

## **SYMPHYOTRICHUM ESTESII, A NEW SPECIES OF VIRGULOID ASTER FROM TENNESSEE (ASTERACEAE: ASTEREAE)**

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### **ABSTRACT**

A new species of virguloid aster is described from collections from May Prairie, Coffee Co., Tennessee. The species was first discovered by Dwayne Estes, for whom the species is named, and is only known from the type locality in a single hydroxeric oak savanna remnant. ***Symphyotrichum estesii*** Semple, **sp. nov.**, is similar to *S. fontinale* but has white rays, somewhat smaller involucre lacking obvious anthocyanin, smaller floral parts, and longer peduncles with numerous small bracts. It is determined from meiotic cells to have a chromosome number of  $2n = ca. 20_{II}$ . The new species is similar to *S. fontinale* and less so to *S. oblongifolium*, *S. grandiflorum* and *S. ericoides*.

In October 2008, Dwayne Estes observed a fruiting specimen of an unknown species of *Symphyotrichum* while visiting May Prairie State Natural Area, Coffee Co., Tennessee. Estes, who at the time was coauthoring the *Fifth Checklist of Tennessee Vascular Plants* (Wofford et al. 2009), realized that it was not a species then known as part of the Tennessee flora. Because the plant was past anthesis, he was not able to make a conclusive identification. In October 2010, Estes visited May Prairie again and found the plants to be in full flower — he photographed the plants and collected specimens (*Estes 11799*, APSC). Estes sent digital photographs to multiple botanists including J.C.S., who immediately recognized it as a likely new species, similar to *S. fontinale* (Alex.) Nesom (Brouillet et al. 2006). The site was visited again by the author, Mason Brock, Julian Campbell, Todd Crabtree, Dwayne Estes, and Ed Schilling, on 12 September 2012 (Figs. 1-2). The species is described here for the first time as ***Symphyotrichum estesii***, named in honor of its discoverer Dwayne Estes, a native of south-central Tennessee, professor of biology and herbarium director at Austin Peay State University, and executive director and co-founder of the Southeastern Grasslands Initiative (2019).

**SYMPHYOTRICHUM ESTESII** Semple, **sp. nov.** **TYPE: USA. Tennessee.** Coffee Co.: SE of Manchester, E of US-41, just E of 35° 26' 56.4" N, 86° 01' 55.5" W, May Prairie, scattered over large wet prairie glade, 326 m,  $2n = ca. 20_{II}$ , 12 Sep 2012, *J.C. Semple, D. Estes, E. Schilling, T. Crabtree, J. Campbell, & M. Brock 11858* (holotype: MO; isotypes: APSC, BRIT, GH, NCU, NY, TENN, US, WAT in MT; all to be distributed; Thiers, continuously updated; Figs. 2-5).

Similar to *Symphyotrichum fontinale* (Fig. 6) but rays white at anthesis (never pale pink to bluish or violet), somewhat smaller heads (involucre 5–6.4 mm vs. 6–7.6 mm) and floral parts, and peduncles green (vs. anthocyanotic) with numerous congested small green bracts (vs. anthocyanotic bracts).

Perennials, colonial from long rhizomes. Stems 30–85 cm, solitary or several, erect (green with some light to reddish brown, somewhat striate, proximally moderately to densely hispidulo-strigillose, distally moderately to densely hispidulo-strigillose, sometimes sparsely stipitate-glandular. Leaves green, firm, margins sparsely serrate distally to entire, faces sparsely to densely short strigos-scabrous, hairs usually denser and longer on abaxial veins, sometimes sparsely stipitate-glandular, usually curving upward from patent base; basal rosettes at base of stem absent at flowering; lower stem leaves oblanceolate, 50–66 × 6–9 mm, bases attenuate, margins entire to distally serrate, short scabrous, apices obtuse, short-mucronate; lower cauline often withering by flowering, sessile, blades



Figure 1. May Prairie, Coffee Co., Tennessee 12 September 2012. **A.** Dwayne Estes and *Symphyotrichum estesii*. **B.** Central portion of prairie; from left to right: Todd Crabtree, D. Estes, Mason Brock, Ed Schilling, J.C. Semple (Photograph by Julian Campbell). **C.** Northeast corner of prairie; from left to right: E. Schilling, D. Estes, T. Crabtree.



