# NEW COMBINATIONS, RANK CHANGES, AND NOMENCLATURAL AND TAXONOMIC COMMENTS IN THE VASCULAR FLORA OF THE SOUTHEASTERN UNITED STATES. III

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## ABSTRACT

As part of ongoing efforts to understand and document the flora of the southeastern United States, a number of taxonomic changes at generic, specific, and infraspecific rank are made. We also discuss and clarify the recommended taxonomy for other taxa (not requiring nomenclatural acts) and present a point of view about the practical and philosophic basis for making taxonomic changes in an allegedly well-understood flora. The genera (and families) affected are *Endodeca* (Aristolochiaceae), *Erigeron*, *Pityopsis*, and *Solidago* (Asteraceae), *Tillandsia* (Bromeliaceae), *Carex* (Cyperaceae), *Baptisia* and *Indigofera* (Fabaceae), *Salvia* and *Scutellaria* (Lamiaceae), *Stenanthium* (Melanthiaceae), *Epidendrum* (Orchidaceae), and *Andropogon*, *Coleataenia*, *Dichanthelium*, *Digitaria*, and *Panicum* (Poaceae).

## RESUMEN

Como parte de los esfuerzos para entender y documentar la flora del sureste de Estados Unidos, se han realizado cierto número de cambios taxonómicos a nivel genérico, específico e infraespecífico. También hemos discutido y clarificado la taxonomía recomendada para otros taxones (que no requiere acciones nomenclaturales) y hemos presentado un punto de vista sobre los principios básicos para la realización de cambios taxonómicos en la presuntamente bien conocida flora. Los géneros (y familias) implicados son *Endodeca* (Aristolochiaceae), *Erigeron, Pityopsis,* y *Solidago* (Asteraceae), *Tillandsia* (Bromeliaceae), *Carex* (Cyperaceae), *Baptisia* e *Indigofera* (Fabaceae), *Salvia* y *Scutellaria* (Lamiaceae), *Stenanthium* (Melanthiaceae), *Epidendrum* (Orchidaceae), y *Andropogon*, *Coleataenia, Dichanthelium, Digitaria,* y *Panicum* (Poaceae).

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## INTRODUCTION

As part of ongoing work on the *Flora of the Southern and Mid-Atlantic States* (Weakley 2015; Weakley 2018), as well as for general floristic, conservation, and scientific work in eastern North America, it is necessary or desirable to document taxonomic and nomenclatural changes. In some cases, new combinations are needed to accurately reflect current taxonomic understanding. Some of these are rank changes, whereas others are generic transfers to apply new (or old) generic concepts to taxa that do not have corresponding available names at the specific or infraspecific level. We have also addressed various nomenclatural issues and clarified characters and identification of difficult groups in the regional flora, and we include in the section on *Tillandsia floridana* a preliminary discussion of a problematic issue in botanical nomenclature—the variable usage of the hybrid symbol (×) and its implications for how a plant taxon is regarded for treatment in floras and ranking for conservation.

We here present a third volume of such changes, contributed by twelve authors. Primary authorship of the sections in this paper is as follows (and is also indicated at the beginning of each section): *Endodeca* (AJF & ASW), *Erigeron* (DBP, BRK, & RDN), *Pityopsis* (ELB & SLO), *Solidago* (BAS), *Tillandsia* (ARF & ASW), *Carex* (DBP & ASW), *Baptisia* (ASW), *Indigofera* (ARF), *Salvia* (BRK & ARD), *Scutellaria* (DBP & ASW), *Stenanthium* (BAS & ASW), *Epidendrum* (ARF), *Andropogon* (ASW & MS), *Coleataenia* (RJL), *Dichanthelium* (RJL), *Digitaria* (ELB & SLO), and *Panicum* (BAS).

## ARISTOLOCHIACEAE

### **ENDODECA:** *Endodeca* at genus rank, with a new combination at species rank

Primary authors: Aaron J. Floden & Alan S. Weakley

The relationships of the supraspecific entities of Aristolochiaceae subfamily Aristolochioideae have been well documented in molecular studies (Murata et al. 2001; González & Stevenson 2002; Kelly & González 2003; Neinhus et al. 2005; Ohi-Toma et al. 2006; Wanke 2006; Wagner et al. 2012; Ohi-Toma et al. 2016; Wanke et al. 2017; Wanke et al. 2017), morphological analyses (Huber 1993; González & Stevenson 2002), cytological studies (Ohi-Toma et al. 2006), and combined analyses of those data. The appropriate rank at which to recognize these entities has remained controversial, but more recent publications have favored recognition of these distinctive clades (strongly supported by multiple lines of evidence) as genera (or at least subgenera) separate from *Aristolochia* sensu stricto. González & Stevenson (2002) and Huber (1993) recognized several genera, including *Isotrema* Raf. and *Endodeca* Raf., as separate from the core *Aristolochia*; Huber (1993) placed *Isotrema* and *Endodeca* in tribe Isotrematinae and *Aristolochia* s.s. and several other genera in tribe Aristolochiinae. Ohi-Toma et al. (2006) supported *Isotrema* and *Endodeca* as distinct genera based on molecular and cytological data. Molecular data, including chloroplast and nuclear loci, support these genera as monophyletic, with *Endodeca* sister to *Isotrema*, although their recognition as genera or subgenera differs by author.

The *Isotrema* + *Endodeca* clade is well supported by a three-lobed gynostemium with anthers in pairs on the outer surface of each segment, a perianth with three lobes that are valvate in bud, a ring-like structure at the perianth throat (face of the calyx lobes), a capsule that is apically dehiscent (though opening nearly completely with the lobes of the capsule splitting to the base), and a chromosome number of $2n = 32$ (Ohi-Toma et al. 2006). Despite these shared characteristics, *Endodeca* and *Isotrema* are also well supported as separate entities at a molecular level and also differ in many characters. *Endodeca* species are erect, herbaceous perennials with reduced subtending leaves, bracts that are clasping, short lateral internodes, and inflorescences that comprise multiple flowers borne at the base of the stem and often prostrate and buried in the leaf litter (Huber 1993; González & Stevenson 2002; Wanke et al. 2006). By contrast *Isotrema* species are lianas with axillary single-flowered inflorescences, an abscission zone at the petiole base, and a floral tube that is evenly inflated (Wanke et al. 2006). We prefer to recognize *Isotrema* and *Endodeca* at generic rank because of their morphological differences and deep phylogenetic divergence, which requires a combination for *Aristolochia reticulata* Nutt. in *Endodeca*.

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As thus circumscribed, *Endodeca* is a small genus of woodland herbs of eastern North America with two or quite possibly several species (as currently circumscribed, *Endodeca serpentaria* encompasses a striking diversity of forms, some previously accorded species rank, and needing modern study to determine their reasonable taxonomic disposition). By contrast, *Isotrema* is a larger genus of perhaps 50 species of erect and twining shrubs and lianas, more widely distributed than *Endodeca* and occurring in temperate and tropical eastern and southeastern Asia and in eastern North America southward through Mexico to Central America.

**Endodeca reticulata** (Nutt.) Floden & Weakley, **comb. nov.** Basionym: *Aristolochia reticulata* Nutt., Trans. Amer. Philos. Soc., n.s. 5(6[2]):162–163. 1837 [1835]. *Siphisia reticulata* (Nutt.) Klotzsch, Monatsb. Akad. Berl. 604. 1859. Type: U.S.A. Territory of Arkansas: Hab. in woods, and on the shelvings of rocks on the banks of Arkansas and Red rivers, common, flowering in Jun, *Nuttall s.n.* (**lectotype, designated here:** K 000820437!; isolectotypes: BM!, PH, digital images).

## ASTERACEAE

### ERIGERON: A new name for *Erigeron strigosus* var. *calcicola* at species rank

Primary authors: Derick B. Poindexter, Brian R. Keener, and Richard D. Noyes

When we proposed the elevation of *E. strigosus* var. *calcicola* to species rank (Weakley et al. 2017), we did not realize that the varietal epithet was already used at the species rank by *E. calcicola* Greenm. (1905), a species typified from the state of Hidalgo, Mexico. Here we provide a *nomen novum* to give this distinctive taxon a valid name at species rank, commemorating its discoverer, Jim Allison.

**Erigeron allisonii** D.B. Poind , B.R. Keener, & Noyes, **nom. nov.** Replaced synonym: *Erigeron strigosus* Muhl. ex Willd. var. *calcicola* J. Allison, Castanea 66:173. 2001. Type: U.S.A. Tennessee: Rutherford Co.: ca. 18.7 km E of Murfreesboro, ca. 3.7 km NNW of Readyville; limestone glade W of Tassey Rd., ca. 0.2 rd. km N of crossing of Andrews Creek, 22 Jul 2000, *James R. Allison 12431* (holotype: NY! [digital image]; isotypes: DUKE! [digital image], GA! [digital image], GH! [digital image], MO! [digital image], NCU!, TENN, UNA!, US! [digital image], VDB! [digital image]).

*Erigeron calcicola* D.B. Poind., B.R.Keener, & Noyes (non Greenm. 1905), nom. illeg.

### PITYOPSIS: Reassessment of *Pityopsis* sect. *Graminifoliae* (Small) Semple in peninsular Florida

Primary authors: Edwin L. Bridges & Steve L. Orzell

*Pityopsis* Nutt. (Asteraceae), the genus of grass-leaved goldenasters, has a history of unresolved taxonomic, typification, and nomenclatural issues. Authors have often misapplied names and not recognized fire-adapted morphological characteristics of *Pityopsis* within Florida, the center of diversity for the genus. Within Florida, all three known ploidy levels (diploid, tetraploid, and hexaploid) occur, and hybridization has been documented among species with overlapping ranges, thereby rendering section *Graminifoliae* (Small) Semple infamous for species- and varietal-level incongruences (i.e., Small 1903, 1933; Cronquist 1980; Semple & Bowers 1985, 1987; Semple 2006). Furthermore, widely differing interpretations of the number of taxa within section *Graminifoliae*, coupled with floristic treatments that have lumped most taxa in *Graminifoliae* into one broadly defined species, *Pityopsis graminifolia* (Michx.) Nutt., have created problems for understanding species delimitation in the section.

We propose recognition of four species within central and south Florida in section *Graminifoliae,* based on morphological, phenological, and ecological differences. Three of these—*Pityopsis latifolia* comb. et stat. nov., *P. aequilifolia* comb. et stat. nov , and *P. tracyi* (Small) Small—are endemic to peninsular Florida. Although our taxonomic understanding of *Graminifoliae* is largely based upon the landmark treatment by Semple and Bowers (1985), we also utilized the nomenclatural and typification work of Fernald (1942). Recent population genetic and phylogenomic studies in *Pityopsis* (Teoh et al. 2007; Boggess 2013; Hatmaker 2016), while improving understanding of some species relationships, have not resolved the broader taxonomic issues in *Graminifoliae.* Studies of fire-adapted traits (Gowe & Brewer 2005; Teoh et al. 2007; Brewer 2008) demonstrate the evolutionary role of fire-dependent flowering, which is thought to have arisen in the "Florida clade" of *Pityopsis* (Teoh et al. 2007). We suspect that growth form (caespitose vs. rhizomatous), plant height, and leaf width in section *Graminifoliae* have resulted from selection driven by fire frequency (which varies by habitat type) and that post-burn resprouting traits further differentiate taxa that diversified in Florida pyrogenic natural

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communities. Our field observations and vegetation sampling spanning 25 years in fire-frequented landscapes in peninsular Florida have been instrumental in developing our species concepts in section *Graminifoliae,* which follow the guidelines of species delimitation in Weakley et al. (2017).

### ***Pityopsis latifolia* in southern Florida**

Since 1993, we have questioned the taxonomic placement of a morphologically distinct member of the *Pityopsis graminifolia* complex (sensu Semple & Bowers 1985) from southern Florida. This entity is readily recognized by its well-developed rosette of spreading to somewhat ascending, broadly strap-like basal leaves, typically over 2 cm wide, and its reduced, clasping cauline leaves. The inflorescence stalks are relatively short and stout, usually under 40 cm tall, and bear few heads. We have encountered this entity on xeric Atlantic Coastal ridges (ACR) in Palm Beach, Martin, and St. Lucie counties and further inland on xeric sand ridges in southwestern St. Lucie County and near Fort Drum in Okeechobee County. It flowers most profusely in the mid to late dry season (winter into early spring) and is therefore phenologically segregated from other members of *Graminifoliae* in the region, which flower in the late wet season into the early part of the dry season.

We determined that Fernald (1897) described this entity as *Chrysopsis graminifolia* var. *latifolia* and considered it distinct in habit from typical *C. graminifolia*, with its much wider leaves (2–3 cm wide) and more compact inflorescences with fewer flowering heads. He listed two specimens in his description, *Curtiss 5819* and *Palmer 259.* The name was lectotypified by Semple and Bowers (1985) using *Curtiss 5819*, collected on 25 Mar 1897 in Jensen (in Martin County, Florida). The lectotype is at GH, but there is a duplicate specimen at NY, which should therefore be considered an isolectotype. A digital image of the NY specimen and a photograph of the GH specimen in Bowers (1972) appear to be an exact match for our ACR material. In a discussion of the variation and application of names within the *Chrysopsis graminifolia* complex in Virginia and the Carolinas, Fernald (1942) prefaced his remarks with a list of taxa in the complex that he considered to be distinct species. Among these he included *Chrysopsis latifolia* (Fernald) Small, which had been given species rank by Small (1903). Fernald (1942) discussed the correct names for other members of this complex without any further discussion specific to *C. latifolia* because it did not occur within the geographic scope of his study.

Later, Semple and Bowers (1985) made the combination *Pityopsis graminifolia* var. *latifolia* and applied it to many *P. graminifolia* specimens with large involucres distributed from Delaware south to Florida and west to Arkansas and eastern Texas and to disjunct populations from Mexico to Honduras and the Bahamas. Because "*latifolia*" was the first name used at the varietal level for their broadly defined taxon, it takes precedence at that rank over well-established species epithets for this group, such as "*nervosa*" and "*correllii*." The vast majority of the specimens that Semple and Bowers referred to var. *latifolia* have long basal leaves that narrow much more towards the base than do the leaves of var. *latifolia* from the Florida ACR. The stem leaves of these specimens match the small, reduced leaves typical of varieties *tenuifolia*, *graminifolia*, and *tracyi*, not the well-developed spreading stem leaves of varieties *latifolia* and *aequilifolia*. Specimens from the Florida Panhandle northward and westward with relatively broad basal leaves, which Semple and Bowers referred to var. *latifolia*, otherwise lack the distinctive characters of var. *latifolia* (sensu stricto) and are not the same entity. Provisionally, we suspect they most likely represent gradations in leaf size of *Pityopsis nervosa*.

Authors have been reluctant to recognize named varieties of *Pityopsis graminifolia* as distinct taxa, perhaps in part because of confusion over application of the name *Pityopsis graminifolia* var. *latifolia*. Many wide-leaved, large-headed *Pityopsis graminifolia* specimens outside of south Florida had been identified as var. *latifolia*, whose type is from the ACR; this may have led to the taxon being considered polyphyletic (Teoh et al. 2007). If var. *latifolia* is restricted to the *P. graminifolia* specimens of coastal sand ridges of southern Florida, it may very well reflect a distinct, monophyletic taxon. We have considered the rationale given by Semple and Bowers (1985) for broadening the concept of var. *latifolia* beyond the characters of the type collection. They stated that the type of the variety has the widest leaves encountered among the specimens of var. *latifolia* they examined. Small (1933) implied that the characters Fernald used to distinguish var. *latifolia* are characters that we would currently apply to var. *aequilifolia*. Fernald (1897) did discuss an unusual specimen (*Nash 2313*), which he considered to be intermediate between var. *latifolia* and typical *C. graminifolia*. Based on his

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description of the specimen, we interpret it to be one of the first collections of var. *aequilifolia*. It seems that the confusing morphological variation in section *Graminfoliae* caused Small (1933) to recognize too few taxa, in direct contrast to his earlier treatment in which six were treated as species (Small 1903).

By regarding the taxon as a species, *Pityopsis latifolia*, endemic to southern Florida, we substantially limit the concept of the *latifolia* entity and open the question of the proper name (or names) for the remaining specimens identified as *P. graminifolia* var. *latifolia* by Semple and Bowers (1985). It seems that most specimens referred to var. *latifolia* from regions outside of Florida probably fall within the circumscriptions of *Pityopsis nervosa* (Willd.) Dress, *Chyrsopsis correllii* Fernald (if so, the combination in *Pityopsis* needs to be made), and *Heyfeldera sericea* Sch. Bip. (or other possible names for the Mexican and Central American material). More careful consideration and examination of the type material for all these names is required, and someone needs to more precisely circumscribe the variation within populations. It is possible that these may include other as yet unrecognized species or varieties in *P. graminifolia,* given the geographic extent of the complex.

Regardless, we believe that the type of *P. graminifolia* var. *latifolia* is the same entity as the *Pityopsis* with broad basal leaves we have collected and observed on the ACR (and in Okeechobee County), and it therefore has a valid name. Given its distinctiveness from other *Pityopsis* taxa in the region, it should be recognized at species rank, requiring the following combination:

**Pityopsis latifolia** (Fernald) E.L. Bridges & Orzell, **comb. et stat. nov.** Basionym: *Chrysopsis graminifolia* (Michx.) Elliott var. *latifolia* Fernald, Bot. Gaz. 24:434. 1897. *Chrysopsis latifolia* (Fernald) Small, Fl. S.E. U.S. 1182, 1339. 1903. Type: U.S.A. Florida. Martin Co.: Jensen, 25 Mar 1897, *A.H. Curtiss 5819* (lectotype, designated by Semple & Bowers 1985, GH; isolectotypes: GH, NY!).

