakly graduate and loose) but consistently distinct in its densely hispid to hispid-hirsute adaxial and abaxial leaf surfaces. Typical *S. purpurascens* in Chiapas occurs only in a single area (Fig. 2) of six essentially contiguous municipios (Amatenango del Valle, Comitán de Domínguez, Las Rosas, San Cristobal Las Casas, San Juan Chamula, Tenejapa, Teopisca) in a tight cluster and within the wider distribution of *S. bimater*.

Evidence at hand suggests that *Symphyotrichum purpurascens* and *S. bimater* are sympatric in Guatemala and at least in part of Chiapas, and there appears to be little morphological intergradation between them. One collection from Mpio. San Miguel Chimalapa in Oaxaca, from a locality near two of typical *S. bimater* (see citations), is identified here as *S. bimater* although it has only a few spreading hairs on leaf surfaces, perhaps reflecting gene exchange with *S. purpurascens*: Rio Escondido (Arroyo Baúl), 1 Jul 1986, *Maya J. 3501* (TEX); a duplicate (MEXU image) is prominently hispid-hirsute. In a small area of Nuevo León, vestiture variation in *S. purpurascens* includes plants that might be identified as *S. bimater* in a typological system (see comments above) – in contrast, two evolutionary entities appear to be present in the Chiapas region.

Additional collections examined. GUATEMALA. Dept. Huehuetenango. Aguacatán road, 10–15 km E of Huehuetenango, ca. 1900 m, Jan 1941, *Standley 81931, 82065* (F, as cited by Standley and Steyermark 1944). **MEXICO. Chiapas. Mpio. Cintalapa:** Hacienda Monserrate, Sep 1923, *Purpus 9071* (NY image, UC); Hacienda Monserrate, Sep 1923, *Purpus 9304* (DS, UC); ravines and hillsides near Monserrate, rare, Jun 1930, *Purpus 10059* (UC; a NY sheet [image] of 10059 gives "open pine and oak forest, near Fenix" as the locality). **Mpio. Jitotol:** 6–8 km W of Jitotol, adjacent to large double waterfall, steep slopes with *Pinus*, *Quercus*, 1450 m, 16 Dec 1971, *Breedlove 23287* (DS); 5 km SE of Jitotol along road to Bochil, open forest with *Pinus*, *Quercus*, *Nyssa*, *Liquidambar*, and *Brunellia*, 1600 m, 11 Jul 1972, *Breedlove 26149* (DS), *Breedlove 26150* (NY image!); 5 mi S of Pueblo Nuevo Solistahuacán along road to Jitotol, slope with *Quercus*, *Pinus*, and tree legumes, grassy openings, 5300 ft, Sep 1971, *Thorne & Lathrop 41389* (DS). **Mpio. La Independencia:** 6–10 km NNE of La Soledad along logging road from Las Margaritas to Campo Alegre, slope with pine and oak, 1600 m, 1 Jul 1981, *Breedlove 51280* (CAS); above