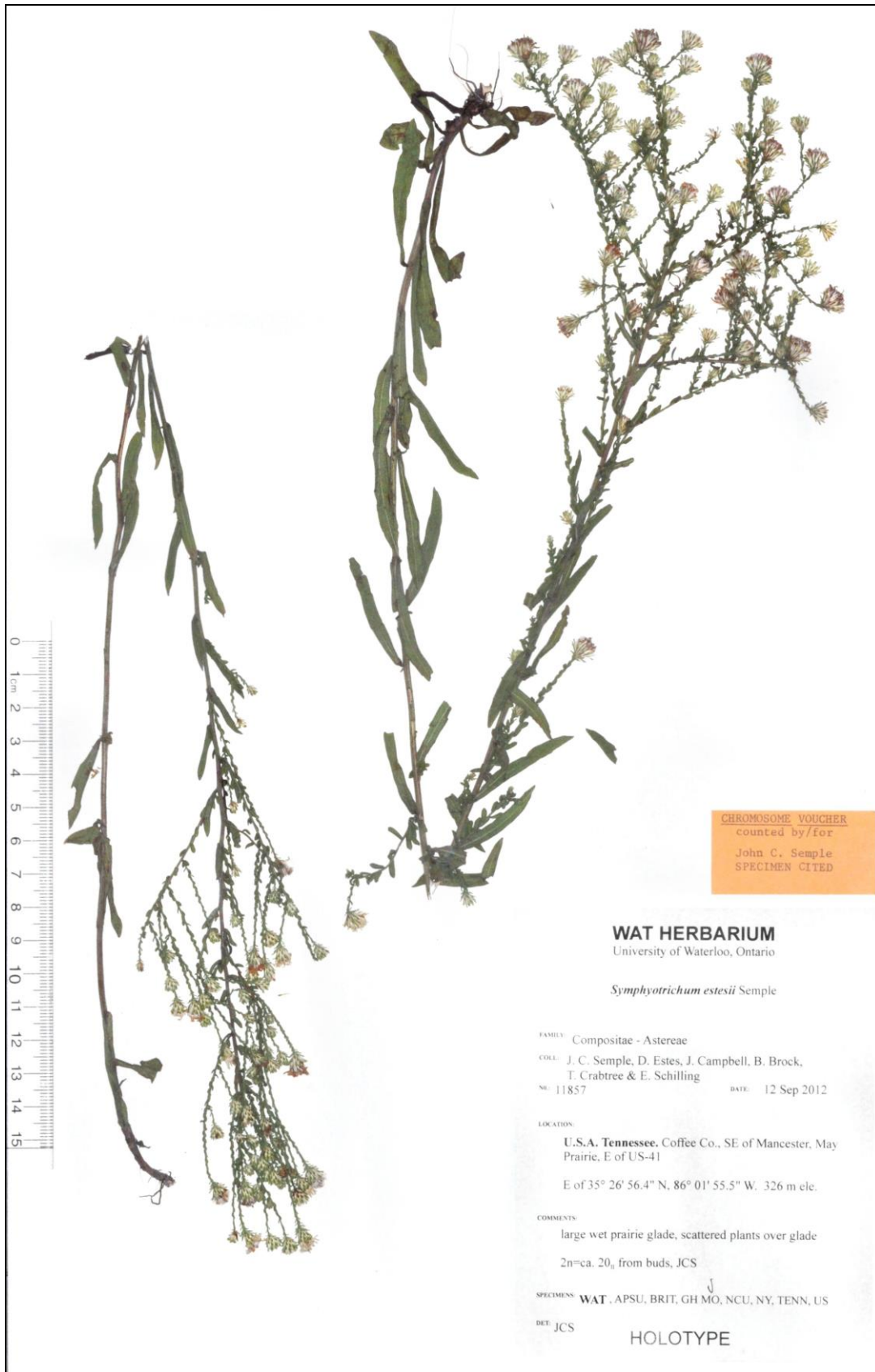


Figure 2. Holotype of *Symphotrichum estesii*, Seuple et al. 10857 (MO, unmounted to be distributed).