There are only three digital specimen images at USF (out of over a hundred *Pityopsis graminifolia* specimen images) that represent this species: *Lakela 28333*, collected 21 Mar 1965 near Deerfield Beach in Broward County; *Orzell and Bridges 21259*, collected 8 Mar 1993 in Martin County; and a dubious *Perkins s.n.* specimen, collected 23 Jan 1943 in Sarasota County. All of these collections are from xeric coastal sand ridges and have the wide basal leaves and short, stout stems characteristic of the holotype. There are probably specimens of *P. latifolia* at other herbaria, but we have not conducted an exhaustive search for them.

### *Pityopsis aequilifolia*, *P. tracyi*, and *P. microcephala* in central and south-central Florida

Within the Central Highlands of peninsular Florida, a *Pityopsis* with well-developed spreading stem leaves with clasping, imbricate bases is distinct from other taxa in section *Graminifoliae*. It is found exclusively on xeric sands, in both Florida scrub and fire-prone sandhills within central Florida. In these habitats, it is often the sole entity of the section, displaying considerable morphological uniformity. Despite the rare occurrence of intermediate entities, it seems best to recognize it at species rank, with the following combination:

**Pityopsis aequilifolia** (Bowers & Semple) E.L. Bridges & Orzell, **comb. et stat. nov.** Basionym: *Pityopsis graminifolia* (Michx.) Elliott var. *aequilifolia* Bowers & Semple, Phytologia 58:430. 1985. Type: U.S.A. Florida. Lake Co.: Tavares, sandy roadside on FL-19 S of old US-441, 20 Sep 1971, *Wofford and Bowers 71-558* (holotype: TENN).

There are two additional *Pityopsis* species (*P. tracyi* and *P. microcephala*) in central and south Florida. *Pityposis tracyi* is a robust, large-flowered species that is locally abundant in somewhat poorly to poorly drained pine savannas and seasonally wet grasslands with a historical high fire return interval (annual or biennial) from lightning season fires. Within the $C_4$ grass-dominated groundcover matrix of these savanna-grasslands, *P. tracyi* often forms clonal patches from its elongated and branched underground rhizomes, which enable it to rapidly resprout after fires. A single genet is capable of occupying an area several meters in diameter. This species was first named by Small as *Chrysopsis tracyi*, and he later made the combination *P. tracyi* (Small) Small. Ward (2004) made a new combination treating it as a variety of *P. nervosa*, as *P. nervosa* var. *tracyi* (Small) D.B. Ward. We recognize it as a very distinct species and the most common member of section *Graminifoliae* in central and south-central Florida.

The last of the four *Pityopsis* species in central and southern Florida is *Pityopsis microcephala* (Small) Small, a short, small-headed species with very narrow leaves. In central and south Florida it is restricted to well-drained sandhills with an open canopy of *Pinus palustris* or *Pinus densa*. The taxonomy of *Pityopsis*

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*microcephala* Small remains uncertain, pending further analysis of the variation between it and *P. graminifolia* (sensu stricto). The presence or absence of glandular hairs on the involucre (and on other plant parts) is considered important in the taxonomy of *Pityopsis*, and it seems that the presence or absence of glandular hairs on the involucre is consistent within populations of these two species (or varieties). More study is needed to clarify the appropriate rank for *P. microcephala*. If it is considered a variety, the correct name would be *Pityopsis g.* var. *tenuifolia* (Torrey) Semple & F.D. Bowers.

Within central Florida, we have only found one specimen record of *P. graminifolia* (sensu stricto), from Lake County (*Bowers & Wofford 71-557*, TENN). There are additional records in northeast Florida, and therefore we are including the taxon in the following key. Our key is intended only to distinguish species in section *Graminifoliae* from within central and southern peninsular Florida. A key to the entire group awaits further study of material of *P. nervosa* and its possible segregate taxa from outside this region.

### KEY TO *PITYOPSIS* IN CENTRAL AND SOUTHERN PENINSULAR FLORIDA

1. Basal leaves similar in size and shape to stem leaves, the stem leaves not noticeably reduced upward; middle and upper stem leaves ascending to somewhat spreading, 5–20 mm wide.
   2. Involucres 5–8 mm high; disc florets 15–29; stem leaves dense, stiff and sharply pointed at apex__________ **Pityopsis aequilifolia**
   2. Involucres 8–12 mm high; disc florets > 30; stem leaves few, soft and obtuse or slightly acute at apex__________ **Pityopsis latifolia**
1. Basal leaves much longer than the stem leaves; stem leaves strongly reduced upward, the upper stem leaves much smaller than middle stem leaves, appressed to the stem or nearly so, the largest stem leaves less than 5 mm wide.
   3. Involucres 12–14 mm high; disc florets > 30; ray florets 13–25; flowering plants robust, often 50–100 cm tall; largest basal leaves on sterile shoots 15–30 cm long, 5–10 mm wide; largest stem leaves 5–11 cm long, 3–5 mm wide__________ **Pityopsis tracyi**
   3. Involucres 5–8 mm high; disc florets 15–29; ray florets 5–12; flowering plants more delicate, usually less than 50 cm tall; largest basal leaves on sterile shoots 10–25 cm long, 1–3 mm wide; largest stem leaves 2–6 cm long, 1–3 mm wide.
      4. Inner phyllaries densely stipitate-glandular, at least distally__________ **Pityopsis graminifolia**
      4. Inner phyllaries eglandular to sparsely glandular__________ **Pityopsis microcephala**

## **SOLIDAGO:** *Solidago aestivalis* in the Carolinas

Primary author: Bruce A. Sorrie

Semple and Cook (2006) showed *Solidago rugosa* Miller var. *sphagnophila* Graves [= *S. aestivalis* Bicknell] in NS, ME, MA, RI, CT, NY, NJ, PA, VA, NC, and SC. Haines (2011) added NH, and Fernald (1936, 1950) stated that it occurred from ME to NC, in wetter, boggier habitats than any of the other taxa within the *S. rugosa* species complex. Radford et al. (1968) and Cronquist (1980) did not mention this variety, so either they did not recognize it or they did not believe it occurred in the Carolinas. Weakley (2015) listed it from NC and SC, on the strength of reports from Harnett and Hoke Cos., NC, and Horry Co., SC, by Uttal and Porter (1988). The North Carolina Natural Heritage Program (2016) lists it as W7, a Watch List category signifying that more data are needed before it may be elevated to the main Rare List (Robinson & Finnegan 2017).

My experience in Massachusetts convinced me of the taxonomic worthiness of *S. rugosa* var. *sphagnophila*, which I encountered in red maple-Atlantic white cedar swamps. However, distinguishing *S. rugosa* var. *sphagnophila* from *S. latissimifolia* P. Miller [= *S. elliottii* Torrey & A. Gray] can be challenging, as they share a number of morphological details: glabrous stem, glabrous or glabrate leaves, leaves ± crowded on the stem, plants about 1.5–2 m tall, plants long rhizomatous. In the field, these morphological characters of var. *sphagnophila* recall those of *S. latissimifolia* much more so than those of others in the *S. rugosa* complex (stems hairy, leaves less crowded, plants less than 1.5 m tall). It is not surprising that most of the NC specimens annotated as var. *sphagnophila* and *S. aestivalis* by Uttal and myself were originally determined as "*S. elliottii*."

In the following paragraphs, I make comparisons first between *S. rugosa* var. *sphagnophila* and *S. latissimifolia* and then with the *S. rugosa* complex.

### **Comparison with** *Solidago latissimifolia*

Fernald's (1950) key separates *S. rugosa* var. *sphagnophila* from *S. latissimifolia* by the following characters: *S. latissimifolia* with involucre height 3.5–6.5 mm, median phyllaries oblong-obtuse, disk corollas 4–5.5 mm, pappus 3–5 mm, vs. *S. rugosa* var. *sphagnophila* with involucre height 3–4 mm, median phyllaries

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linear-lanceolate to linear-oblong, disk corollas 2.5–3.5 mm, pappus 2–3 mm. Weakley (2015) uses similar characters in his key, adding phyllary width: 0.7–1.1 mm in *latissimifolia*; mostly < 0.5 in var. *sphagnophila*. Uttal and Porter (1988) do not have a key but give distinguishing characters in a paragraph; characters are qualitative comparisons except for phyllary width: 1.2 mm wide in *latissimifolia*; 0.6 mm wide in var. *sphagnophila*.

I tested these characters on specimens at NCU and found more divergence from these values than expected, using verified specimens from MA and NC. For example, my measurements of involucre height was 4.5–5.0 mm for both taxa. Uttal & Porter (1988) mentioned that botanists have often confused these taxa.

Other characters prove to be more useful. If used together, the following easily separate all specimens at NCU:

1) Median phyllaries of var. *latissimifoli*a have a blunt (or almost rounded) tip, whereas those of var. *sphagnophila* are acute (pointed). Fernald's (1950) key and Uttal and Porter (1988) observe the same.
2) Pappus bristles are about 3.5 mm long in *latissimifolia*; 4.0 mm in var. *sphagnophila*. This is a small sample, but probably valid, as Fernald's key lists similar values.
3) Leaf abaxial side is glabrous in *latissimifolia*; but in var. *sphagnophila* has scattered (sparse to moderately numerous) appressed, white, straight hairs on the midvein and lateral veins that diverge from the veins at 90 degrees but are appressed (parallel) to the leaf surface. I find this character mentioned only by Graves (1904).

### **Comparison with the *Solidago rugosa* complex**

In his original description, Graves (1904) did not provide a key that separated var. *sphagnophila* from the rest of the *S. rugosa* complex. Instead, scattered in his text, he included characters such as "glabrous stems" and apparently assumed that readers knew that stems of other varieties *S. rugosa* are hairy. Graves also noted that "It is one of our earliest flowering goldenrods, following close after *S. juncea* Ait., and *S. odora* Ait., and antedating *S. rugosa* in the same neighborhood by at least four weeks" (around Waterford, CT). Graves also wrote "As to whether it [var. *sphagnophila*] should be looked upon as specifically distinct from *S. rugosa* there might be an honest difference of opinion, but on account of the discovery of a few plants showing intermediate characters it seems best to regard it as a well-marked variety of that species." Nowhere, however, are specimens of such intermediates described or cited.

Bicknell (1915) also compared his *S. aestivalis* with *S. rugosa* within the text, remarking on the glabrous stem and especially on the much earlier flowering period: "In full flower August 4 1906, passing out of bloom September 2 1904, when the earliest flowers of *S. rugosa* were only beginning to appear" (on Nantucket Island, MA).

Fernald (1936) gave the most detailed account available of the *S. rugosa* complex, providing comments in the text and images of plants and plant parts, but he provided no key. He noted that vars. *aspera* and *celtidifolia* have stems that are scabrous-puberulent to short-hirsute and leaves that are harshly scabrous, rounded-ovate to lanceolate, firm in texture and coarsely rugose-veiny. Moreover, these varieties are short (maximum 1.0 m, pers. obs.) These strongly divergent characters eliminate vars. *aspera* and *celtidifolia* from any further discussion relative to var. *sphagnophila* in this paper. In life and on herbarium sheets, these two varieties of *S. rugosa* simply cannot be confused with var. *sphagnophila* (*S. aestivalis*). Therefore, we are left with vars. *rugosa* and *villosa* to compare with var. *sphagnophila*.

Fernald (1936), while maintaining *villosa* as a variety, stated that "Typical *Solidago rugosa* passes into the ecological var. *villosa*." In discussing both these varieties together, he emphasized the "usually villous" or pubescent stems, "usually sharply serrate leaves … slightly harsh above," and leaves "villous-hirsute on the loose but not prominently rugose veins beneath." The above characters contrast strongly with the "glabrous stems," "glabrous leaves," "appressed serrate" leaves, and "rather firm" but not rugose leaves of var. *sphagnophila*. Images (Plate 426) show numerous erect crinkly hairs on leaf undersides, not the sparse, appressed, straight hairs of var. *sphagnophila* that Graves (1904) and I have observed. In addition, Fernald (1936) noted the pilose inflorescence rachis and branches of vars. *rugosa* and *villosa*, whereas the inflorescence is glabrous or

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glabrate in var. *sphagnophila*. He also stated that var. *sphagnophila* usually shows "low striate ridges on the stem, decurrent from leaf bases," whereas these are lacking in *S. rugosa*.

Uttal and Porter (1988) stated that var. *sphagnophila* is anomalous in its essentially glabrous stems and foliage, features not found in all the other variants of *S. rugosa*. They suggested that var. *sphagnophila* might better be treated as a full species, *S. aestivalis* Bicknell, an idea first adopted by Seymour (1969) and later by Gleason & Cronquist (1991:372, key) and Haines (2011).

Haines (2011) provided a key to separate *S. aestivalis* from *S. rugosa* in New England:

1. Leaf blades abaxially pubescent, the hairs commonly found on the tertiary veins (as well as the midvein and primary lateral veins); stems conspicuously spreading-pubescent (varying to sparsely pubescent in ssp. aspera); widespread plants found throughout most of New England ______ **S. rugosa**
1. Leaf blades ± glabrous abaxially, hairs, when present, few in number and confined to the midrib and primary lateral veins; stem glabrous or with pubescent lines of decurrence from the leaf blades; plants mainly of southern New England and the coastal plain ______ **S. aestivalis** and **S. latissimifolia**

In his key, Haines (2011) then separated *S. aestivalis* from *S. latissimifolia* by involucre length and involucre bract shape, as discussed above. Haines (2011) also noted that *S. aestivalis* "…tends to flower 20–35 days earlier than *Solidago rugosa* when the two grow sympatrically," which verifies observations made by Graves (1904) and Bicknell (1915). To the above observations I can add the following: the height of *S. aestivalis* plants—mostly 1.5–2 m—is greater than any variant of *S. rugosa* (mostly 1 m or less) and thus matches heights of *S. latissimifolia*. Finally, the permanently saturated habitat of *S. aestivalis* is much wetter than habitats occupied by *S. rugosa*, except for some populations of *S. rugosa* var. *celtidifolia* which can tolerate ± saturated soils of ecotones of streamhead pocosins in the Sandhills of NC–SC–GA.

### KEY TO *SOLIDAGO AESTIVALIS* AND *S. RUGOSA*

1. Leaf blades harshly to moderately scabrid adaxially, moderately to densely pubescent with crinkly hairs abaxially, surfaces coarsely rugose ______ **S. rugosa** vars. **aspera** and **celtidifolia**
1. Leaf blades moderately to mildly scabrid or smooth adaxially, moderately to densely pubescent or glabrate with crinkly hairs abaxially, surfaces moderately rugose or smooth.
   2. Stem pubescent with crinkly hairs throughout (occasional plants varying to glabrate below), stem without striate ridges decurrent from leaf bases; leaf blades sharply serrate (teeth coarse), blades villous to crinkly hairy beneath; [of dry to moist fields, meadows, and other open habitats]; late blooming (ca. 1 month later than *S. aestivalis* in same area) ______ **S. rugosa** vars. **rugosa** and **villosa**
   2. Stem glabrous throughout (except for scattered hairs in inflorescence), stem with striate ridges decurrent from leaf bases; leaf blades appressed serrate (teeth short), blades glabrous beneath except for sparse, short, appressed, straight hairs; [of permanently saturated, ± forested wetlands with sphagnum moss, such as red maple-Atlantic white cedar swamps, streamhead pocosins, montane bogs]; early blooming (1 month earlier than *S. rugosa* in same area) ______ **S. aestivalis**

For those who are concerned about the idea of separating species based primarily on vegetative characters, as I have done in the above key, I offer the following.

Fernald (1936) was puzzled by var. *sphagnophila*. On p. 219, he stated "Another series which is quite baffling is the group of glabrous plants which was set off as var. *sphagnophila* by Graves in 1904 and, eleven years later, as *S. aestivalis* Bicknell." On p. 221, he stated that "There is much to say for recognizing *Solidago aestivalis* as a species, but I am so constituted that I cannot accept as true species in *Solidago* plants without definite morphological differences. I have vainly sought for stable characters of corollas, achenes, pappus, and anthers, such as clearly separate these plants from *S. elliottii* …" Clearly, Fernald was conflicted by *S. aestivalis*.

**A)** A complete review of the *S. rugosa* complex, with analyses of involucre size, phyllary size and shape, corolla size and number, and achene characteristics, would be a years-long endeavor and to date no one has attempted it. And despite Fernald's stated desire for "stable characters of corollas, achenes, pappus, and anthers," his key (1950) used vegetative characters as primary discriminators.

**B)** I believe that in addition to the vegetative characters in my key, the inclusion of habitat data and phenology is equally important. After all, they are expressions of the biology and ecology of *S. aestivalis*, and <u>when well known</u> for a species can provide unique character states that separate a species from its congeners.

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**C)** Modern species concepts are not dependent on features of flowers and fruits but rather on the totality of evidence (Weakley et al. 2017). Here, the correlation of morphologic features, phenologic separation, and different habitats warrants recognition of two entities at specific rank.

NC and SC specimens of *Solidago aestivalis* examined: **NORTH CAROLINA. Harnett Co.:** roadside, state road 87, 0.1 mi N of junction, 3.9 mi SE of Spout Springs, 4 Oct 1956, *Laing 536* (NCU) [originally det. *S. elliottii*, annot. Uttal & Sorrie]. **Henderson Co.:** Franklin Bog, N side of Blythe Mill Creek, 9 Sep 2011, *Schwartzman s.n.* (NCU, 2 sheets) [originally det. *S. rugosa var. sphagnophila*, annot. Sorrie]. **Hoke Co.:** low woods, 6 mi W of Timberland, 10 Oct 1957, *Ahles 36421* (NCU, 3 sheets) [originally det. *S. elliottii*, annot. Uttal & Sorrie]; Buffalo Creek, slough at county road 1214, 24 Sep 1984, *Uttal 13461* (VPI) [cited by Uttal & Porter (1988)]; Fort Bragg, S of Little River, W of Horse Creek, and N of Manchester Rd., shrub-tree pocosin burned in spring of 1993, 22 Sep 1993, *Sorrie 7710* (NCU, 2 sheets) [originally det. *S. latissimifolia*, annot. Sorrie]. **SOUTH CAROLINA. Horry Co.:** edge of swale on junction of US 17 and N 70th Street, North Myrtle Beach, 19 Oct 1957, *Duke 0022* (NCU) [cited by Uttal & Porter; annot. Sorrie].