and SW of La Soledad on road to Las Margaritas, rocky slope with *Pinus*, *Acacia*, and *Quercus*, 1525 m, 29 Sep 1981, *Breedlove 52113* (CAS). **Mpio. La Trinitaria:** Near Colonia Carmen Xhan and the ruins of Chinkultik, pine-oak forest, 1525 m, 9 Aug 1981, *Breedlove 52013* (CAS). **Mpio. San Juan Cancuc:** 4 km from La Gloria, pine-oak woodland, 3900 ft, 6 Jul 1990, *Brett 70* (CAS); 5 km N of Cancuc, pine-oak woodland, 3200 ft, 1 Aug 1990, *Brett 152* (CAS); Saka Te'el, 2 km abajo del pueblo de Cancuc, 3800 ft, 12 Sep 1987, *Sántiz C. 299* (CAS); Sakil Tontik, 6 km al NE del poblado, 3500 ft, 7 May 1988, *Sántiz C. 660* (CAS, LL, NY image). **Mpio. Teopisca:** 5 km WSW of Teopisca on small dirt road, slopes with *Pinus*, *Quercus*, *Arbutus*, 1750 m, 27 Nov 1976, *Breedlove 41867* (DS, LL). **Mpio. Totolapa:** 6-8 km W of Teopisca on the side of Cerro Chenek'ultik, slopes with *Pinus* and *Quercus*, 2150 m, 16 Aug 1972, *Breedlove 27059* (DS). **Mpio. Venustiano Carranza:** 3 mi S of Aguacatenango along road to Pinola Las Rosas, steep slope with *Quercus* and *Pinus*, 5600 ft, 25 Jun 1965, *Breedlove 10549* (DS, LL, NY image); 5 mi S of Aguacatenango along road to Pinola Las Rosas, steep slope with *Quercus* and *Pinus*, 1725 m, 17 Oct 1980, *Breedlove 46402* (CAS). **Oaxaca. Mpio. San Miguel Chimalapa:** Cerrito al N de El Trebol, ca. 1.5 km al NE de Benito Juárez, ca. 39 km en línea recta al N de San Pedro Tapanatepec, 1000 m, bosque de encino con pino, pendiente fuerte arenosa, 1 Jul 1985, *Maya J. 1838* (MEXU image, TEX); cañada al N de Cerro de la Leona (cerro al NE de Cerro Quetzal y ca. 7-9 km al N de Cerro Guayabitos), ca. 46 km en línea recta al N de San Pedro Tapanatepec, 1300 m, laderas arenosas en bosque de pino-encino, 13-14 Jul 1986, *Maya J. 3599* (MEXU image, TEX).