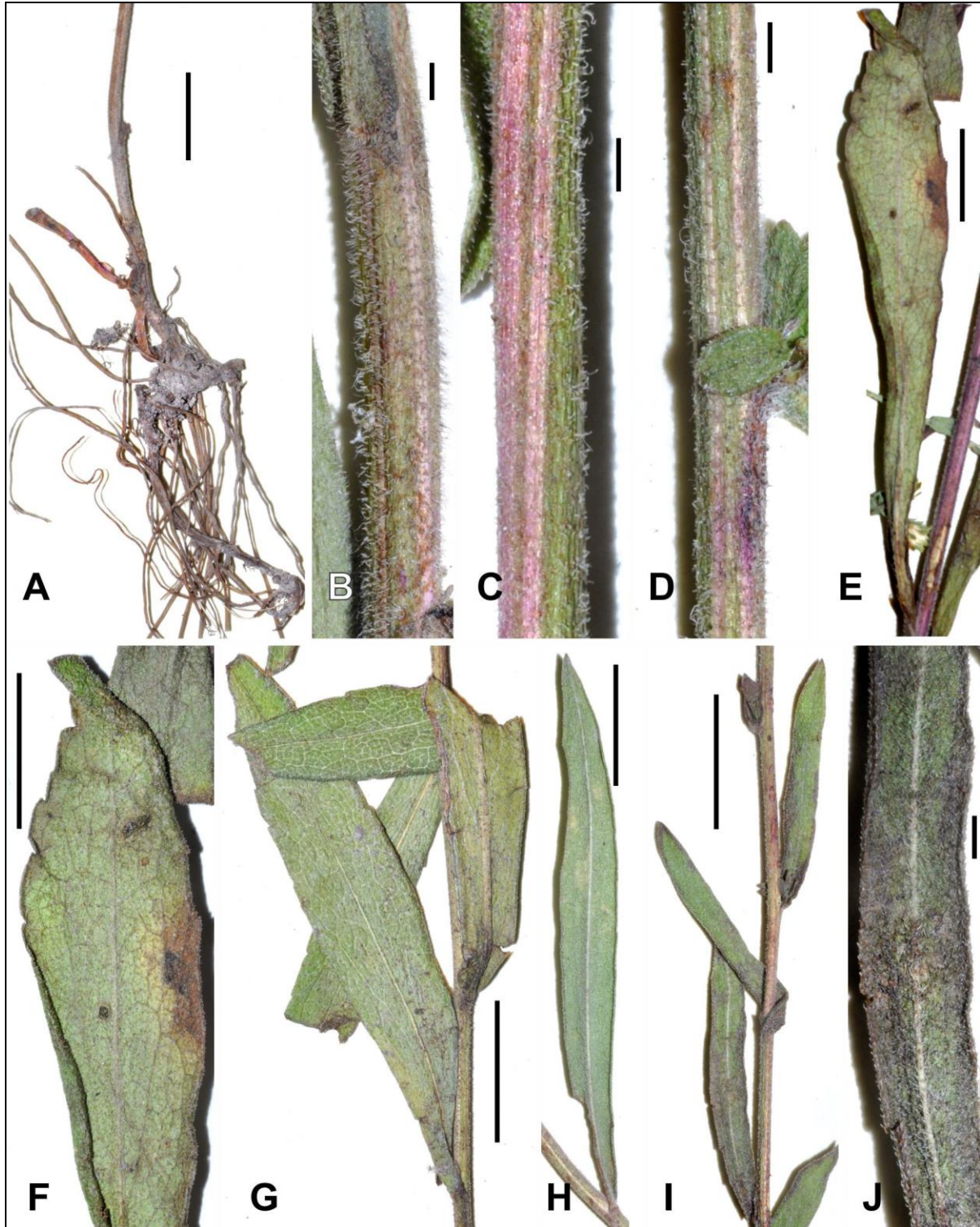


Figure 3. Details of types of *Symphotrichum estesii*, Semple et al. 11857: stems and leaves. **A.** Rhizomes and basal stem (BRIT). **B.** Lower stem (MO). **C-D.** Mid stems (WAT, GH). **E-F.** Lower stem leaf, abaxial surface (WAT in MT). **G.** Lower mid stem leaves (TENN). **H.** Mid stem leaf, abaxial surface (GH). **I.** Upper stem leaves (BRIT). **J.** Upper stem leaf, abaxial surface (BRIT). Scale bar = 1 mm in A-D, J; = 1 cm in E-I.