This interesting distribution—Sandhills seepages and montane bogs—is one which matches other Coastal Plain taxa that have disjunct populations in montane seepage bogs (Sorrie & Weakley 2001).

## BROMELIACEAE

### TILLANDSIA: *Tillandsia floridana* should be treated as a species, not a hybrid

Primary authors: Alan R. Franck and Alan S. Weakley

*Tillandsia* L. is represented by 13 native species in the southeastern USA. In this region, they are epiphytic but occasionally may fall to the ground and continue growing. Many species can be difficult to identify, especially a group of species characterized by their non-bulbous habit, long peduncles, and inflorescence branches with many densely congested flowers. This group includes *T. bartramii* Elliott, *T. fasciculata* Sw., *T. floridana* (L.B. Sm.) H. Luther, *T. setacea* Sw , and *T. simulata* Small (Table 1).

Endemic to central Florida, *T. floridana* was described first as a variety of *T. fasciculata* (Smith 1967; reflected in treatment of Wunderlin 1982) and later as a hybrid of *T. bartramii* and *T. fasciculata* (Luther 1985; reflected in treatment of Wunderlin 1998). Luther (1985) mentioned that two others also considered *T. floridana* a possible hybrid: Mulford B. Foster, the collector of the holotype of *T. floridana*, and Cecelia S. Gardner, whose dissertation focused on *Tillandsia* subg. *Tillandsia*. Since Luther (1985), *T. floridana* has continually been treated as a hybrid with the notation *T. ×floridana*.

Based on plastid DNA sequences, *T. floridana* was most closely related to samples of *T. fasciculata* from Florida, Cuba, and the Bahamas, although clade support was low (Sidoti 2015: 56–57, 67, and 69). Analysis of nuclear ETS sequences yielded a well-supported clade of *T. juncea* (Ruiz & Pav.) Poir., *T. balbisiana* Schult.f., and *T. floridana*, which itself was in a larger clade including *T. palmasolana* Matuda (Sidoti 2015:58–59, 63–64, 77), while nuclear PRK sequences did not support this relationship (Sidoti 2015:68, 78). Microsatellite analyses found *T. floridana* to be nearer to *T. bartramii* than *T. fasciculata* (Sidoti 2015:134–135). Although *T. bartramii* was speculated to be a parent, *T. floridana* seems closer in size to *T. simulata*, which was not sampled by Sidoti (2015). Generally, *T. floridana* is smaller than *T. fasciculata* but larger than *T. bartramii* and *T. simulata* (Table 1). Although the analyses by Sidoti (2015) are suggestive of a hybrid origin for *T. floridana*, additional work is needed to clarify its evolutionary relationships (Luther & Benzing 2009:108).

*Tillandsia floridana* appears to be relatively frequent and fecund, it occurs in places where *T. fasciculata* is not known, and intermediates with other species are not apparent. As evidence of its frequency and fecundity, *T. floridana* is represented by 29 wild-collected specimens at USF. In comparison, *T. simulata*, another central Florida endemic, has 47 wild-collected specimens at USF. Furthermore, *T. floridana* is known from Citrus (*Ward 8837*, FLAS), Flagler (*Ward 1851*, FLAS), Hernando (*Genelle & Fleming 1850*, USF), Lake (*M. Minno s.n.*, USF), and Pasco (*Genelle & Fleming 2115*, USF) counties, whereas *T. fasciculata*, its alleged parent, has not yet been vouchered in those five counties. Additionally, in our opinion, specimens of *Tillandsia* from central Florida are readily identifiable to a particular species and intermediacy, or evidence of active hybridization, is not apparent.

The evidence supports treating *T. floridana* as a species whose continual occurrence does not rely on the presence of purported parent taxa such as *T. fasciculata*. Historically, *T. fasciculata* may have hybridized with

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Table 1. Comparison of selected Florida *Tillandsia* species. All measurements taken from flowering or fruiting shoots. Shoot base is approximated by measuring the width of the shoot including the appressed leaf bases. Leaf base width is measured from the basal, widest leaves. Peduncle width is approximated by measuring near mid-peduncle and includes the appressed bract bases. Measurements were made from USF specimens except for the number of inflorescence branches (Luther & Brown 2000).

| | **Shoot base width** | **Leaf base width** | **Peduncle width** | **Infl. branches** | **Floral bracts (pubescence, length, and keel-to-edge width)** |
|---|---|---|---|---|---|
| *T. bartramii* | ≤ 2 cm | ≤ 1 cm | 2–4 mm | 1–5 | lepidote, 14–17 × 3–5 |
| *T. fasciculata* | ≥ 3 cm | ≥ 2.5 cm | 4–14 mm | 3–15 | glabrate, 20–30 × 8–10 mm |
| *T. floridana* | ≥ 2.5 cm | ≥ 1.5 cm | 4–10 mm | 2–10 | lepidote, 18–21 × 4–5 mm |
| *T. setacea* | ≤ 1 cm | ≤ 0.7 cm | 1–2 mm | 1–5 | lepidote, 9–14 × 2–4 |
| *T. simulata* | ≤ 2.5 cm | 1–2 cm | 2–4 mm | 1–5 | lepidote, 14–16 × 4–5 mm |

another species to establish *T. floridana*, but historic hybridization has played a role in innumerable plant taxa that are recognized as species (Mallet 2007). The Melbourne Code (McNeill et al. 2012:Art. H1) states that "Hybridity is indicated by use of the multiplication sign × or by addition of the prefix "notho-" to the term denoting the rank of the taxon." Application of the "hybrid ×" in botanical nomenclature is optional, though, and given the frequency of hybridization in plants, it could be easily overused. A taxon is usually regarded as a nothotaxon when its hybrid nature is clearly demonstrated and its parents are known, especially when it is a first-generation (F1) hybrid or is reproductively impaired (sterile or with reduced reproductive ability). *Tillandsia floridana*, by contrast, seems to be acting as an independent species, and even if it were clearly demonstrated to be a species of hybrid origin, omission of the hybrid symbol would be warranted because of its behavior in the landscape as an independent species. Hybridization is so prevalent as a generator of species in plants that we would have a difficult time determining when to use the hybrid symbol if we applied it liberally to any taxon with a hybrid origin.

One problem with treating *T. floridana* as a hybrid is that hybrids have a denigrated connotation compared to species (Allendorf et al. 2001; Piett et al. 2015). Hybrids are often omitted from floras and identification keys as trivial components of the flora (occasional F1 hybrids of little or no importance or evolutionary significance, unlikely to be encountered frequently, and if encountered easy to identify by their co-occurrence with and intermediacy between their parents). Hybrids are also devalued in conservation policy as "not species" and "not independent evolutionary entities." The main conservation ranking for species used in the United States is that of NatureServe (2017). Because hybrids are not treated as conservation targets, *Tillandsia ×floridana* is accorded a global conservation rank of GNA: "Global Rank Not Applicable." It is ranked "National Not Ranked" for the United States and "State Not Ranked" for Florida (NatureServe 2017). If the hybrid symbol were removed from its name, it would be given conservation ranks at the applicable hierarchical geographic units. The other conservation ranking system widely used worldwide for conservation ranking of species is the IUCN Red List system (IUCN 2017). It likewise explicitly excludes hybrids from consideration: "Taxa Not Included on the IUCN Red List: Hybrids (except for apomictic plant hybrids which are treated as 'species')." Therefore, it is important to consider whether to treat stable species of hybrid origin as species (see Art. 50), and not as hybrids, lest they be treated as "non-species" by conservation organizations and government agencies.

Although some active hybridization processes may be a threat to conservation (e.g., *Lantana depressa* Small, see Maschinski et al. 2010), this is not the case for *T. floridana*. It is difficult to define precisely what circumstances call for a plant to be treated as a hybrid nomenclaturally (i.e , denoted with the multiplication symbol, ×) (Rickett & Camp 1948), but for such a fecund, independent lineage as *T. floridana*, denoting it as a hybrid is inconsistent with taxonomic concepts and is potentially harmful to its valuation. A similar case may be made for *Potamogeton floridanus* Small, which was found to be a hybrid (Kaplan et al. 2018) but is probably best treated as a species for taxonomic and conservation purposes, especially since it was speculated to originate from a prehistoric hybridization event involving a now disjunct parent species (Kaplan et al. 2018).

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Thus, we conclude that *T. floridana* behaves as an independent, reproductively successful species that should be included in floras, keys, and checklists, and should be given conservation ranks appropriate to its status as a species; the appropriate nomenclatural treatment of this taxon is as a species, omitting the multiplication sign: *Tillandsia floridana* (L.B. Smith) H. Luther (pro hybr.).

## CYPERACEAE

### **CAREX:** Wading a nomenclatural quagmire—lectotypifications and resurrection of a long-neglected variety of *Carex bullata*

Primary authors: Derick B. Poindexter and Alan S. Weakley

*Carex bullata* Schukhr ex Willd. is a sparsely distributed sedge endemic to eastern North America. Within sect. *Vesicariae*, it is distinguished from other members by pistillate and staminate scales that lack scabrous awned tips, in conjunction with its long, scabrous-beaked perigynia. Like many members of the section, it is found in wetlands and is an anemophilous taxon that is often sterile. The staminate spikes of this species are usually elevated high above the pistillate spikes, which on occasion may be androgynous. Two apparent morphotypes are associated with *Carex bullata* (Fig. 1). One of these has small perigynia with elongate beaks, narrow pistillate inflorescences that are usually only 2–3 perigynia across, and spikes that are usually elongate in mature individuals, imparting a high length-to-width ratio of both the spikes and pergynia. This "cylindrical morphotype" is mostly found in the southern Appalachian Mountains of Georgia, North Carolina, and Virginia, with sparingly distributed northern occurrences (to Massachusetts and Pennsylvania), and an apparent disjunct population in Arkansas (Fig. 2). The second morphotype is more robust, with subglobose to thick cylindric pistillate spikes. This "globose morphotype" has larger perigynia with shorter beaks on average, pistillate inflorescences that are usually 3–4 perigynia across, and shorter spikes that impart a lower length-to-width ratio of both the spikes and perigynia. This entity is more widely distributed from Nova Scotia south to Georgia along the Atlantic Coastal Plain and adjacent Piedmont, with sporadic occurrences along the Gulf Coast, the Eastern Highland Rim of Tennessee, and presumably also disjunct in the Ouachita Mountains of Arkansas. All collections from across the distribution of the species are from wetlands, particularly bogs and their ecotonal margins.

In addition to these two morphotypes, *Carex bullata* has been implicated as one of the parents of the putative hybrid *Carex olneyi* Boott (see Fernald 1901, 1906), with *Carex utriculata* Boott as the other alleged parent. *Carex olneyi* is most similar to the latter parent except for its slightly scabrous perigynium beaks, which affiliate it with *C. bullata*. This latter character is very diagnostic for *C. bullata*, though other closely related taxa with allegedly smooth beaks such as *Carex elliottii* Schein. & Torr. can rarely be slightly scabrous because of the presence of a few scabrous hairs (pers. obs.).

*Carex bullata* was originally described and illustrated by Schkuhr (1806), but Willdenow (1805) validly published the name, attributing it to Schkuhr, before the latter's work was printed. On p. 85, Schkuhr mentioned that the plant was collected from wet places in Pennsylvania, and his illustration (tab. UUU, f. 166) depicts a taxon with somewhat narrow pistillate inflorescences. As it was not the convention to designate a holotype at the time that Willdenow published the name, Smith (1962) lectotypified the name with specimen no. 684 of the Muhlenberg Herbarium (Fig. 3), which corresponds to "no. 39 of material sent to Schkuhr from which the description and plate were drawn." This type specimen most closely resembles the "cylindrical morphotype."

Schweinitz (1824) published a key to carices of North America that lacked any formal, truly diagnostic descriptions, although a more thorough conspectus was completed with the aid of John Torrey (Schweinitz & Torrey 1825). A sedge referred to as *Carex cylindrica* Schwein. was originally listed in the earlier publication as occurring in "Carolina"; it differed from *C. bullata* based largely upon its longer staminate peduncle. *Carex bullata* was treated within this preliminary key as occurring in Pennsylvania and Massachusetts. In the later publication, *Carex cylindrica* is omitted without explanation. In addition, Stuckey (1979) documented the absence of a type specimen for *C. cylindrica* in Schweinitz's herbarium. However, examination of digital

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**Fig. 1.** Comparison of pistillate spike morphologies of **A)** *Carex bullata* var. *bullata* (lectotype; *Muhlenberg 684*, PH) and **B)** *Carex greenei* (=*C. bullata* var. *greenei*; lectotype; *Greene s.n.*, P). Scale bar = 1 cm.

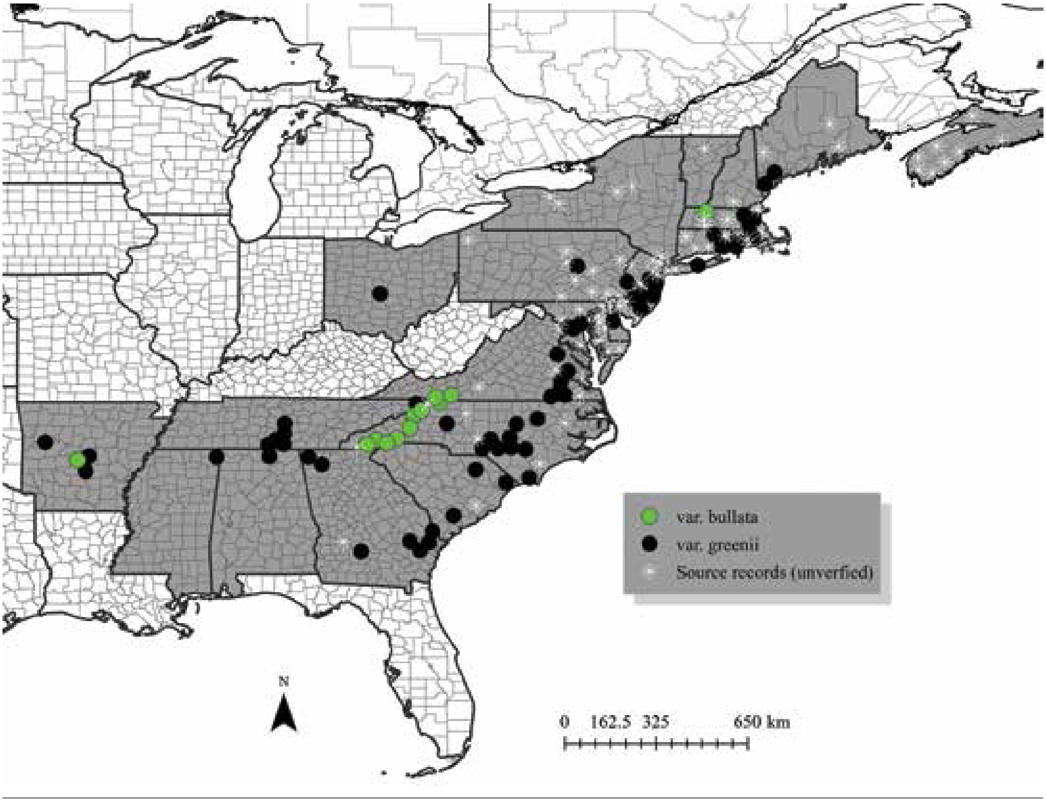

**Fig. 2.** Approximate distribution of *Carex bullata* in North America.

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CHICAGO NATURAL HISTORY MUSEUM
Isotype Collection
Carex bullata Schkuhr
# 39 of Schkuhr list.
det 19

Carex bullata Schkuhr
Academy of Natural Sciences of Philadelphia
TYPE OR AUTHENTIC MATERIAL
Current Status: ____ Holotype; ✓ Isotype;
____ Syntype or isosyntype; ____ Lectotype (as designated by/(ref.) Chicago Nat Hist Mus
Authentic material but status uncertain:
Authentic material but definitely NOT a type:
Annotated by: E.C. Bray
Date: 4/20/85

379 Schutz
The Academy of Natural Sciences of Philadelphia
Muhlenberg Herbarium
DEPOSITED BY
American Philosophical Society
No.
Coll.

Fig. 3. Lectotype of *Carex bullata* (*Muhlenberg 684*, PH).

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specimens in the Muséum National d'Histoire Naturelle (MNHN) - Paris Herbarium (P) indicated the presence of a specimen (Fig. 4) of this taxon collected by Schweinitz from "N. Carolina" in 1823 (*Schweinitz s.n.*, P!, digital image #P00303634). In a confounding twist, Dewey (1826) treated *Carex cylindrica* Schweinitz as a variety of *Carex bullata* and named it var. *cylindracea* Dewey. He stated that var. *cylindracea* was found in South Carolina according to Schweinitz and that var. *bullata* occurred in New England. It is uncertain why Dewey would have considered South Carolina for this taxon, unless he was confused by Schweinitz's authority abbreviation of "L.S." followed by the locality in the original key—in this case *Carex cylindrica* L.S. Carolina. Schweinitz did not cite a specimen in his key, but the collection at P can be considered original material that can serve as the lectotype of *Carex cylindrica*.

**Carex cylindrica** Schwein , Ann. Lyceum Nat. Hist. New York 1:71. 1824. Type: U.S.A. North Carolina: 1823, *Schweinitz s.n.* (lectotype, **designated here:** P!, digital image #P00303634).

In concert with our own observations, Tuckerman (1843) attested to the presence of two "species" (here morphotypes) that were causing much confusion. Oddly, Dewey (1860) later described *Carex physema* Dewey from an illustration of *C. bullata* by Boott (1858–1897). This illustration and text clearly refer to the "globose morphotype."