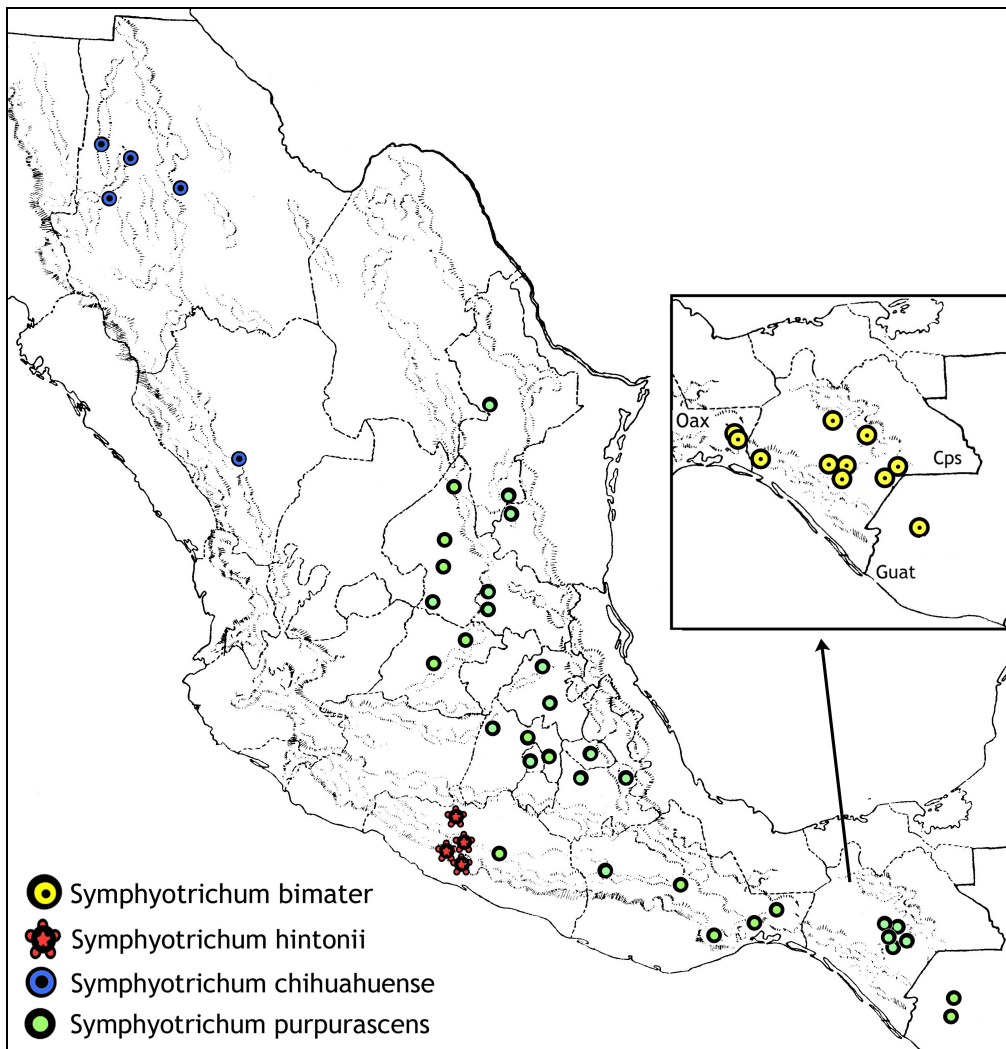


Figure 1. Distribution of *Symphyotrichum purpurascens*, *S. chihuahuense*, *S. hintonii*, and *S. bimater*. Municipios for the tight cluster of *S. purpurascens* populations in Chiapas are cited in the text.

Generic placement

Jones (1980, as noted above) placed *Aster moranensis* with other $x=5$ taxa of *Aster*. Reveal and Keener (1981) also included it (along with *A. bimater* and *A. lima*) among the virguloid asters, although Semple and Brouillet (1980a, 1980b) did not. Sundberg and Jones (1986) placed *A. moranensis* in subg. *Virgulus*, and in 1989, I reckoned (Nesom 1989) that it was closely related to *A. oblongifolius* Nutt. of subg. *Virgulus* (also $x=5$).

Molecular data of Morgan and Holland (2012) place *Aster moranensis* with either the "Almutaster-Psilactus-Virgulus clade" (the APV clade; based on ITS + ETS data) or the "Symphyotrichum clade" (based on 5S data) of subtribe Symphyotrichinae. The chromosome number and morphology of *A. moranensis* align with the subg. *Virgulus* species. Morgan and Holland (p. 828) concluded that "The ITS + ETS, cytological, and morphological evidence indicate that the ancestry of *S. moranense* and *S. trilineatum* is from subg. *Virgulus* and other members of the APV clade; the conflicting 5S results might then be explained by introgression."