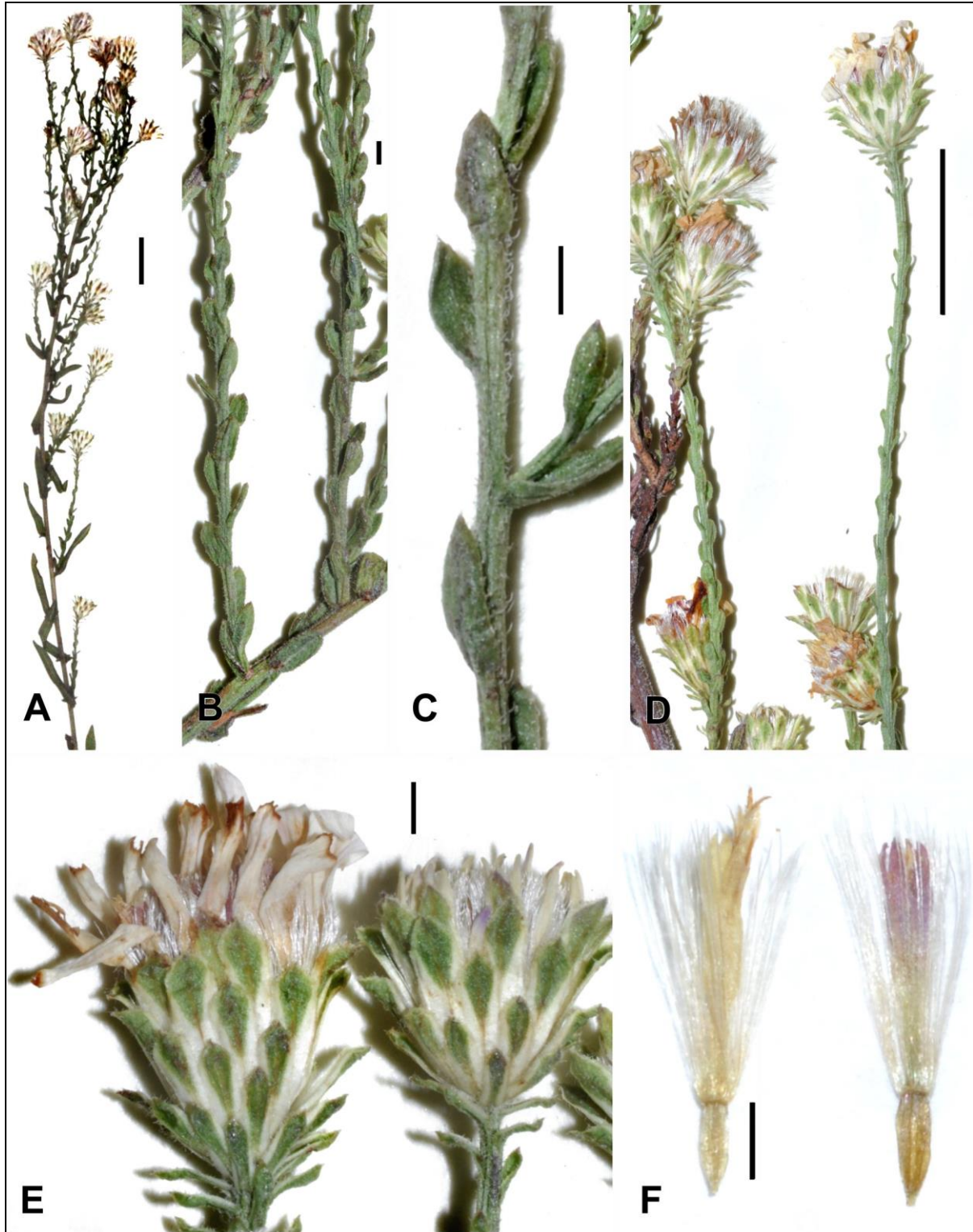


Figure 4. Details of types of *Symphotrichum estesii*: floral traits. **A.** Small inflorescence with ascending branches (APSC). **B.** Peduncles (MO). **C.** Peduncle bracts (WAT). **D.** Heads and peduncles (APSC). **E.** Heads (APSC). **F.** Disc florets, flowering and post anthesis (MO). Scale bar = 1 cm in A, D; = 1 mm in B-C and E-F.