The only other validly applied name that is referable to *Carex bullata* is *Carex greenei* Boeck. This species was described by Johann Otto Boeckeler (1858), a German apothecary, botanist, and caricologist, from "America sept. Dr. Green leg." Both the collector information and location are obscure, but they likely refer to collections made in North America (in Massachusetts) by Dr. Benjamin Daniel Greene—misspelled by Boeckeler. No explicit type material was cited by Boeckeler. One undated and unnumbered collection (GH!, digital image #GH00218746) by Greene in the Gray Herbarium at Harvard is possible original material, but it has additional information associated with it (i.e., "near Boston") that would have likely been included by Boeckeler had this information been available. In contrast, Boeckeler, would have had ready access to specimens collected by Dr. Greene, but housed in European herbaria. Thus, a more likely candidate for the specimen examined by Boeckeler in his description of *Carex greenii* is a presumed type collected by Greene in 1825 (Fig. 5) at the Muséum National d'Histoire Naturelle (MNHN) - Paris Herbarium (P). Regardless, both specimens match the "globose morphotype." These are the only two collections known to the authors that may serve as "original material." Due to the higher likelihood of access to Boeckeler, we selected the "type" collection at P as lectotype of *Carex greenei*.

**Carex greenei** Boeckeler (as "*greenii*"), Flora 41:649. 1858. Type: U.S.A.: no locality (presumably Massachusetts), 1825, *Greene s.n.* (lectotype, **designated here:** P!, digital image #P00303638).

Fernald (1901) treated *Carex olneyi* as a variety of *C. bullata*, *C. bullata* var. *olneyi* Fernald, but he dismissed this in a following publication (Fernald 1906) by assuming that *C. olneyi* was what Schkuhr had in hand when preparing the type illustration for *C. bullata*; he also treated *C. greenei* as a variety, *C. bullata* var. *greenei* Fernald. Although his assumptions regarding *C. olneyi* as typical *C. bullata* were incorrect, the publication of var. *greenei* is still valid. Interestingly, Fernald (1950) excluded any varieties of *C. bullata* and treated *C. olneyi* as a hybrid of the aforementioned putative parents.

From Small (1933) to more recent treatments (e.g., Reznicek & Ford 2002; Weakley et al. 2012; Weakley 2015), *Carex bullata* has been treated as a single species with no recognized variants. In light of our own observations that indicate the potential for two recognizable entities, further study seems necessary.

We examined select specimens from ANHC, CLEMS, GA, BOON, MO, MOAR, NCU, NCSC, UT, and VPI to ascertain geographic patterns in the *C. bullata* morphotypes. A digital image of the Logan County, Arkansas, specimen was examined from WIS (*Moore 480070*), as was a live specimen image by D. Goldman from Rabun County, Georgia (USDA, NRCS 2017). Type specimens of *Carex bullata* (*Muhlenberg 684,* PH, digital image #PH00036401) and *C. greenei* (*Greene s.n.*, P, digital image #P00303638) were also critically examined. Previous distribution maps captured most of the range of the species (Reznicek & Ford 2002; Kartesz 2017; USDA, NRCS 2017). We add a state record for Ohio (possibly extirpated) that is based on a collection at MO (*Tuckerman s.n.*, Jun 1837). This collection was mixed and contained both *Carex bullata* and C. *tuckermanii*.

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**Fig. 4. Lectotype of *Carex cylindrica* (*Schweinitz s.n.*, P).**

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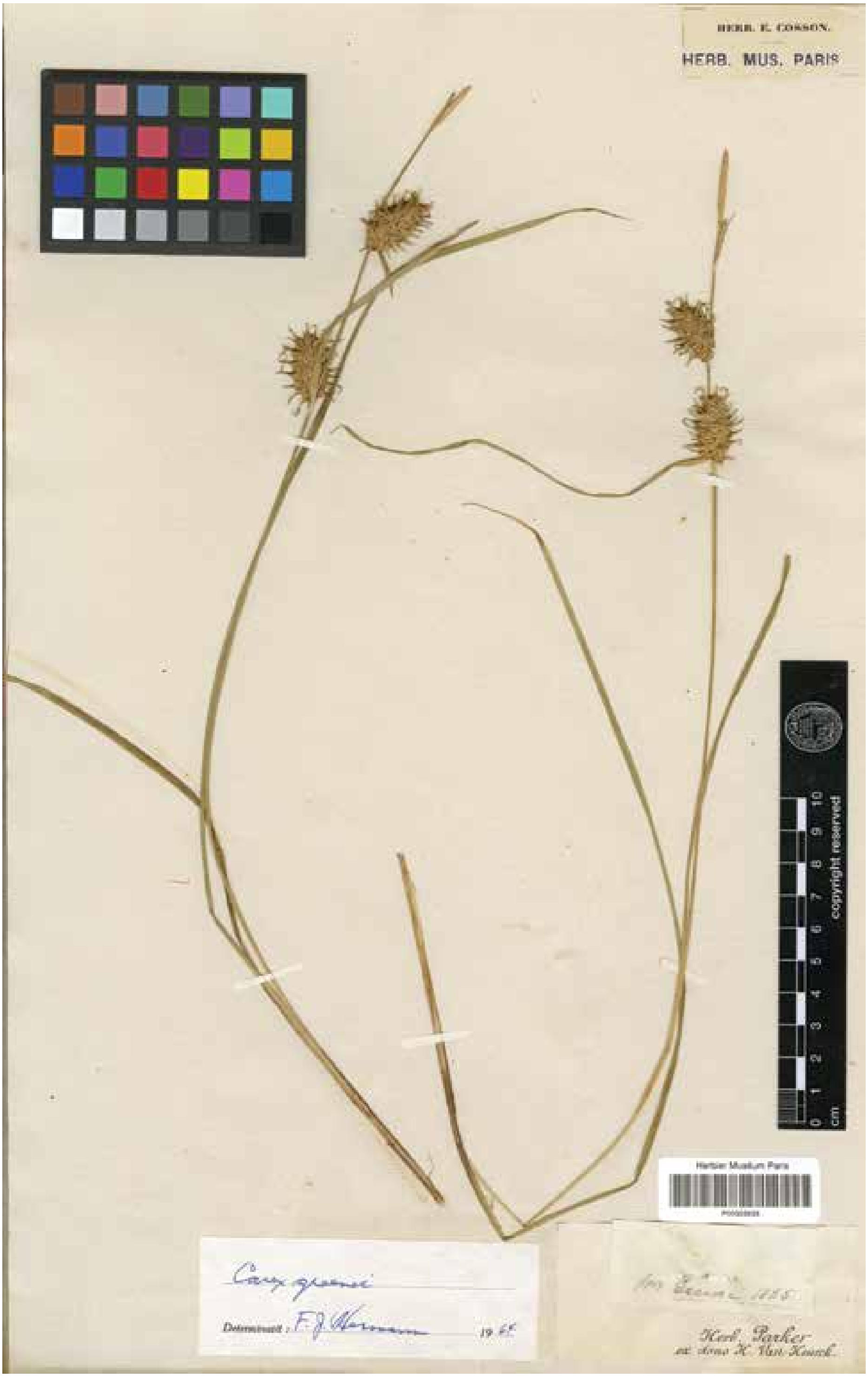

**Fig. 5. Lectotype of *Carex greenei* (*Greene s.n.*, P).**

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Our examination of *Carex bullata* specimens indicates that at least two taxa exist within the present concept of this species. Owing to the morphological overlap in the two taxa (and relative plasticity of members in sect. *Vesicariae*), we currently treat these two entities conservatively as partially sympatric, intergrading varieties. At their respective extremes, these two taxa appear very different, so why have they been dismissed by current treatments? We suspect that the answer lies in the rather restricted distribution of the narrow morphotype. With only rare, local populations encountered in the northeast, it seems logical that most botanists would dismiss this "form" as representing depauperate individuals or a mere ecotype. However, it is primarily centered in the southern Appalachians, where there is a notable absence of the globose morphotype, and these collections, which are very local in distribution, were likely unknown to previous workers. Fernald (1906) was the last taxonomist to recognize *Carex bullata* var. *greenei*, only to dismiss it later. However, given the distinctiveness of the two morphotypes, we feel that it is appropriate to treat them as distinct varieties while additional study is done to better assess the best taxonomic treatment.

## FABACEAE

### **BAPTISIA:** Three southern blue baptisia species

Primary author: Alan S. Weakley

Blue-flowered *Baptisia* have been taxonomically controversial for most of the last several centuries. As beautifully summarized by Larisey (1940):

> *Baptisia australis-B. minor* complex: *B. australis* has for many years been the classical "dumping ground" for material collected in the Middle West. There can be little doubt as to the true nature of *B. australis* because for no other species is there such a wealth of literature, copiously illustrated. As originally described, it is a beautiful blue-flowered, large leaved, simple- and erect-branched species of the eastern states and responds very well to cultivation. Early in the nineteenth century it was introduced into European gardens, especially in England and France. This fact, incidentally, paved the way for a number of problems in synonymy as it was given a number of new names abroad. A comparison of illustrations and descriptions, however, leaves no question as to their identity.

Throughout the Middle West a blue-flowered, smaller-leaved, dichotomously and divaricately branched plant was found in great abundance and was accepted as *B. australis*. For many years this smaller type has been taken for *B. australis*, and at least four-fifths of the material examined in the course of this investigation proved to be the plant of questionable status. A comparison with authentic *B. australis* makes it very clear that the more western type is specifically distinct. Discovery of the type specimen of *B. minor* Lehm. in the Gray Herbarium indicates that this fact was recognized as early as 1827. However, Lehmann's name has been universally regarded as a synonym of *B. australis*. In 1861, it was again described as *B. texana* by Buckley; but this name was not even generally honored as a synonym of *B. australis*. Not until 1932, when Small, in Rydberg's "Flora of the Prairies and Plains of Central North America," described a new species, *B. vespertina*, from Missouri, Kansas and Texas, was any widespread cognizance of its existence manifested. But Small's name, which has been recognized in the last few years, must go into synonymy along with *B. texana* Buckl. The true *B. australis* extends from Pennsylvania to southern Indiana, south to Virginia and Tennessee.

Later in the same work, Larisey (1940) added a third taxon, naming it *B. minor* var. *aberrans* Larisey, and giving the following diagnosis: "As the species except: branches usually subdichotomous ascending rather than dichotomous-spreading-drooping; leaflets obovate-oblanceolate; racemes occasionally intercalary, flowers frequently somewhat smaller; occurs out of natural range. Distribution: dry open ground or hills, central North Carolina southwest to northwestern Georgia and adjacent Tennessee."

Following Larisey's work, treatment of the blue-flowered *Baptisia* from mafic glades, barrens, and former prairies and oak savannas east of the Mississippi River has proved problematic for taxonomists, perhaps because the characters she provided were not very satisfying and were difficult to apply. Radford et al. (1968) apparently (though tacitly) included *B. minor* var. *aberrans* within a broadly conceived *B. australis*. Isely (1981,

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1990) and Turner (2006) treated blue-flowered *Baptisia* as *B. australis* var. *australis* and var. *minor*, regarding var. *minor* as reaching its eastern limit in MO (the two varieties thus allopatric); Isely (1990) stated that "sporadic collections within the range of var. *australis* have the pods and some of the vegetative characters of var. *minor* … most of these collections are from dry or sterile habitats, e.g., cedar glades, that var. *australis* typically does not inhabit." His treatment of "*australis*" and "*minor*" at the varietal level seems largely based on the existence of *minor*-like plants (Larisey's "*aberrans*") within his concept of the range of *australis*. Yet, plants from glade-like sites are morphologically more similar to midwestern prairie *B. minor*, occur in similar habitats, and grow with a large number of other plants with midwestern phytogeographic affinities, such as *Eryngium yuccifolium* var. *yuccifolium*, *Echinacea laevigata* (an eastern sibling of *E. purpurea*), *Solidago ptarmicoides*, *Solidago rigida* subsp. *glabrata* (an eastern sibling of *S. rigida* subsp. *rigida*), *Silphium terebinthinaceum*, and others. Based on habitat, the affinities of these plants would seem to be more with *B. minor* (but see below). Southeastern *B. minor* var. *aberrans* does differ from midwestern *B. minor* var. *minor*, as noted by Larisey (1940), Isely (1981, 1990), and Mendenhall (1994b). *Baptisia minor* var. *aberrans* holds it leaflets in a vertical plane, has smaller flowers, smaller and less persistent stipules, branches that are less ascending, longer and broader leaflets that are more narrowly shaped (L:W ratio), and smaller legumes on shorter stipes with fewer ovules (Mendenhall 1994b; Larisey 1940). Given the variation in blue-flowered *Baptisia*, three taxonomic entities seem warranted.

The question of appropriate rank remains. We agree with Larisey (1940) that "a comparison [of *B. minor*] with authentic *B. australis* makes it very clear that the more western type is specifically distinct." Mendenhall (1994a, 1994b) found that the "*aberrans*" entity warranted taxonomic recognition; she chose to treat the three entities as varieties under *B. australis*. Yet, in her dissertation she wrote that "the nuclear DNA sequence, morphological, and combined data sets indicate that *B. australis* and *B. minor* var. *minor* are sister taxa and that *B. minor* var. *aberrans* was the first of the trio to diverge independently." If western "*minor*" is evidently specifically distinct from east-central "*australis*," yet southern "*aberrans*" is sister to this pair, what are we to do? Morphologically, Mendenhall (1994b) found that "*aberrans*" was intermediate in many traits between "*australis*" and "*minor,*" lending some plausibility to Isely's (1981, 1990, 1998) inclination to merge "*aberrans*" with "*australis*" based in part on their distribution east of the Mississippi River. Yet, "*aberrans*" is also an outlier in some features: it has the smallest flowers (in all measurements), the most widely divergent branching pattern, and is the only one of the three to regularly array all of the leaflets of a plant in a vertical plane as opposed to having them loosely and more horizontally disposed.

The "*aberrans*" entity has been lumped into either "*minor*" or "*australis*," it has been treated as a variety of both "*minor*" and "*australis*," and it has been judged to be "the first of the trio to diverge independently." Applying a modern species concept (are these independent lineages that are on separate evolutionary tracks?) to the three entities and considering the full available evidence (biogeographic, ecological, morphologic, and molecular), we conclude that they are best treated as three species. The choice of species rank also removes the temptation of arguing about which of the three is the most different and trying to reflect that with a taxonomic scheme of two species, one with two varieties. Larisey (1940) regarded "*australis*" as a separate species from "*minor*" and its variety "*aberrans*." Radford et al. (1968), Isely (1981, 1986, 1990, 1998), Turner (2006), Woods and Diamond (2014), and Tennessee Flora Committee (2015) regarded "*minor*" as a separate species from "*australis*" (with a synonymized "*aberrans*"). Mendenhall (1994b) suggested that "*aberrans*" was a separate taxon, the "first of the trio to diverge," though she selected a neutral taxonomic option with all three at varietal rank under the species name with priority, *B. australis*. A "flatter" taxonomy of three taxa at species rank has the additional advantage of being more stable (see Weakley et al. 2017).

Additional work is needed on this complex and indeed on the genus as a whole; modern molecular techniques are especially badly needed in *Baptisia*. "*Aberrans*" itself may not be homogeneous, with geographically widely separated and disjunct populations in old and relictual open grassland/glade habitats in central North Carolina (on mafic intrusive and metamorphic rocks); on limestone and dolomite in the Ridge and Valley of Tennessee, Georgia and Alabama; and on calcareous rocks in the Interior Low Plateau of Kentucky and Tennessee. But in the spirit of incrementalism, "*aberrans*" is here accorded its due.

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**Baptisia aberrans** (Larisey) Weakley, **comb. et stat. nov.** Basionym: *Baptisia minor* var. *aberrans* Larisey, Ann. Missouri Bot. Gard. 27:206. 1940. *Baptisia australis* (L.) R. Brown var. *aberrans* (Larisey) M.G. Mendenhall, Phytologia 76(5):383. 1994. Type: U.S.A. Georgia. Walker Co.: sandy roadside 8.5 mi S of Chickamauga, 24 Apr 1938, *Pyron & McVaugh 2690* (holotype: MO).

### INDIGOFERA: *Indigofera hendecaphylla* is misapplied and *I. spicata* is the proper name for plants in the southeastern USA

Primary author: Alan R. Franck

There is some confusion as to whether *Indigofera hendecaphylla* Jacq. and/or *I. spicata* Forssk. occur in the southeastern USA because both names have been applied in the region. They are usually regarded as two distinct species, although they have sometimes been considered synonymous (De Wet et al. 1989; Morton 1989; Isley 1998). *Indigofera hendecaphylla* was taken up by Long and Lakela (1971: 481, misspelled as *I. endecaphylla*) for Florida, but the name was later considered misapplied by Wunderlin (1998:360). Of *I. hendecaphylla*, Du Puy et al. (1993) stated it was introduced in the New World, citing a specimen each from Dominica and Brazil (*Lewis 991*, K, NY). Wilson and Rowe (2008) stated that "the description by Morton (1989) [from Florida] is certainly of this species [*I. hendecaphylla*]" and indicated it was naturalized in the southern United States, the West Indies, and South America.

The distinctions between *I. hendecaphylla* and *I. spicata* were clarified by Du Puy et al. (1993). One recognizable character is that *I. hendecaphylla* generally has more leaflets, (7)9–12, which is evident on its type specimen (at W [acc. no. 0007793]) and the associated Jacquin illustration (1786–1793: pl. 570). *Indigofera spicata* usually has fewer leaflets, 5–8(9), which is consistent with the scanty type specimen (at C [barcode C10002414]). The inflorescence of *I. hendecaphylla* is typically longer than 10 cm with crescent-shaped mature fruits longer than 2 cm, whereas in *I. spicata*, the inflorescence is less than 10 cm with relatively straight fruits ca. 2 cm or less (Du Puy et al. 1993; Wilson & Rowe 2008).

After examining the type specimens and using the identification keys provided (Du Puy et al. 1993; Wilson & Rowe 2008), the 70 specimens from Florida at USF were readily keyed out to *I. spicata* and clearly did not match *I. hendecaphylla*. These 70 USF specimens primarily have 5–7 leaflets, and nearly all have inflorescences less than 8 cm long (from the base of the peduncle to the inflorescence tip), with few exceptions (e.g., ca. 10.5 cm long in *Longbottom & Williams 23988*). Thus, the toxicity reported by Morton (1989) can definitely be associated with consumption of *I. spicata* in Florida. Examination of the digital images of *Lewis 991* (K, NY) shows it primarily has 5–7 leaflets, suggesting it would also fit *I. spicata*. It is unclear why this *Lewis 991* collection was instead identified as *I. hendecaphylla* by Du Puy et al. (1993), despite *I. hendecaphylla* being characterized as having "9–11 (rarely fewer)" leaflets (Du Puy et al. 1993).