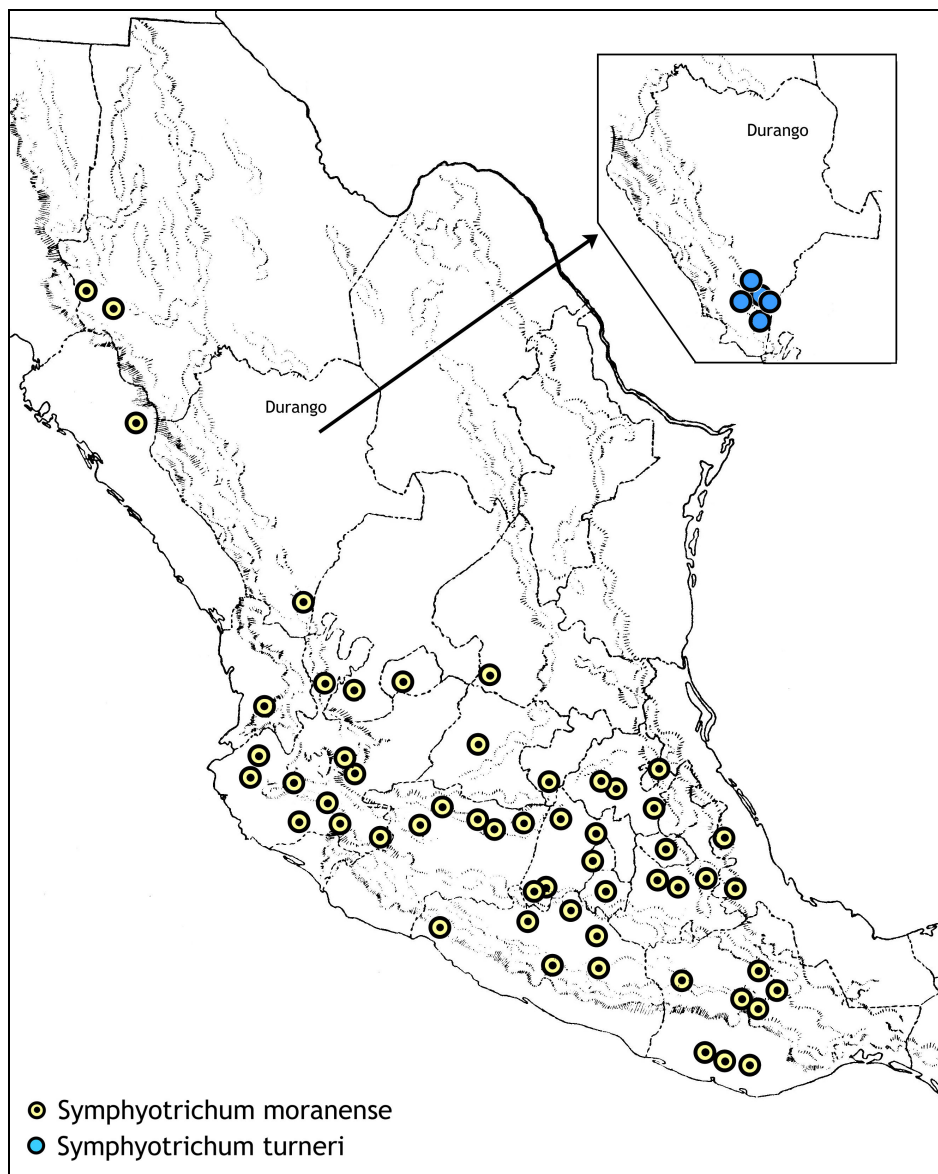


Figure 2. Distribution of *Symphyotrichum moranense* and *S. turneri*.



Figure 3. *Symphyotrichum moranense*, holotype.



Figure 4. *Symphyotrichum moranense*. Southeastern Chihuahua, *Spellenberg et al.* 15346 (UNM). Note presence of rhizomes.



Figure 5. *Symphyotrichum hintonii*, isotype (NY). None of the collections of *S. hintonii* includes the base, but its similarity to *S. moranense* and *M. turneri* in other features suggests that it is rhizomatous.



Figure 6. *Symphyotrichum turneri*, holotype. Note presence of rhizomes.



Figure 7. *Symphyotrichum purpurascens* (*Aster purpurascens*, from the lectotype).



Figure 8. *Symphyotrichum purpurascens* (from the lectotype of *Aster purpurascens*). Subclasping leaf bases.



Figure 9. *Symphyotrichum purpurascens* (lectotype of *Aster trilineatus*). As noted by Sundberg's annotation, a line drawing of the left stem, from the F.W. Klatt herbarium, is filed at NY (copy at TEX!).



Figure 10. *Symphotrichum purpurascens*. Nuevo León, Nesom 7103 (NY).



Figure 11. *Symphyotrichum chihuahuense*, holotype. Cormoid base, without rhizomes.