Figure 5. *Symphyotrichum estesii*: May Prairie, Coffee Co., Tennessee. **A.** Shoot. **B.** Rhizomes and stem. **C.** Ray and disc florets. **D.** Heads and peduncles.



oblanceolate to linear oblanceolate, 32–68 × 3–11 mm, margins distally shallowly serrate to entire, scabrellous, apices spinulose-mucronate; mid stem leaves sessile, blades lanceolate or oblanceolate to oblong-lanceolate, 18–45 × 2–7 mm, reduced distally and becoming bractlike in inflorescence, bases rounded, margins scabrous, apices acute to white-mucronulate or -subspinulose, faces sometimes shiny, minutely gland-dotted; branch leaves much reduced, 1–7 × 0.5–3 mm. Heads (5–50) in wide to narrow, paniculiform arrays, branches ascending to widely spreading, densely small-leaved. Peduncles ascending, rarely divergent, 1–5 cm, sparsely to densely strigoso-hirsute, sparsely stipitate-glandular, bracts dense, curving upward from patent base, narrowly oblong to broadly oblanceolate, mostly 1.5–2.5(–5) × 0.5–1(–2.5) mm, spinulose-mucronate, sparsely to moderately strigilloso-scabrous, sparsely minutely stipitate-glandular, grading into phyllaries. Involucres cylindro-campanulate, 5–6.4 mm. Phyllaries in 4–5 series (appressed), oblong or oblanceolate, unequal, bases indurate, glabrate to sparsely strigose, sparsely minutely stipitate-glandular, not anthocyanotic, margins hyaline, scarious, ciliate or ciliolate, green zones narrowly oblanceolate to obrhombic (inner), apices erect, acute to acuminate, mucronulate to apiculate (inner). Rays 9–17, laminae 2–4.5 × 0.6–1.2 mm, white. Disc florets 12–28; corollas yellow turning reddish purple to brownish, 3.6–5 mm, lobes triangular, 0.4–0.7 mm. Cypselae tan, obovoid-fusiform, slightly compressed, 1.9–2.3 mm, 4–6-nerved, faces sparsely strigillose to glabrescent; pappi 4.5–5.5 mm, the longest inner very weakly clavate.

Flowering Aug–Nov. Prairie and oak savanna; of conservation concern.

**Additional collections. Tennessee.** Coffee Co.: May Prairie and surrounding woods, 2 Sep 1984, *Medley 11505-84* (APSC, digital image! posted on SERNEC Data Portal. 2019; originally identified as *Aster dumosus* L.); May Prairie Natural Area, in W half of open prairie, 19 Oct 2010, *Estes 11799* APSU; May Prairie, 11 Oct 2014, *Brock et al. 797* (APSC, digital image! posted on SERNEC Data Portal. 2019; as *Symphyotrichum* sp.). Estes (pers. comm.) indicates that two additional collections not seen via SERNEC by the author are also likely specimens of *S. estesii* — a E. Quaterman collection (VDB?) and H. DeSelm collection (TENN?).

The collections of *Symphyotrichum estesii* have previously been misidentified as one of several aster species, including *S. dumosum*, *S. ericoides*, and possibly *S. pratense*. In aspect, with its white rays and habit, it is most likely to be confused with *S. dumosum* but can readily be distinguished by its erect-ascending cauline leaves (vs. spreading-descending), difference in vestiture, etc. From *S. ericoides* it is readily separated by phyllaries lacking a spinulose tip. *Symphyotrichum pratense* has purple rays, larger heads, and different vestiture but is somewhat similar in its sparingly branched habit with ascending branches.

*Symphyotrichum estesii* is closely similar to *S. fontinale*. In addition to features of difference noted in the diagnosis, *S. estesii* is disjunct from the range of *S. fontinale*. The latter is endemic to Florida and the bottom tier of counties in Georgia.

*Symphyotrichum estesii* shares stem, leaf, and inflorescence traits and stipitate-glands with *S. fontinale* ( $2n=50$ ), which is native to Florida (Brouillet et al. 2006; Semple 2014), and less so with *S. oblongifolium* ( $2n=10, 20$ ) of *S.* subg. *Virgulus* sect. *Grandiflori*, which also includes *S. campestre* ( $2n=10$ ), *S. fendleri* ( $2n=10$ ), *S. grandiflorum* ( $2n=60$ ), *S. pygmaeum* (no count), and *S. yukonense* ( $2n=10$ ).

The meiotic count or  $2n = ca. 20_{II}$  is based on multiple pollen mother cells examined in diakinesis and metaphase I. No mitotic count confirmation was possible because the rootstocks did not transplant successfully to the greenhouse. The base number is  $x = 5$ ;  $2n = 40$  is octoploid.



Figure 6. *Symphotrichum fontinale*: *Semple 11700* (WAT), Taylor Co., Florida. **A.** Shoots. **B.** Upper mid stem and leaves. **C.** Inflorescence branches. **D.** Florets. **E.** Heads and peduncles.