*Indigofera spicata* is present and extensively naturalized in Florida, and additional reports in the southeastern USA are likely of this species. *Indigofera hendecaphylla* should be regarded as a misapplied name in the southeastern USA unless specimens matching its type and its description can be confirmed.

## LAMIACEAE

### SALVIA: Re-recognition of *Salvia chapmanii* A. Gray, a rare species of the Gulf Coastal Plain and lectotypification of the replaced synonym *Salvia urticifolia* var. *major* Chapm.

Primary authors: Brian R. Keener and Alvin R. Diamond, Jr.

A series of recent collections of a tall, fall-flowering *Salvia* from limestone outcroppings in the Coastal Plain of southern Alabama led us to initiate an investigation into the genus and the identity of odd collections. The specimens were similar to *S. urticifolia* L., a much shorter spring-flowering species common to several southeastern states from Virginia to Mississippi. *Salvia urticifolia* occurs primarily in uplands with some outlier stations in the lower Coastal Plain (Kartesz 2017) including Florida, where it is considered an endangered species at the state level (Florida Natural Areas Inventory 2018). We finally determined, however, that the populations in southern Alabama represented *S. chapmanii* A. Gray.

The taxon that became known as *Salvia chapmanii* was first published in 1860 as *Salvia urticifolia* var. *major* Chapman. Clearly, Chapman believed the new entity was a close relative of *S. urticifolia* because he

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placed it as a variety of that taxon. While he did not provide a key or parallel descriptions of the two varieties, Chapman distinguished the new variety in the description by stating "Leaves rigid, narrower, … with longer and broader-winged petioles; flowers smaller." He indicated that *S. urticifolia* was 1–2 ft. tall with terminal inflorescences whereas var. *major* was 4–6 ft. tall with axillary and terminal inflorescences. Chapman also provided some distributional data by indicating that *S. urticifolia* occurred in the "upper districts of Georgia, and northward," whereas the new variety was of "Middle Florida." In Chapman's time, the reference to "Middle Florida" was most likely the informal area designation for land bound by the Apalachicola River to the west and Suwannee River to the east ("Territorial Period," Florida Department of State 2018).

Gray (1878), perhaps more confident in the distinctness of Chapman's variety, raised *Salvia urticifolia* var. *major* to species rank under the replacement name *Salvia chapmanii* [as *Chapmani*] (the potential use of the epithet "*major*" being blocked by *S. major* Garsault, 1767). Gray cited two specimens, "Middle Florida, *Chapman*" and "Alabama, *Buckley*." Presumably, the Chapman specimen was used for the original description of the variety by Chapman.

Since the time of Gray's description, *Salvia chapmanii* has received varying treatments in regional floras, guides, and manuals. Chapman continued to recognize the entity as a variety in 1883 but later followed Gray and treated it as *S. chapmanii* (1897). Small (1903, 1913, 1933), Mohr (1901), and Clewell (1985) each treated it as a distinct species. However, it is likely Mohr did not personally encounter *S. chapmanii* in Alabama as he stated "not collected lately in the state" and only cited the specimens from Gray's original publication. Clewell also may not have encountered the species or specimens in Florida as he only wrote "Reportedly from the panhandle," instead of listing the habitat and flowering time as for other species in his treatment. In each of the three editions of the *Guide to the Vascular Plants of Florida* (Wunderlin 1998; Wunderlin & Hansen 2003, 2011), *S. chapmanii* was included in synonymy under *S. urticifolia*. In Lowe (1921), Duncan and Kartesz (1981), Jones and Coile (1988), and Kral et al. (2011), there is no mention of the name *S. chapmanii*. Clearly, Kral et al. should have included the taxon at least in synonymy following Mohr (1901). However, the authors of the works from Georgia and Mississippi may not have been aware of the existence of such a rare species in those states. In Weakley's various editions of *Flora of the Southern and Mid-Atlantic States* (2015 and earlier), he included *S. chapmanii* as a species stating "Uncertain taxonomic status, often included in *S. urticifolia*."

In visiting various populations and examining available specimens of *Salvia chapmanii* and *S. urticifolia*, we found clear distinguishing characters between the two. *Salvia chapmanii* is a much taller species, often exceeding 1.5 m, whereas *S. urticifolia* is less than 1 m. We have not observed any mature flowering stems of *S. chapmanii* to be less than 1 m. *Salvia chapmanii* consistently produces axillary inflorescences from the upper stem leaves along with a terminal inflorescence, whereas *S. urticifolia* usually only produces a terminal inflorescence. Oddly, the more robust *S. chapmanii* produces smaller flowers than *S. urticifolia*, but despite the smaller flowers, the fruits of *S. chapmanii* are slightly larger. The nutlets of *S. chapmanii* (usually 1, rarely 2 per flower) are densely resin dotted on the distal end; resin dots are absent on *S. urticifolia* nutlets. The two species are also completely isolated from each other by phenology. *Salvia chapmanii* flowers in Sep–Oct while *S. urticifolia* flowers in Apr–early May.

*Salvia chapmanii* appears to be restricted various Oligocene and Eocene limestone outcrops of the southeastern coastal plain in Alabama, Florida, Georgia, and Mississippi (Fig. 6). The two species occur near each other in south Alabama and Georgia, but to date, no co-occurring populations have been discovered. All specimens we examined from Florida that were previously identified as *S. urticifolia* turned out to be *S. chapmanii*.

### *SALVIA* KEY

1. Stems of reproductive plants 1.4–1.8 m tall, often branched in distal 1/3; lower stem leaves usually withered at the time of flowering; inflorescences axillary from distal leaves and terminal; calyx 3.5–4 mm long in flower; corolla 7–8.75 mm long; nutlets 2.5–2.9 mm long, densely resin dotted especially on distal end; flowering Sep–Oct. _______________ **Salvia chapmanii**
1. Stems of reproductive plants 0.5–0.8 m tall, unbranched or rarely branched; lower stem leaves usually present at the time of flowering; inflorescence single and terminal; calyx 4–5.2 mm long in flower; corolla 10–13 mm long; nutlets 2–2.2 mm long, not resin dotted; flowering Apr–May _______________ **Salvia urticifolia**

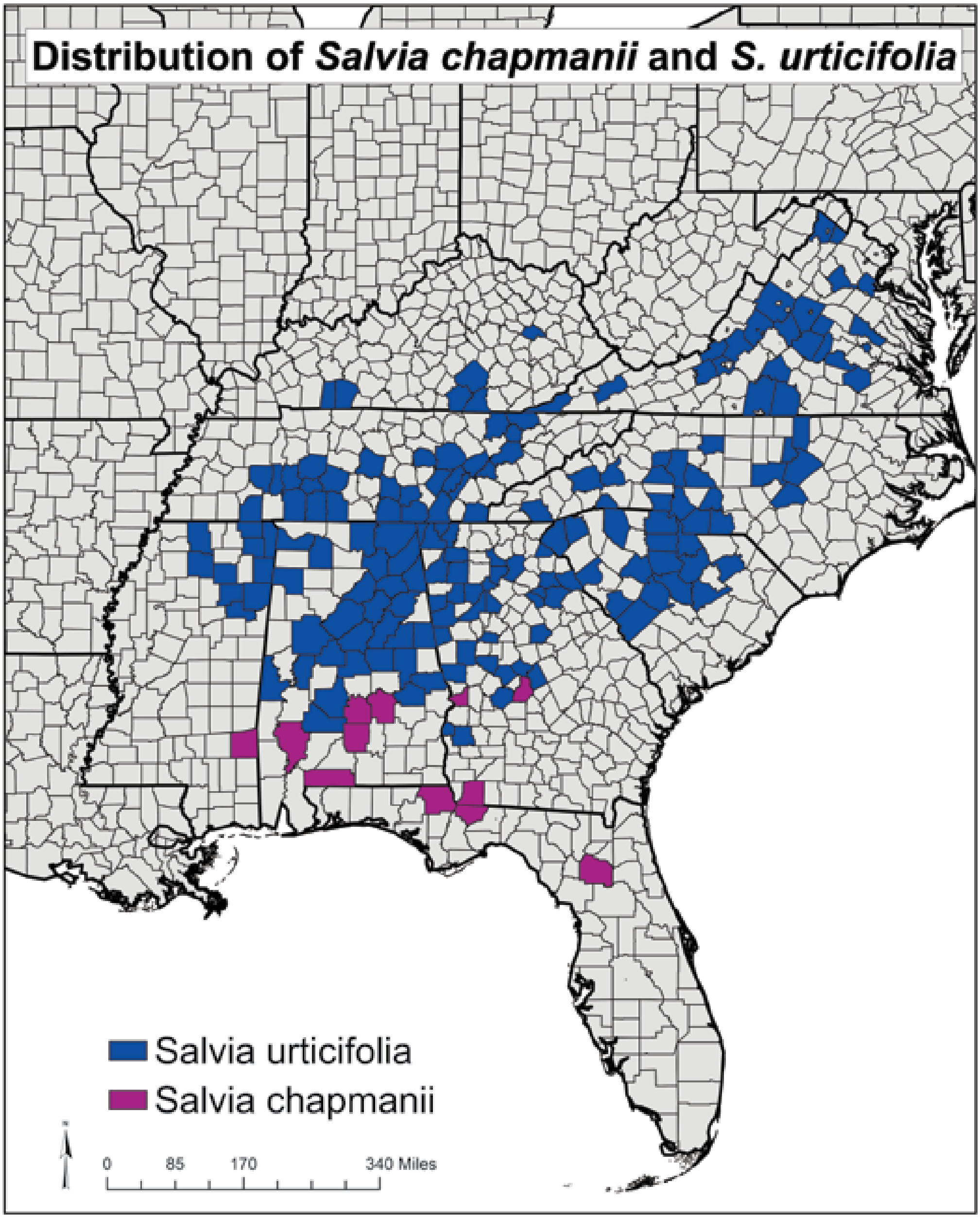

**Fig. 6. Distribution map of *Salvia chapmanii* and *S. urticifolia*. The basis of *S. chapmanii* records are cited in the text. The *S. urticifolia* records were obtained from numerous herbaria via SERNEC (SERNEC Data Portal 2018). Editable base map by Lee (2012).**

The various treatments of *Salvia chapmanii* by previous authors may be in part due to the rarity of collections coupled with the morphological similarity to *S. urticifolia* already discussed. This is especially so given that many other species of Salvia have strikingly different morphology, making delineation of species often quite simple. Incomplete collections may have also contributed to a poor understanding of *S. chapmanii*: when the

**Fig. 7. Lectotype of *Salvia chapmanii*, *Chapman s.n.* (US).**

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plant flowers in Aug–Sep, most of the midstem and lower leaves have withered or fallen. A collector may be inclined to only collect the part that still has healthy leaves and flowers, which is about half or a third of the total height. When only this portion of the plant is presented on a standard herbarium sheet, other than the axillary inflorescences, it seems extremely similar to *S. urticifolia*. Several of the specimens cited here are just as described, including the lectotype (Fig. 7). However, given the clear morphological distinctions along with isolation through phenology, we feel *S. chapmanii* should be recognized as a distinct species.

**Salvia chapmanii** A. Gray, Syn. Fl. N. Amer. 2(1):370. 1878. (**Fig. 7**). *Salvia urticifolia* L. var. *major* Chapm., Fl. South. U.S. 319. 1860. TYPE: U.S.A. FLORIDA: Quincy, 1836, *Chapman s.n.* (**LECTOTYPE, designated here:** US-00121429).

Chapman's original herbarium was eventually deposited at NY (Stafleu et al. 1988). Unfortunately, a search at NY failed to reveal any of Chapman's original material (bearing his name as collector) identified as *Salvia urticifolia* var. *major* or *S. chapmanii* (A. Weiss, pers comm.). However, an anonymous and undated specimen from Florida determined as "*Salvia chapmanii*" (Barcode #3095551) was discovered with a label that appears to be in Chapman's handwriting (A.R. Franck, per comm.). We did not select this specimen to serve as the lectotype mainly due to the absence of a date. An additional search at GH only produced the "Alabama, *Buckley*" specimen that was cited by Gray as previously mentioned (A. Brach, pers comm.). The US specimen cited above appears to be original material from the Chapman Herbarium even though it only bears the "*Salvia chapmanii*" determination instead of or in addition to the replaced synonym. Even so, the date of the specimen is well before the original publication describing *S. urticifolia* var. *major* and the location "Quincy, Florida" is within the area referred to as "Middle Florida" at that time. Thus, we are confident that the US specimen is original material suitable for designation as a lectotype.

Specimens examined: **ALABAMA. Butler Co.:** 16 Sep 2012, *A.R. Diamond 23372* with W. Webb (TROY); 9 Sep 2011, *B.R. Keener 6686 with W.K. Webb & A. Diamond* (UWAL); 27 Sep 2013, *A.R. Diamond 24582* (TROY, UWAL); 27 Oct 2011, *W. Webb s.n.* (TROY, UWAL); 9 Sep 2011, *A.R. Diamond 22510* with B.R. Keener and W. Webb (TROY). **Clarke Co.:** 24 Sep 2016, *B.R. Keener 9802* (UWAL). **Escambia Co.:** 25 Oct 2011, *C.J. Hansen 5369* (AUA). **Lowndes Co.:** 28 Oct 2011, *W. Webb s.n.* (TROY). **FLORIDA:** s.d., anonymous [probably *Chapman*, [Barcode #--3095551 (NY). **Alachua Co.:** 28 Sep 1939, *E. West 209* (FLAS x2); 24 Sep 1978, *W.J. Dunn 224* (FLAS). **Gadsden Co.:** 1836, *A. Chapman s.n.* (US); 1 Apr 1968 [early non-flowering collection], *L. Anderson 9197* (FSU), 12 Sep 1985, *A. Gholson 11489 with W. Baker* (FSU x2). **Jackson Co.:** 23 Sep 1975, *R. Kral 56702* (BRIT, NY, VSC); 30 Sep 2005, *L. Anderson 21366 with W. Baker* (FSU x2); 23 Sep 2014, *L. Anderson 28428* (FSU); 2 Oct 1946, *C.H. Beck 321* (FLAS); 12 Sep 1961, *R.S. Michell 1297* (FSU). **GEORGIA. Chattahoochee Co.:** 5 Sep 2004, *L. Lee 466* (USCH). **Decatur Co.:** 11 Sep 1981, *A. Gholson 9292* (VSC); 8 Sep 1982, *R.K. Godfrey 79969 with A. Gholson* (BRIT, TTRS); 23 Sep 1981, *A. Gholson 9345* (TTRS). **Houston Co.:** 10 Oct 2008, *P. Lynch 41 with W. Zomlefer, D.E. Giannasi, and T. Patrick* (GA, VSC). **MISSISSIPPI. Wayne Co.:** 8 Sep 2002, *S. Leonard 10898* (MMNS).

### **SCUTELLARIA:** A new skullcap variety, two new varietal combinations, and notes on anther locule characters of taxonomic utility

Primary authors: Derick B. Poindexter and Alan S. Weakley

Our understanding of species diversity in this taxonomically difficult genus is still in progress. Morphological intermediacy is prevalent and often obscures taxonomic relationships within the genus. Consequently, some authors have chosen different nomenclatural extremes to address this. For instance, Epling (1942) often treated taxa with mildly intergrading variation at the species level, while Pittman (1988) employed the rare use of infraspecific quadrinomials. Like so many other complicated issues in the flora of the southeastern United States, more detailed research is necessary to fully elucidate relationships within the genus. In the interim, we have identified some immediate needs in the group that will help us move forward towards better resolution.

During the preparation of the generic treatment of *Scutellaria* for the Flora of North America project by DBP, it became clear that several changes would be necessary to standardize ranks and recognize morphologically significant variation in the genus, specifically sect. *Annulatae*. These changes included two new combinations and one new variety. Keys, descriptions, and images are presented to aid identification of these taxa. In addition, notes on often-overlooked, yet salient characters for distinguishing members of sect. *Annulatae* based upon anther locule pubescence are here provided and illustrated.

For the sake of explicit decision making, we have chosen a conservative position regarding ranks within

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**Fig. 8. Anther locule pubescence and size difference in different sections of *Scutellaria*. A)** ***Scutellaria alabamensis*** **(sect.** ***Annulatae*****;** ***Kral 53165*****, NCU), B)** ***S. ovata*** **var.** ***ovata*** **(sect.** ***Mixtae*****;** ***Poindexter 05-1282*****, NCU), and C)** ***S. leonardii*** **(sect.** ***Galericularia*****;** ***Kukla 81*****, NCU). Scale bar = 1 mm.**

*Scutellaria* for the taxa discussed below. We have relied upon the research of previous authors to guide our choices. We interpret the rank of species to only be applicable to taxa that are demonstrably coherent both morphologically and geographically. The three entities that we discuss here exhibit overlap in these two conditions, though their extreme forms may be remarkable. Consequently and based on current information available, we regard this as within-species variation.

Infraspecific ranks in the North American constituents of the genus have chiefly been at the varietal level rather than subspecific, which we consider equivalent (Weakley et al. 2017). To normalize the use of this rank across our species, a single new combination is made for *Scutellaria angustifolia* subsp. *micrantha* at varietal rank. Olmstead (1990) noted that previous workers had once erroneously included this small-flowered form in *Scutellaria antirrhinoides* Benth., yet both morphological characters and isozyme loci clearly align it with *S. angustifolia*. Together, the two varieties form a contiguous distribution, with the northern var. *angustifolia* (ne. Oregon, e. Washington, and n. Idaho) abutting the southern var. *micrantha* (n. Nevada, se. Oregon, and s. Idaho). One could argue species status for each taxon, but their continua of distribution and variation raise an uncertainty that present data cannot remedy.