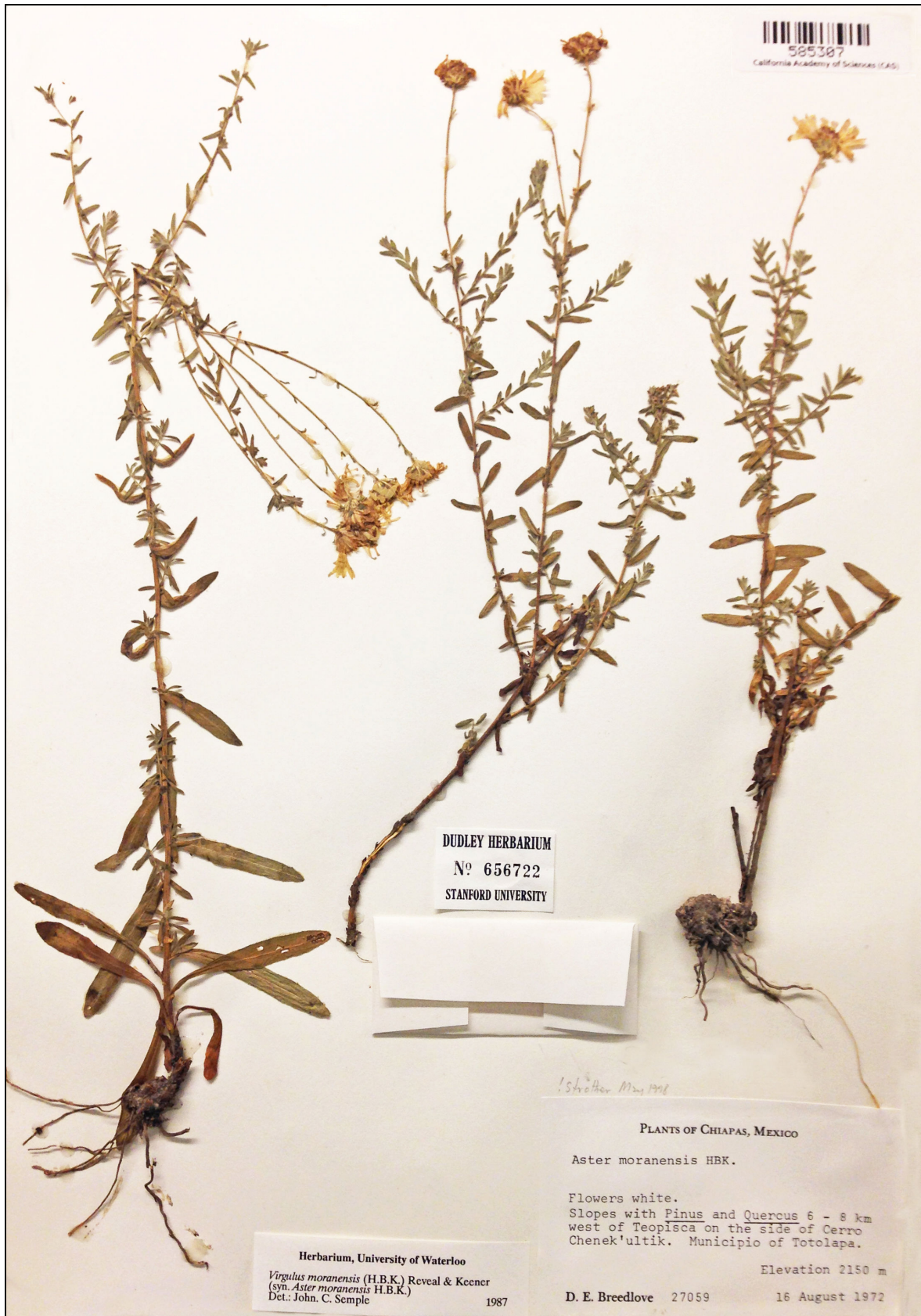


Figure 12. *Symphyotrichum bimater*, representative collection. Cormoid base, without rhizomes.



Figure 13. *Symphyotrichum bimater*, representative leaf vestiture. Upper photo shows abaxial (raised midvein) and adaxial surfaces.

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