*Symphyotrichum estesii* is currently known only from May Prairie State Natural Area (SNA) in Coffee Co., Tennessee. May Prairie has long been known to Tennessee botanists as a unique unplowed grassland that harbors perhaps more rare species than any other site in the state, including many species that are disjunct from the longleaf pine savannas and wetlands of the Coastal Plain (Sorrie & Weakley 2001). Noss (2012), in *Forgotten Grasslands of the South*, points out the significance of May Prairie as one of the Mid-South's best remaining grasslands. The site is owned by the Tennessee Department of Environment and Conservation's Division of Natural Areas, which also manages the site with prescribed fire and periodic mowing. This region of Tennessee has been known as "The Barrens" for more than 200 years, a term given by early English-speaking settlers who visited the area in the late 1700s-early 1800s (DeSelm 1990, 1994).

*Symphyotrichum estesii* occupies a global range of less than 5 ha, consisting of portions of two prairie openings within the May Prairie SNA. It is rare and of conservation concern due to its geographically restricted range, but the one known population is being well managed on the natural area and appears to be stable. Additional searches by D. Estes in areas of suitable habitat on the nearby Arnold Air Force Base in 2011 did not turn up any additional populations (D. Estes, pers. comm.). More searches for this species are needed in the region and in other similar types of grassland habitats in the southeastern USA.

*Symphyotrichum estesii* is endemic to open, sunny, seasonally wet grasslands, specifically prairie-like openings among what historically was post oak savanna of the Eastern Highland Rim, part of the Interior Plateaus Ecoregion. These grasslands are associated with flat sites with acidic silt loam soils (of the Guthrie and Dickson soil series) underlain by a clay fragipan (Web Soil Survey 2019). These soils are hydroxic, i.e., frequently waterlogged in winter and spring (with frequent surface ponding) and highly desiccated in late summer and fall, owing to the presence of the fragipan at a depth of 0.5-0.9 m. Tree ring studies by Stambaugh et al. (2016) show a fire record dating back to 1610 with a conservative fire return interval of 3.2-5.5 years, which along with grazing, would have been sufficient to maintain the area as a combination of oak savanna and prairie in pre-European settlement times (Estes et al. 2016). These grasslands are classified by NatureServe (2019) as part of the Eastern Highland Rim Prairie and Barrens Ecological System and by the Southeastern Grasslands Initiative (2019) as part of the Highland Rim Savanna community (Estes et al. 2016).

Within the prairie proper, *Symphyotrichum estesii* is common and abundant but is less so within the partially shaded adjacent oak woodlands, where it drops out almost entirely within a couple dozen meters from the prairie edge. In the prairie, it is associated with a rich diversity of native graminoids: *Andropogon gerardii*, *Calamagrostis coarctata*, *Carex meadii*, *Panicum virgatum*, *Rhynchospora chalarocephala*, *R. glomerata*, *Schizachyrium scoparium* var. *divergens*, and *Sorghastrum nutans*; forbs: *Agalinis decemloba*, *A. purpurea*, *Aletris farinosa*, *Asclepias hirtella*, *Baptisia aberrans*, *Castilleja coccinea*, *Coreopsis tripteris*, *Drosera brevifolia*, *Eryngium integrifolium*, *E. yuccifolium* var. *yuccifolium*, *Eupatorium hyssopifolium*, *E. leucolepis*, *E. pilosum*, *E. rotundifolium*, *Eurybia hemispherica*, *Euthamia leptoccephala*, *Helianthus mollis*, *Lespedeza capitata*, *Liatris spicata*, *Oenothera tetragona* var. *sharpii*, *Packera crawfordii*, *Parthenium integrifolium*, *Polygala cruciata*, *Pycnanthemum muticum*, *P. tenuifolium*, *Rhexia mariana* var. *mariana*, *Rudbeckia palustris*, *Silphium mohrii*, *S. pinnatifidum*, *Sisyrinchium atlanticum*, *Solidago austrina*, *Symphyotrichum dumosum*, and *Tephrosia virginiana*. Some of the taxa listed above are endemic or nearly-endemic to the prairies and savannas of the Highland Rim and closely adjacent ecoregions, including *Helianthus eggertii*, *Oenothera tetragona* var. *sharpii*, *Silphium mohrii*, *S. pinnatifidum*, and *Solidago austrina*. The recently described *Stenanthium tennesseense* Sorrie & Weakley is also narrowly endemic to this same system of grasslands (Sorrie & Weakley 2017).

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