**Scutellaria angustifolia** var. **micrantha** (Olmstead) D.B. Poind. & Weakley, **comb. et. stat. nov.** Basionym: *Scutellaria angustifolia* subsp. *micrantha* Olmstead. Contr. Univ. Mich. Herb. 17:240. 1990. Type: U.S.A. Nevada. Elko Co.: Ruby Mtns, Lamoille Canyon. 23.5 mi SE of Elko, 0.3 mi W of scout camp entrance, T32N, R58E, Sec. 9, 6920 ft, 3 Jul 1984, *Olmstead 620* (Holotype: WTU; isotypes: CAS, NY, OSC, UC, US).

*Scutellaria nevadensis* Eastwood. Bull. Torrey Bot. Club 30:492. 1903. Type: U.S.A. Nevada: Elko Co., Little Lakes Canyon, W Stampede, 1 Jul 1902, *Kennedy 546* (Lectotype, designated by Epling 1942; CAS; isolectotypes: NY, US).

Two doctoral students of Robert Kral, Leo Collins and Albert Pittman, contributed significant dissertations focused on two eastern North American sections of *Scutellaria* (fide Epling 1942), sect. *Annulatae* and sect. *Mixtae*, respectively. As implied by the name "*Annulatae*," most members of this section (with the exception of *Scutellaria montana* Champ.) exhibit a corolla with an internal annulus. Leaf morphology varies greatly in the section, but several species have nearly cordate leaves, occasionally resulting in their confusion with other taxa, particularly those of sect. *Mixtae*. Both Collins (1976) and Pittman (1988) referenced pubescence morphology of the anther locules, yet this information was never widely disseminated or illustrated. Variation in this character between better-defined clades of the genus is remarkable and of diagnostic utility. Here we illustrate a subset of this variation to supplement section-level diagnosis (Fig. 8). Anther locule margins are long villous in members of sect. *Annulatae*, minutely hirsute in sect. *Mixtae*, and papillate to short puberulent in sect. *Galericularia*.

Collins (1976) made one new combination and described one new variety in the course of his work on

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*Scutellaria elliptica* Muhl. variety *glandulosa* Collins

Examined in a revision of the annulate *Scutellaria* L. (Labiatae).

Joseph L. Collins 1976 Vanderbilt University

PLANTS OF MISSOURI

Carter Co. 30 May 1975 J.L. Collins [2899

Scutellaria elliptica Muhl. var. glandulosa [Collins

Rocky slope above county road D within Van Buren city limits. Corolla lower lip cleft to rounded and bearing central blue stripe.

Det: J. L. Collins

Fig. 9. Holotype of *Scutellaria elliptica* var. *glandulosa* (*Collins 2899,* VDB).

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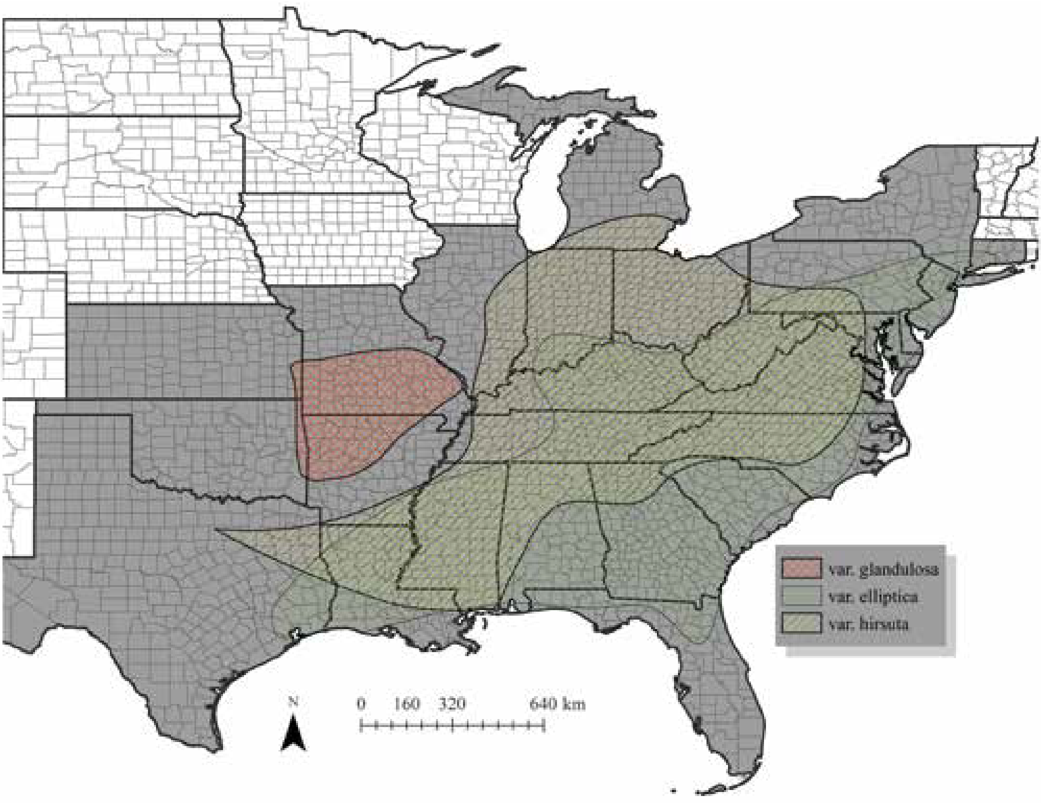

**Fig. 10. Generalized distribution of *Scutellaria elliptica* varieties.**

section *Annulatae*. Based on our observations, these taxonomic decisions were warranted, yet unfortunately, they were not validly published (McNeill et al. 2012:Art. 30.8) and have therefore remained unavailable for taxonomic usage, despite being widely acknowledged by botanists working in the region. We here formalize these nomenclatural novelties.

### SCUTELLARIA ELLIPTICA Muhl ex Spreng.

**Scutellaria elliptica** var. **glandulosa** J.L. Collins ex D.B. Poind , **var. nov.** (**Fig. 9**). Type: U.S.A. Missouri. Carter Co.: Van Buren, 30 May 1975, *Collins 2899.* (holotype: VDB; isotypes: F, FSU, GH, NCU, NY, SMU, TENN).

*Description (from Collins 1976).*—Stems with short, curled to slightly spreading hairs principally on alternate faces. Leaves ovate below mid-stem, lanceolate above, deeply and sharply crenate to serrate, usually glabrate with numerous golden, sessile glands on both surfaces. Petioles 10–15 mm long. Bracts bearing usually eglandular trichomes 0.1 mm long or less. With strong geographic affinities centered in and adjacent to the Ozark Mountains and Ouachita Mountains of southern Missouri and northern Arkansas (Fig. 10). Flowering May–Jul. Rocky woods; 150–450 m; Ark., Kans., Mo., Okla.

*Etymology.*—The epithet "*glandulosa*" refers to the prominent swollen resin glands on the calyx and leaves of this taxon.

KEY TO VARIETIES OF *SCUTELLARIA ELLIPTICA*

1. Leaves deeply crenate or serrate, glabrate, with dense, resinous, yellow punctate glands; bracts bearing hairs 0.2 mm or less long, usually eglandular; calyces with stipitate-glandular hairs 0.3 mm or less long and with an understory of notably short eglandular hairs, also with dense, resinous, yellow punctate glands ____________________ **S. elliptica** var. **glandulosa**

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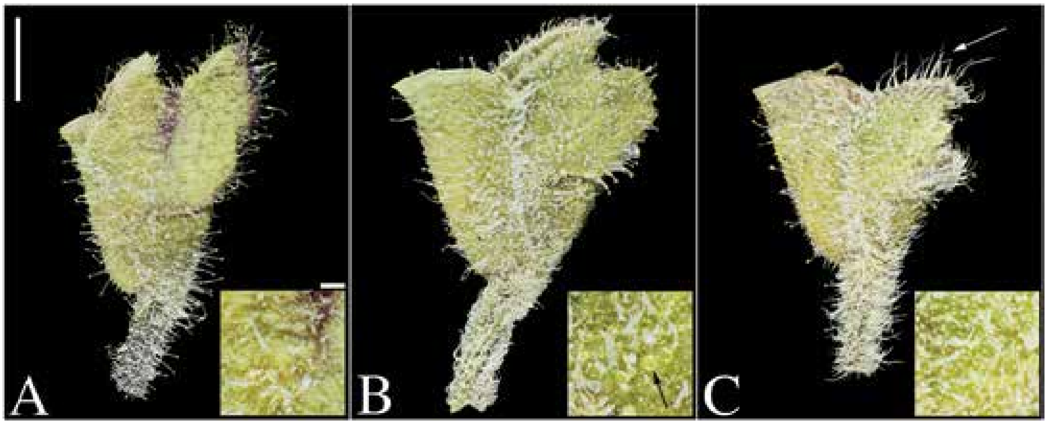

**Fig. 11. Comparison of salient calyx features in *Scutellaria elliptica* varieties. A) var. *elliptica*, B) var. *glandulosa* (arrow points to an enlarged resinous gland), and C) var. *hirsuta* (arrow points to characteristic long hirsute acicular trichomes). Scale bar = 1 mm, inset = 0.1 mm.**

1. Leaves shallowly crenate, moderately to densely hirsute, with sparse to moderate flattened-sunken translucent or light yellow punctate glands; bracts bearing hairs 0.3 mm long or greater, usually glandular; calyces with stipitate-glandular trichomes 0.3 mm or less, or 0.3–0.7 mm long, with or without an understory of notably short eglandular hairs, also with moderate flattened-sunken translucent or light yellow punctate glands.
   2. Calyx with spreading, pilose-glandular hairs ca. 0.3 mm long or less and eglandular hairs ca. 0.1 mm long, and a notable understory of shorter eglandular hairs ____ **S. elliptica** var. **elliptica**
   2. Calyx with long spreading, pilose-glandular and eglandular hairs 0.3–0.7 mm long, lacking an understory of eglandular hairs ____ **S. elliptica** var. **hirsuta** (Short & Peter) Fern.

Distinctive features of the calyces that differentiate each variety are illustrated in Fig. 11.

### SCUTELLARIA INCANA Biehler

**Scutellaria incana** var. **australis** (Epling) J.L. Collins ex D.B. Poind. & Weakley, **comb. nov.** Basionym: *Scutellaria altamaha* Small subsp. *australis* Epling, Univ. Calif. Publ. Bot. 20(1):89. 1942. *Scutellaria altamaha* Small var. *australis* (Epling) D.B. Ward, Phytologia 94:474. 2012. Type: U.S.A. Alabama. Houston Co.: 10 mi S of Dothan, 10 Aug 1927, *Wiegand & Manning 2782* (GH).

Flowering Jul–Aug. Dry sandy open woods or woodland margins; 0–130 m; Ala., Fla., Ga., Miss., N.C., S.C.

This variety is most common in the Florida panhandle and Coastal Plain of Alabama, Georgia, and Mississippi, with rare outlier populations in southeastern North Carolina and adjacent South Carolina (Fig. 12). It was first recognized and described by Epling (1942) as a subspecies of *Scutellaria altamaha*, chiefly on the basis of perceived geographic discontinuity. Collins (1976) made a new taxonomic combination for this taxon as *Scutellaria incana* var. *australis* J.L. Collins ined., noting that previous authors had traditionally treated it as part of the broad variation in *Scutellaria incana*, owing to the immaculate central patch of the lower lip exhibited by all three varieties (vs. spotted in *Scutellaria altamaha*). In addition, *S. altamaha* differs from *S. incana* by its lack of stipitate glands on the branches of the inflorescence and phenology—usually flowering a month earlier than *S. incana*. Furthermore, as noted by Collins (1976), specimens from the Gulf states of Louisiana, Mississippi, and Alabama often show intermediacy between var. *australis* and var. *incana*, suggesting interpopulation gene flow.

#### KEY TO VARIETIES OF *SCUTELLARIA INCANA*

1. Lower surfaces of leaves evenly softly villous across the entire surface; punctate glands of the leaves, bracts, and calyces flattened-sunken; calyces and pedicels canescent, stipitate-glandular hairs rarely present; widespread ____ **Scutellaria incana** var. **incana**
1. Lower surfaces of leaves glabrate, with hairs confined strictly to the veins; punctate glands of the leaves, bracts, and calyces either resinous-swollen or flattened-sunken; calyces with stipitate-glandular hairs rare or frequently present; centered in the Gulf Coastal Plain or the Appalachian mountains.
   2. Stems villosulous, canescent; punctate glands resinous-swollen; calyces and pedicels sparingly canescent, frequently stipitate-glandular; plants primarily of the Gulf Coastal Plain ____ **Scutellaria incana** var. **australis**

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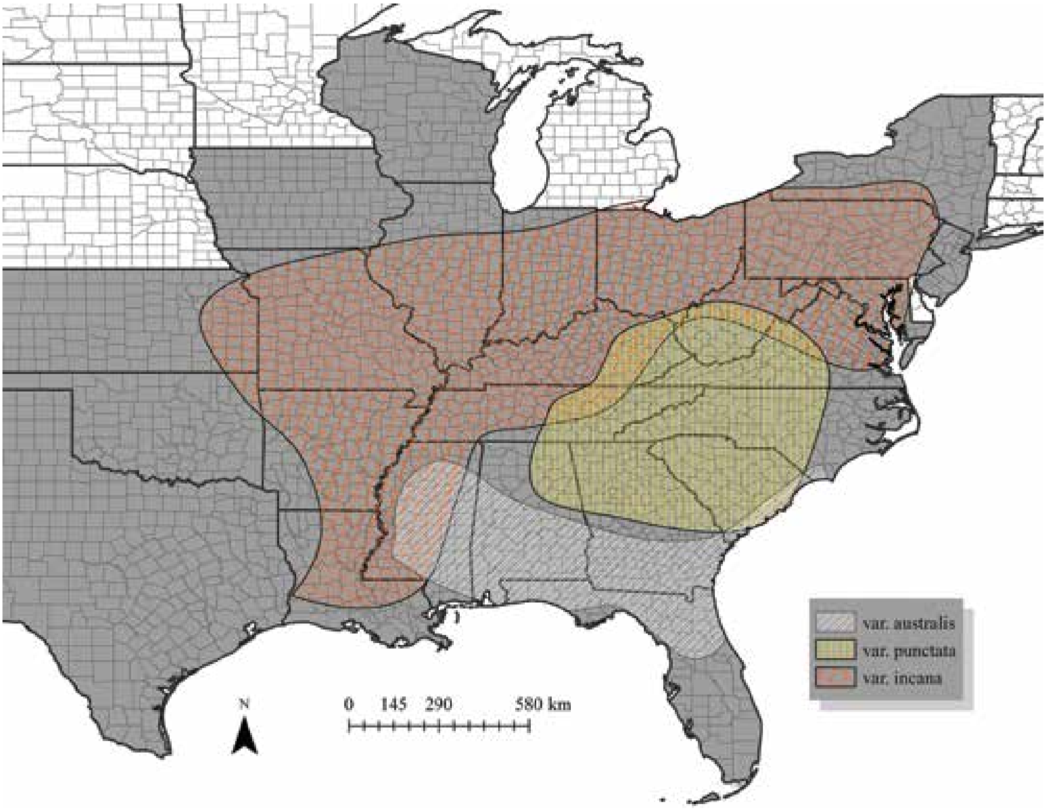

**Fig. 12. Generalized distribution of *Scutellaria incana* varieties.**

2. Stems frequently glabrate or somewhat puberulent; punctate glands flattened-sunken; calyces and pedicels canescent, rarely with stipitate-glandular hairs; plants centered in the Appalachian mountains ____________________ **Scutellaria incana** var. **punctata** (Chapm.) C. Mohr

Discriminating characters of the calyx and leaves are illustrated in Figs. 13–14.

## MELANTHIACEAE

### STENANTHIUM: The correct name for *Stenanthium macrum* Sorrie & Weakley, nom. illeg.

Primary authors: Bruce A. Sorrie and Alan S. Weakley

Sorrie and Weakley (2017) discussed the taxonomy of the *Stenanthium leimanthoides/densum* complex, concluding that Gulf Coast plants that had been variously treated as either southern disjunct populations of the northeastern United States *Stenanthium leimanthoides* (or synonyms) or as vigorous plants of *S. densum* with branched inflorescences were best treated as a separate species apparently most closely related to *S. densum* and named the taxon *Stenanthium macrum* Sorrie & Weakley. After publication, our colleague Alan R. Franck pointed out a possible earlier name for the same taxon. Benjamin Franklin Bush (1906) published *Tracyanthus angustifolius* (Michx.) Small var. *texanus* Bush, distinguishing it from typical *Tracyanthus angustifolius* (Michx.) Small [now treated as *Stenanthium densum* (Desrousseaux) Zomlefer & Judd] by its "large compound panicles," "more robust size," and "decidedly yellowish flowers." Bush states that "the only specimens seeen are those of the type, collected at Swan, Smith County, by *J. Reverchon 2782*, May 16, 1902," but based on examination of the specimens (see below), the correct collection number is *2772* (as they exactly match the information

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**Fig. 13. Comparison of salient calyx features in *Scutellaria incana* varieties. A) var. *incana* (*Barans 370*, NCU; note densely canescent transverse crest), B) var. *australis* (*Kral 48957*, NCU; arrow points to characteristic stipitate glandular hairs), and C) var. *punctata* (*Radford 17352*, NCU). Scale bar = 1 mm.**

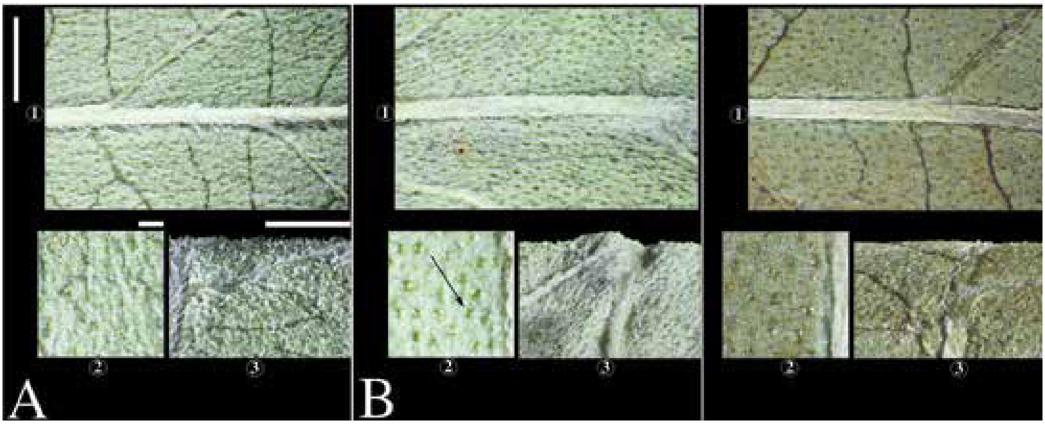

**Fig. 14. Comparison of leaf features in *Scutellaria incana* varieties. A) var. *incana* (*Barans 370*, NCU; note confluent hairs across the leaf surface), B) var. *australis* (*Kral 48957*, NCU; arrow points to characteristic resinous-swollen punctate hairs), and C) var. *punctata* (*Radford 17352*, NCU). 1 = abaxial leaf surface [scale bar = 1 mm], 2 = higher magnification illustrating glands [scale bar =0.1 mm], and 3 = curved leaf illustrating pubescence [scale bar = 1 mm].**

in the protologue) and *2782* is apparently an error on Bush's part. Four sheets of *2772* are at MO, including ones with what appear to be original handwritten labels. The lectotype is identified as being part of the Reverchon herbarium, and one of the isolectotypes has a "Part of type" annotation, all of which indicate that these are the specimens which Bush examined. Small (1913) raised the taxon to species rank, as *Tracyanthus texanus* (Bush) Small, largely repeating information from Bush. An additional combination based on this basionym was made in *Amianthium* by Gates (1918).

We have reviewed online images of the series of specimens collected by Julien Reverchon near Swan [Smith County, TX], on May 16, 1902. Reverchon's specimens are clearly conspecific with "*Stenanthium macrum*" and come from a locality within the distribution of the taxon. Two of Bush's three characters (large compound panicles and more robust size) are also characters we used to distinguish this taxon from *Stenanthium densum*. Bush's emphasis on "decidedly yellowish flowers" as a distinguishing characteristic of var. *texanus* gave us some pause, but it appears that Bush was working from Reverchon's dried specimens, in which the

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tepals had turned a creamy yellow (a common artifact in *Stenanthium*), so this seemingly conflicting or misleading statement can be reconciled with the white-flowered species.

We here make a combination in *Stenanthium* based on the oldest available basionym.

**Stenanthium texanum** (Bush) Sorrie & Weakley, **comb. et stat. nov.** Basionym: *Tracyanthus angustifolius* (Michx.) Small var. *texanus* Bush, Ann. Rep. Mo. Bot. Gard 17:119. 1906. *Tracyanthus texanus* (Bush) Small 1913. *Amianthium texanum* (Bush) R.R. Gates 1918. Type: U.S.A. Texas: Swan, swamps, 16 May 1902, *J. Reverchon 2772* (**lectotype, designated here:** MO 1702776! [digital]; isolectotypes: GH [digital]; MO 1702774! [digital], MO 1702775! [digital], MO 1702777! [digital]; NY! [digital]).

*Stenanthium macrum* Sorrie & Weakley 2017, nom. illeg.

## ORCHIDACEAE

### EPIDENDRUM: *Epidendrum magnoliae* is an invalid name and *E. conopseum* should be maintained in usage

Primary author: Alan R. Franck

*Epidendrum conopseum* R.Br. is native to the southeastern USA and Mexico, and it is the only species of its genus native in northern Florida and the Carolinas (Luer 1972). It was described in 1813 based on a plant cultivated at Kew that was originally collected by William Bartram in Florida, presumably from northern Florida where Bartram had visited. This name was soon picked up by Nuttall (1818:198), who described it as a parasite found mostly on the trunks of *Magnolia grandiflora* L. *Epidendrum conopseum* is actually an epiphyte that grows on a variety of trees. Nuttall (1818) also listed another name, *E. magnoliae* Muhl., in synonymy under *E. conopseum*.

*Epidendrum conopseum* was maintained in usage until Hágsater (2000) noted that *E. magnoliae* was published a month prior to *E. conopseum*. Following Hágsater (2000), *Epidendrum magnoliae* was subsequently used in various floras and research articles. Unfortunately, *E. magnoliae* is an invalid name.

The name *Epidendrum magnoliae* was introduced by Muhlenberg (1813:81) in a catalogue. In this catalogue, descriptions are provided for genera but it appears no generic names are newly introduced. For some species in Muhlenberg (1813), flower color, common name, distribution, and flowering times are given. However, it appears that no validating descriptions (McNeill et al. 2012:Art. 38) were written to validly publish new species names. Some of these invalid new species names introduced by Muhlenberg were later validated by other authors (e.g , *Arethusa verticillata* Muhl. ex Willd.). In at least one instance, a new name introduced by Muhlenberg is valid because of a reference to an earlier valid description (i.e., *Poa refracta* Muhl.).

Under *Epidendrum* L., Muhlenberg listed only one species, *E. magnoliae*, and provided only the abbreviation "Car." to denote its known distribution. Geographic distribution cannot be considered a valid description (McNeill et al. 2012:Art. 38.3). Although a description was provided for the genus *Epidendrum*, this description cannot be considered a validating description for the species name *E. magnoliae* since the genus was polytypic at that time (McNeill et al. 2012:Arts. 38.5–38.6).

*Epidendrum magnoliae* is an invalid name that has no nomenclatural standing and cannot be typified. *Epidendrum conopseum* should continue in usage for this epiphytic orchid.

## POACEAE

### ANDROPOGON: A new name for a chalky bluestem

Primary authors: Alan S. Weakley and Melanie Schori

Following Campbell's revelatory work on the *Andropogon virginicus* L. complex (Campbell 1983, 2003), botanists working in the Southeastern U.S. Coastal Plain have come to recognize and appreciate a diversity of taxa in the genus *Andropogon*, many of which had been recognized at one time but had usually been treated as one taxon during most of the 1900s. Among these taxa were three "chalky bluestems," recognized by Campbell as *A. glomeratus* (Walter) Britton, Sterns, & Poggenb. var. *glaucopsis* (Elliott ex Beal) C. Mohr, *A. virginicus* L. var. *glaucus* Hackel "wetlands variant," and *A. virginicus* var. *glaucus* "drylands variant," all three primarily distributed in Southeastern Coastal Plain longleaf pinelands and associated wetland communities and all with strongly whitened, waxy bases. These three bluestems have recently come to be regarded as separate species,

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with distinctive distributions and ecological associations in the Southeast: *A. glaucopsis* (Elliott ex Beal) Nash, *A. capillipes* Nash, and *A. dealbatus* (C. Mohr) Weakley & LeBlond (Weakley et al. 2011; Weakley 2015).

Although the name *Andropogon glaucopsis* (Elliott ex Beal) Nash, published in 1903, has been widely used for the most robust of the chalky bluestems for over a century (though often given as *A. glaucopsis* Elliott or *A. glaucopsis* (Elliott) Nash) in various floras, checklists, and papers (e.g., Small 1903; Godfrey & Wooten 1979; Kartesz 1999; Singhurst et al. 2012; Weakley et al. 2013; Kartesz 2017), it is an illegitimate name. The basionym *A. macrourus* var. *glaucopsis* Elliott ex Beal cannot be used at species rank because it is blocked by *Andropogon glaucopsis* Steudel (Syn. Pl. Glumac. 1(4–5):397. 1854), with a type from Asia (now considered a synonym of *Capillipedium assimile* (Steudel) A. Camus). Although the variety has been attributed to Elliott, he did not validly publish the name. The phrasing—under *A. macrourus*, "Varies, (Glaucopsis), with leaves very glabrous, glaucous, and the peduncles less clustered. Perhaps a distinct species"—differs from Elliott's usual phrasing for formally designating a variety. Beal (1896) validly published the name, ascribing the epithet *glaucopsis* to Elliott, and cited two Curtiss collections, one of which is lectotypified here.

We here propose a *nomen novum* at the rank of species for *A. macrourus* var. *glaucopsis* Elliott ex Beal.

**Andropogon cretaceus** Weakley & Schori, **nom. nov.** Replaced synonym: *A. macrourus* var. *glaucopsis* Elliott ex Beal, Grass N. Amer. 2:52. 1896. Type: FLORIDA: moist pine barrens, near Jacksonville, Nov 1878, *A.H. Curtiss 3639b* (**lectotype, designated here:** NY 1639478; isolectotypes: MICH, MISSA 20012, MO 2465349).

*Andropogon glaucopsis* (Elliott ex Beal) Nash, nom. illeg., non *A. glaucopsis* Steud.; *A. glomeratus* (Walter) Britton, Sterns, & Poggenb. var. *glaucopsis* (Elliott ex Beal) C. Mohr; *A. virginicus* L. var. *glaucopsis* (Elliott ex Beal) A.S. Hitchcock.
*Andropogon glaucus* Muhl.1817, nom. illeg., non *A. glaucus* Retz.

*Andropogon cretaceus* is rather easily distinguished from all other *Andropogon* species in the Southeastern United States. It is tall, usually over 1 m in height, with long leaves (the blades usually over 30 cm long), and has a "semi-bushy" inflorescence; these features suggest a relationship with *A. glomeratus* and explain why it has been treated as a variety of that species by some authors. The white-waxy plant base is similar to that of *A. capillipes* and *A. dealbatus*, which are generally smaller and slenderer. The three "chalky bluestems" can be further diagnosically distinguished with this key (adapted from Weakley 2018):

*Etymology.*—The epithet *cretaceus* ("chalk-like") refers to the powdery white wax that densely coats the lower stem and leaf sheaths. The plant can often be noticed and identified from a car traveling at 60 mph because of this prominent waxiness.

1. Leaves green (to somewhat glaucous, but never powdery white), pubescent or glabrous ____ **[other taxa]**
1. Leaves strongly glaucous (often nearly white with a powdery wax that can be rubbed off), glabrous.
  2. Ligule membrane (0.9–)1.5(–2.0) mm long, with cilia 0–0.2 mm long; leaf blades usually (33–) avg. 40(–75) cm long; pubescence beneath raceme sheaths moderate to dense; raceme sheaths (2.0–)2.4–3.6(–4.4) cm long, (1.3–)2.0–2.5 (–3.0) mm wide ____ **Andropogon cretaceus**
  2. Ligule membrane (0.2–)0.4(–0.5) mm long, with cilia 0.3–1.2 mm long; leaf blades (12–) avg. 19(–38) cm long; pubescence beneath raceme sheaths absent to dense; raceme sheaths (2.1–)2.9–4.3(–6.0) cm long, (2.7–)3.1–3.8(–5.5) mm wide.
    3. Summit of branchlet below attachment of raceme sheath glabrous; raceme sheaths (2.1–)2.6–3.8(–4.9) cm long; spikelets (2.6–)3.2–3.5(–3.9) mm long; racemes (1.4–)1.7–2.4(–3.2) cm long; leaves 2–5 mm wide, averaging 3.5 mm; upper floret lemma awn 0.6–1.5 mm long, averaging 1.1 mm ____ **Andropogon capillipes**
    3. Summit of branchlet below attachment of raceme sheath pubescent with hairs 2–4 mm long; raceme sheaths (2.4–)3.2–4.8(–6.0) cm long; spikelets (3.0–)3.5–3.9(–4.4) mm long; racemes (1.5–)2.0–3.0(–4.0) cm long; leaves 2.5–6.5 mm wide, averaging 5 mm; upper floret lemma awn 0.9–2.1 mm long, averaging 1.4 mm ____ **Andropogon dealbatus**

### COLEATAENIA: *Coleataenia longifolia* subsp. *combsii* (Poaceae: Paniceae) in Canada

Primary author: Richard J. LeBlond

Plants collected from the Tusket River valley in southern Nova Scotia in 1920 were determined by Fernald (1921) to be a new variety of *Panicum longifolium* Torrey. He named them *P. longifolium* var. *tusketense* Fernald. The variety was recognized by Fernald (1950), Gleason (1952), Roland and Smith (1969), and Scoggan (1978). It was not recognized by Hitchcock & Chase (1951), even in synonymy, and *P. longifolium* sensu lato was not shown as occurring in Canada.

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Fernald recognized two *Panicum longifolium* varieties as occurring in Nova Scotia: var. *longifolium* and var. *tusketense*. Variety *longifolium* is now treated as *Coleataenia longifolia* (Torrey) Soreng subsp. *longifolia* (Soreng 2010). It was treated as *Panicum rigidulum* Bosc ex Nees subsp. *pubescens* (Vasey) Freckmann & Lelong in Freckmann and Lelong (2003). The last treatment of var. *tusketense* was as a synonym of *P. rigidulum* var. *pubescens* (Vasey) Lelong (Kartesz 1999). Thus both infraspecific names are currently treated as synonyms of *C. longifolia* subsp. *longifolia*.

*Panicum longifolium* var. *tusketense* was not treated in synonymy by Freckmann and Lelong (2003). The Catalogue of New World Grasses (Zuloaga et al. 2003) dismisses it as a "Doubtful or dubious" name. However, the protologue and a specimen at NCU bearing this name do not fit current concepts of *Coleataenia longifolia* subsp. *longifolia*. The specimen (a "topotype") (NCU 54029) was collected by *Fernald and Long s.n.*, 13 Aug 1921, "from type locality" (Plantae Exsiccatae Grayanae #432) and identified by Fernald as belonging to his var. *tusketense*.

The major problem with assigning var. *tusketense* to subsp. *longifolia*, or dismissing it altogether, is spikelet length: 2.6–3.4 mm. That length extends well beyond the maximum range—2.7 mm—given for subsp. *longifolia* in Freckmann and Lelong (2003) and LeBlond (2018) and is well within the range for *Coleataenia longifolia* subsp. *combsii* (Scribn. & C.R. Ball) Soreng (2.4–4.0 mm). Another useful character in these treatments is first glume length: 1.3–1.7 mm in the *tusketense* plants, 1.3–2.9 mm in subsp. *combsii*, and 0.9–1.4 mm in subsp. *longifolia*.

In an examination of the literature, and other rangewide subsp. *combsii* specimens at NCU, only one character has been found that might separate the *tusketense* entity from subsp. *longifolia* and subsp. *combsii*: relative length of second glume to sterile lemma, a character noted in the protologue and used by the treatments that recognized *tusketense*. In subsp. *longifolia* and subsp. *combsii*, the second glume is (sub)equal to or longer than the sterile lemma, while in *tusketense*, the second glume is shorter (0.1–0.6 mm shorter in the NCU *tusketense* specimen). There is too much variability in other characters among the examined specimens to warrant separate recognition of *tusketense*, but a more intensive investigation is recommended.

Prior to this reassessment, southeastern Massachusetts has been recognized as the northern range limit for subsp. *combsii*, with only subsp. *longifolia* recognized as occurring in Nova Scotia. For now, the *tusketense* plants should be recognized as the northern range limit for *Coleataenia longifolia* subsp. *combsii*.

## **DICHANTHELIUM:** Two distinctive Florida species given names in *Dichanthelium*

Primary author: Richard J. LeBlond

Distinctive taxa, long recognized in *Panicum* at either species or variety rank, are accorded species rank in *Dichanthelium*.

**Dichanthelium breve** (Hitchc. & Chase) LeBlond, **comb. nov.** Basionym: *Panicum breve* Hitchcock & Chase, Contr. U.S. Natl. Herb. 15:271. 1910. *Dichanthelium dichotomum* (L.) Gould var. *breve* (Hitchc. & Chase) Gould & C.A. Clark, Ann. Missouri Bot. Gard. 65:1120. 1978. *Panicum chamaelonche* Trinius var. *breve* (Hitchc. & Chase) Lelong, Brittonia 36:267. 1984. *Dichanthelium ensifolium* (Baldwin ex Elliott) Gould var. *breve* (Hitchc. & Chase) B.F. Hansen & Wunderlin, Ann. Missouri Bot. Gard 75:1646–1647. 1988. *Dichanthelium chamaelonche* subsp. *breve* (Hitchc. & Chase) Freckmann & Lelong, Sida 20:168–169. 2002. Type: U.S.A. Florida. Martin Co.: low pine woods between scrub hills, among palmetto, Jensen, 5 Apr 1906, *Hitchcock 734* (holotype: US!).

*Dichanthelium breve* is distinguished from all other members of section *Ensifolia* by its very narrow, involute, and often falcate blades 3–6 cm long and about 1.5 mm wide when unrolled. Within sect. *Ensifolia*, only *D. glabrifolium*, with blades 4–12(–20) cm long and 2–4 mm wide, approaches *D. breve* in blade length:width ratio. *Dichanthelium breve* appears to be most closely related to *D. chamaelonche* and *D. glabrifolium* and is additionally distinguished from them by its pubescent spikelets. *Dichanthelium breve* is endemic to central and south Florida, primarily near the east coast. It is found in low areas in sand pine/scrub oak habitat.

**Dichanthelium glabrifolium** (Nash) LeBlond, **comb. nov.** Basionym: *Panicum glabrifolium* Nash, Bull. Torrey Bot. Club 24:196. 1897. *Dichanthelium dichotomum* (L.) Gould var. *glabrifolium* (Nash) Gould & C.A. Clark, Ann. Missouri Bot. Gard. 65:1120. 1978. Type: U.S.A. Florida. Hillsborough Co.: flatwoods at Tampa, 20 Aug 1895, *Nash 2415a* (holotype: NY; isotype: US, fragm. ex NY).

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*Dichanthelium glabrifolium* is distinguished from *D. chamaelonche* by its much longer blades, a greater blade length:width ratio, longer spikelets, and on average longer culms and vernal panicles (see key). Overwintering leaves can be 10–15 cm long and do not form the dense cushions produced by the shorter (2–5 cm) overwintering leaves of *D. chamaelonche*. *Dichanthelium glabrifolium* is endemic to peninsular Florida, mostly near the west coast. It is found in wet sandy woods.

### KEY TO *DICHANTHELIUM* SECT. *ENSIFOLIA*

1. Lower nodes bearded; sheaths spreading-pilose; ligules 1–2 mm long **D. curtifolium**
1. Lower nodes not bearded; sheaths glabrous, pubescent, or ascending-pilose; ligule less than 1 mm long.
   2. Spikelets glabrous.
      3. Blades 4–12(–20) cm long (the longer at least 7 cm), 2–4 mm wide, 20–30(–50) times as long as wide; vernal panicles 4–9 cm long; spikelets (1.0–)1.2–1.5 mm long; culms 15–50 cm high, internodes glabrous or pubescent **D. glabrifolium**
      3. Blades 1–4(–5) cm long, 1–3(–4) mm wide, 10–20 times as long as wide; vernal panicles 1.5–5 cm long; spikelets 0.9–1.2 or 1.2–1.5 mm long (see couplet 4 for culm height and internode characters).
         4. Spikelets 0.9–1.2(–1.4) mm long; blades 1.5–4(–5) cm long, 1–2.5(–3) mm wide, mostly 15–20 times as long as wide; culms 10–20(–30) cm high, internodes glabrous or puberulent; autumnal plants usually densely tufted and cushion forming **D. chamaelonche**
         4. Spikelets 1.2–1.5 mm long; blades 1–3(–5) cm long, 1.5–3(–4) mm wide, about 10 times as long as wide; culms 15–40 cm high, internodes glabrous; autumnal plants usually loosely tufted, not cushion forming **D. ensifolium**
   2. Spikelets pubescent.
      5. Blades involute and often falcate, 3–6 cm long, about 1.5 mm wide when flattened, 20–50 times as long as wide; lower internodes often strigose; spikelets 1.2–1.4 mm long; culms 5–20 cm long **D. breve**
      5. Blades neither involute (except apically) nor falcate, 1–7(–8) cm long, 1.5–7(–8) mm wide, about 10 times as long as wide; lower internodes glabrous or sparsely pilose, but not strigose; spikelets 1.1–1.7 mm long; culms 10–60 cm long.
         6. Blades (3–)4–6(–9) per culm, pliable, 1–3.5(–5) cm long, 1.5–3(–4) mm wide; blade margins flat and sharp-edged, gray-green to white-beige, 0.1 mm wide or less; spikelets 1.2–1.5 mm long, pubescent or glabrous; culms 10–40 cm long **D. ensifolium**
         6. Blades 3–4 per culm, firm, 2–6(–8) cm long, 2–6(–8) mm wide; at least one blade margin cartilaginously thickened, the edge usually rounded, white-beige to green-straminous, 0.1–0.2 mm wide; spikelets (1.1–)1.3–1.7 mm long, pubescent; culms 15–60 cm long **D. tenue**

## **DIGITARIA:** Rediscovery and reinstatement of *Digitaria subcalva*

Primary authors: Edwin L. Bridges & Steve L. Orzell

The calcareous wet grasslands of south-central and south Florida are among the most diverse natural communities of the United States at small spatial scales, with up to 49 species per square meter, and 170–180 species per 0.1 hectare (Orzell & Bridges 2006). Among the unusual species we found in these communities at Avon Park Air Force Range (APAFR) in Polk County, Florida, was a low, mat-forming, densely villous species of *Digitaria*, which keyed to *Digitaria texana* in most floristic works. However, we were immediately suspicious that a species of the coastal grasslands of south Texas would be disjunct in central Florida. Although there are some species in common between these community types, they all range either through Mexico and the Caribbean, or along the Gulf Coast of the southeast United States. We subsequently found this unusual *Digitaria* at four locations on APAFR, one in Highlands County and three in Polk County.

In examining the existing synonymy for *Digitaria texana*, we were drawn to the name *Digitaria subcalva* Hitchcock. Although *Digitaria subcalva* was placed in synonymy under *Digitaria texana* by Webster and Hatch (1990), they gave no specific rationale for this decision, except to say that its characters fall within the range of variation they accepted for *Digitaria texana*. To test this hypothesis, we requested *Digitaria texana* collections by Bill Carr from Aransas and Kleberg counties, Texas, which he sent for our study. These specimens all have many more primary inflorescence branches than the Florida plants, each of which is more densely flowered, with shorter pedicels and less purplish color in the inflorescences, so that the inflorescences appear dense and mostly greenish, in contrast to the lax, diffuse, and gray or purplish-gray inflorescences of the APAFR specimens.

Compared to *Digitaria texana*, our Florida plants have the following features:

1. Fewer primary inflorescence branches (2–4 vs. 5–12)
2. Lower part of inflorescence branches naked for 2–4 cm (vs. not naked at all)

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3. Relatively slenderer (ca. 0.3 mm or slightly less) inflorescence branches
4. Longer pedicels on upper paired spikelets (2.5–3.0 mm vs. 1–2.5 mm)
5. More strongly papillose-hispid leaf sheaths on flowering culms
6. Relatively slenderer and more delicate culms
7. Longer exsertion of inflorescence axis from the leaf sheaths

Examination of a digital image of the holotype specimen of *Digitaria subcalva* at US (*C. P. Wright s.n.*, US1537173) revealed it to be an exact match for the distinctive characters of our Florida specimens, including having long stolons. In the type description, *D. subcalva* is described as "cespitose" or "tufted," but later in the discussion of this species it is said to grow "in large spreading tufts, sometimes a meter or more in diameter" (Hitchcock 1934). Although the isotype specimens (B, MO, US3010934, US2012685) are of small groups of culms, these sheets simply lack sections of stolons and are otherwise consistent in characters with the holotype. The description of the plants forming tufts a meter or more in diameter is more consistent with our observations of our specimens, in which small groups of aerial (fertile) culms are all connected by stolons, forming a more diffuse plant than would be typical of a cespitose species. In addition, the type description does indicate that the culms are "ascending from a curved, often creeping rooting base," i.e., from stolons.

The remote nature of the spikelets on the inflorescence branches is suggestive of *Digitaria pauciflora*, a south Florida endemic species found in habitats analogous to the calcareous wet grasslands habitats of our specimens at APAFR. However, *D. pauciflora* differs from our specimens in having narrower leaves, longer spikelets, and a hyaline first glume. Interestingly, Hitchcock's handwritten labels on the isotype specimens of *D. subcalva* have the species name "*pauciflora*" crossed out and replaced with "*subcalva*." Hitchcock had described *D. pauciflora* as a new species in 1928 and certainly would have been familiar with both this species and *D. texana* at the time he described *D. subcalva*.

There was some possibility that our specimens could be referred to *Digitaria ekmanii* Hitchc. (Hitchcock 1936:176), which is endemic to Pinar del Río and Isla de la Juventud (Isle of Pines), Cuba. However, *Digitaria ekmanii* differs from our specimens in having slenderer primary inforescence branches (0.2–0.3 mm wide) and shorter spikelets (2.2–2.5 mm long), and by having 4–9 primary inflorescence branches. Examination of digital images of the holotype (*Ekman s.n.*, US1161280) and isotypes of *D. ekmanii* (US1502134, MO) shows that it is unlikely to be the same as our specimens, because they have more inflorescence branches, each densely flowered to the base. The description of *D. texana* in Webster and Hatch (1990) does not include the characters of having 2–4 primary inflorescence branches, naked lower parts of inflorescence branches, or pedicels 2.5–3.0 long, all of which are apparent diagnostic characters for *D. subcalva*. It is possible that they may have correctly included *D. albicoma* in synonymy under *D. texana* but did not have sufficient material of *D. subcalva* to study its diagnostic characters.

In conclusion, we believe that *Digitaria subcalva* should be recognized as distinct from *Digitaria texana*; it is endemic to peninsular Florida. We believe that our specimen from Polk County, Florida, may be the first record of this species since the type collections by C.P. Wright near Plant City in 1932.

**Digitaria subcalva** Hitchc. Amer. J. Bot. 21(3):138. 1934. TYPE: U.S.A. FLORIDA: Low hammock land (Scranton fine sand) near a marsh at Plant City, 26 Oct 1932, *C.P. Wright s.n.* (HOLOTYPE: US; ISOTYPES: B (2 sheets), MO, US (2 sheets), USF).

Stoloniferous perennial, forming large tufts (to one meter in diameter) from creeping stolons, with ascending fertile culms 30–60 cm tall. Leaf sheaths densely papillose-pilose, ligule 2 mm long, leaf blades flat, densely pilose, 3–15 cm long, 1–5 mm wide, spreading to slightly ascending. Inflorescence long-exserted from the leafy part of the culm, consisting of 2–4 primary spike-like branches, each (7–) 10–12 (–13) cm long, relatively slender and delicate, devoid of spikelets (naked) for the lower 2–4 cm of the inflorescence rachis, with most naked for 3.0–3.5 cm. Spikelets rather remotely spaced on the primary branches, such that there is very little (0.2 mm or less) overlap between the apex of one spikelet and the base of the next proximal spikelet, thus the spikelets appearing to be in a single rank. Spikelets paired, the lower of each pair with a pedicel ca. 0.5 mm long, the upper of each pair with a pedicel 2.5–3.0 mm long. Spikelets 2.4–2.8 mm long; lower glume absent; upper

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glume 5–7 nerved, glabrous to sparsely villous; lower lemma 5–7 nerved, the margins somewhat villous; both upper glume and lower lemma sometimes suffused with purple between the veins; upper lemma about the same length as the upper glume and lower lemma, grayish to purplish-grayish, minutely rugulose.

**FLORIDA. Polk Co.:** calcareous fringing wet grassland ca. 0.2 mi E of East Fence Road, and W of Eight Mile Hammock, Avon Park Air Force Range, 16 Nov 2001, *Orzell & Bridges 25975* (FLAS, USF).

Rare in calcareous fringing wet grasslands in Polk and Highlands counties, Florida, and historically from "low hammock land (Scranton fine sand) near a marsh" at Plant City (Hillsborough County). Calcareous fringing wet prairies often form the zone between oak hammocks and marshes in this region, and *D. subcalva* should be sought in eastern Hillsborough and Pasco counties.

### **PANICUM:** *Panicum virgatum* var. *spissum* (Poaceae) in the southeastern United States

Primary author: Bruce A. Sorrie

In 1922, D.H. Linder, a student of M.L. Fernald, published a paper on the varieties of *Panicum virgatum* L. (Linder 1922). He recognized the nominate variety and *P. virgatum* var. *cubense* Griseb., and he described three new varieties. One of those was *P. virgatum* var. *spissum* Linder, ranging from Nova Scotia south to New Jersey and Pennsylvania. According to Linder, var. *spissum* occupied freshwater lakes in southern Nova Scotia and in several localities in New England, but the primary habitat from Maine to southern New Jersey was brackish estuarine and riverine marshes and upper borders of salt marshes.

While conducting rare plant surveys of the North Carolina Outer Banks and adjacent mainland in 2012–2013, I encountered several populations of *Panicum virgatum* that reminded me of var. *spissum* of my native Massachusetts. These plants grew taller than var. *cubense*, a more delicate plant common in North Carolina in wet depressions in longleaf pine-wiregrass savannas and streamhead ecotones, had broader leaves, denser panicles, longer spikelets (3.7–4.0 mm vs. 2.9–3.4), and culms that arose from a knotty crown or short rhizome rather than from elongate rhizomes. They matched in every character plants of *P. virgatum* var. *spissum* from the Northeast. They inhabited brackish marshes bordering Pamlico and Albemarle Sounds and were found along fresh-tidal creeks. Measurements of spikelets from specimens of similar brackish habitats in the Carolinas at NCU have extended the size range to 3.5–4.2 mm.

*Panicum virgatum* var. *spissum* is not known from the Carolinas (Radford et al. 1968), nor known to range south of New Jersey according to Fernald (1950) and Hitchcock (1950). Freckmann and Lelong (2003), Gleason and Cronquist (1963), McAvoy and Bennett (2001, Delaware), Brown and Brown (1984, Maryland), and Weakley et al. (2012, Virginia) all synonymize var. *spissum* or do not mention it at all. The latter two floras mention a number of maritime communities inhabited by *Panicum virgatum* s.l. without making the leap to var. *spissum*; however, specimens at NCU confirm that var. *spissum* does indeed occur not only in Delaware, Maryland, and Virginia, but also the Carolinas and Georgia (specimens cited at end of paper).

These maritime plants are not to be confused with *P. virgatum* var. *virgatum*, which is even more robust, with wider leaves, longer spikelets, larger panicles, and an often glaucescent aspect. Fernald (1950) gave spikelet length as 3.5–6 mm, but measurements of midwestern plants at NCU do not range below 4 mm. In fact, var. *virgatum* is uncommon in the Carolinas, mainly found as an introduction for forage or grassland restoration and escaping to roadsides and fields; it is a rare native on shores of montane/upper Piedmont rivers (data to be presented elsewhere).

More research is needed on the *Panicum virgatum* plants that inhabit maritime communities. Linder (1922) described *P. virgatum* var. *thyrsiforme* from the Gulf Coast of Florida and Mississippi. I have seen specimens, probably of this variety, from Alabama, Louisiana, and Texas. Its relationship with var. *spissum* is unclear, but well-developed (and well-collected) plants possess very thick and long (2.5–10 cm) rhizomes emanating from the knotty plant base.

Finally, Vasey (1886) described *Panicum virgatum* var. *confertum* from the "seashore, Atlantic City, New Jersey." Vasey reported the spikelets to be 3.5 mm long. Hitchcock and Chase (1910) listed specimens of var. *confertum* from New Jersey, Virginia, North Carolina, and Florida. Examination of the holotype at US (online)

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shows it to be to if not matching var. *spissum*, but more detailed work is necessary to confirm this. If confirmed, then var. *confertum* would have priority. Linder (1922) only compared var. *confertum* with his var. *thyrsiforme,* not with var. *spissum* (and in any event thought it "scarcely separable from typical *P. virgatum*").

Specimens examined (southeastern U.S.A. only).—**U.S.A. DELAWARE. New Castle Co.:** Wilmington (NCU); along Delaware River, 2 Aug 1923, *Tidestrom 11530* (DOV). **GEORGIA. Chatham Co.:** Fort Pulaski, Aug 1864, *Peck s.n.* (NCU). **Glynn Co.:** brackish marsh along GA 50, 2 mi W of Jekyll River, 21 Jul 1966, *Bozeman 6434* (NCU). **McIntosh Co.:** Darien Junction, 25–27 Jun 1895, *Small s.n.* (NCU); in clumps to 15" diameter, open live oak woods at edge of saltmarsh, Duplin River, 6 Aug 1956, *Duncan 20386* (NCU). **MARYLAND. St. Marys Co.:** St. Mary's City, shore of river (NCU). **NORTH CAROLINA. Beaufort Co.:** marsh near Hawkins Beach, SW of Bath, 5 Jul 1950, *Radford 5382* (NCU). **Brunswick Co.:** W side Cape Fear River along US 74, *Leonard et al. 2002* (NCU); tidal flats of Cape Fear River just W of Wilmington, 18 Oct 1958, *Bell 16078* (NCU). **Craven Co.:** brackish marsh near Trent River S of New Bern, 19 Jul 1958, *Radford 37345* (NCU). **Currituck Co.:** creek bank 2.6 mi NE of Coinjack on road to Waterlily, 31 Jul 1958, *Ahles & Duke 48228* (NCU); marsh at Sligo, 20 Jul 1938, *Godfrey 5282* (NCU). **Dare Co.:** Roanoke Island, NC 345 0.2 mi N of Wanchese, 7 Sep 1960, *Crutchfield 5522* (NCU); Roanoke Island, low place near Manteo, 30 Jul 1959, *Schallert 735* (NCU); landward side Hatteras Island, near Pea Island, 7 Aug 1954, *Silliman & Munson s.n.* (NCU); Point Peter Road, 12 Jul 2012, *Sorrie 13043* (NCU); Alligator NWR off US 264, along Pamlico Road, 8 Sep 2015, *Driskill 21* (NCU). **Hyde Co.:** Swanquarter, 11–25 April 1898, *Ashe s.n.* (NCU); marsh, Swanquarter, 9 Jun 1938, *Godfrey 4368* (NCU); brackish marsh 1 mi SE of Swanquarter 6 Aug 1958, *Radford 39012* (NCU). **New Hanover Co.:** in sand, Wrightsville Sound waterfront, 1 Aug 1963, *McCrary 768* (NCU). **Onslow Co.:** brackish marsh, Kings Creek, 27 Jul 1957, *Ahles 32657* (NCU). **Pamlico Co.:** saltmarsh, Janeiro, 5 Jul 1958, *Radford 35988* (NCU). **Pasquotank Co.:** (NCU). **Perquimans Co.:** 2 mi ENE of Chowan County line on US 17, 30 Jul 1958, *Ahles & Duke 48006* (NCU). **Tyrrell Co.:** ditch near NC 94 and Alligator River, 8 Aug 1958, *Radford 39225* (NCU); Alligator River at NC 94, *Sorrie 13068* (NCU); Buckridge Coastal Reserve, 4 Aug 2015, *Heraty 3* (NCU). **Washington Co.:** bog 2 mi E of Hoke, 5 Aug 1958, *Radford 38876* (NCU). **SOUTH CAROLINA. Charleston Co.:** Yonges Island, 11 Jul 1922, *Luginbill s.n.* (NCU); brackish marsh, Dawhoo River, 21 Jul 1957, *Ahles 32102* (NCU). **Georgetown Co.:** ditch 4.5 mi NNW of Georgetown, 13 Jun 1957, *Radford 25124* (NCU). **Horry Co.:** roadside near Waccamaw Rivar, 1 Jul 1958, *Bell 13743* (NCU). **VIRGINIA: James City Co.:** (NCU). **Lancaster Co.:** (NCU).

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