

TAXONOMY OF THE *AMSONIA TABERNAEMONTANA* COMPLEX (APOCYNACEAE: RAUVOLFIOIDEAE)

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ABSTRACT

The *Amsonia tabernaemontana* complex for the forthcoming treatment of *Amsonia* in the Flora of North America will be treated as a single species with four geographically and morphologically intergrading varieties: var. *tabernaemontana*, var. *salicifolia*, ***Amsonia tabernaemontana* var. *illustris*** (Woodson) J.K. Williams, **comb. et stat. nov.**, and ***Amsonia tabernaemontana* var. *repens*** (Shinners) J.K. Williams, **comb. et stat. nov.** *Amsonia salicifolia* var. *ciliolata* A. DC. is lectotypified. A key to the varieties of *A. tabernaemontana* is provided.

Amsonia tabernaemontana Walt. is a widespread species found throughout the temperate forest of the southeastern USA and is recognized within the genus by its glabrous elliptic leaves, flat stigmatic head, and pubescent corolla tube. Two additional species of *Amsonia* distributed throughout the southeastern USA also have a flat stigmatic head and a pubescent corolla tube: *Amsonia illustris* Woodson and *A. repens* Shinners. These two species have been distinguished from *A. tabernaemontana* chiefly by having pubescent vs. glabrous sepals.

When Woodson (1929) described *Amsonia illustris* he recognized its similarity to *A. tabernaemontana* var. *gattingeri* Woodson, noting that both taxa have linear-lanceolate leaves, pubescent corolla tubes, and a dense inflorescence. He distinguished *A. illustris* from var. *gattingeri* by only one character — a pubescent vs. glabrous calyx. Woodson (1938) subsequently synonymized var. *gattingeri* under var. *salicifolia* (Pursh) Woodson. Shinners (1951) described a second species of *Amsonia* with a pubescent corolla and calyx, *A. repens* Shinners, which he considered similar to *A. illustris* based on its pubescent corolla and calyx but distinct from it based on its smaller leaves and creeping/geniculate rootstock.

Herbarium, type, and field observations of *Amsonia illustris*, *A. repens*, and *A. tabernaemontana* throughout their ranges (Fig. 1) necessitate a reevaluation of their taxonomic status. Chief among these is the discovery of populations that have discontinuous variation in calyx vestiture. Field trips in Texas encountered populations of *A. tabernaemontana* with individual stems with an inflorescence of flowers with glabrous calyces growing from the same rootstock as individual stems having an inflorescence of flowers with pubescent calyces. Consequently, calyx vestiture in *A. tabernaemontana* appears to be a character that does not merit utilization in species diagnosis. Among herbarium collections from along the border of Indiana and Missouri (Fig. 1) are other populations of *A. tabernaemontana* where individuals with pubescent sepals exist with individuals with glabrous sepals.

In their description of *Amsonia tabernaemontana* Correll & Johnston (1970) noted the following:

“This species along with... *A. illustris*, and *A. repens*, form an extremely close alliance, and it is questionable as to whether or not they should be maintained as separate species rather than variants of one complex unit. The degree of pubescence or lack of pubescence on the... calyx, that mainly separate these entities, is not an entirely reliable characteristic.”

My observations of *A. tabernaemontana* throughout its range (Fig. 1) agree with Correll and Johnston — *A. illustris*, *A. repens*, and *A. tabernaemontana* should be treated as “variants of one complex unit” where calycine vestiture is treated as a clinal characteristic gradually increasing in appearance with the western distribution of *A. tabernaemontana*.

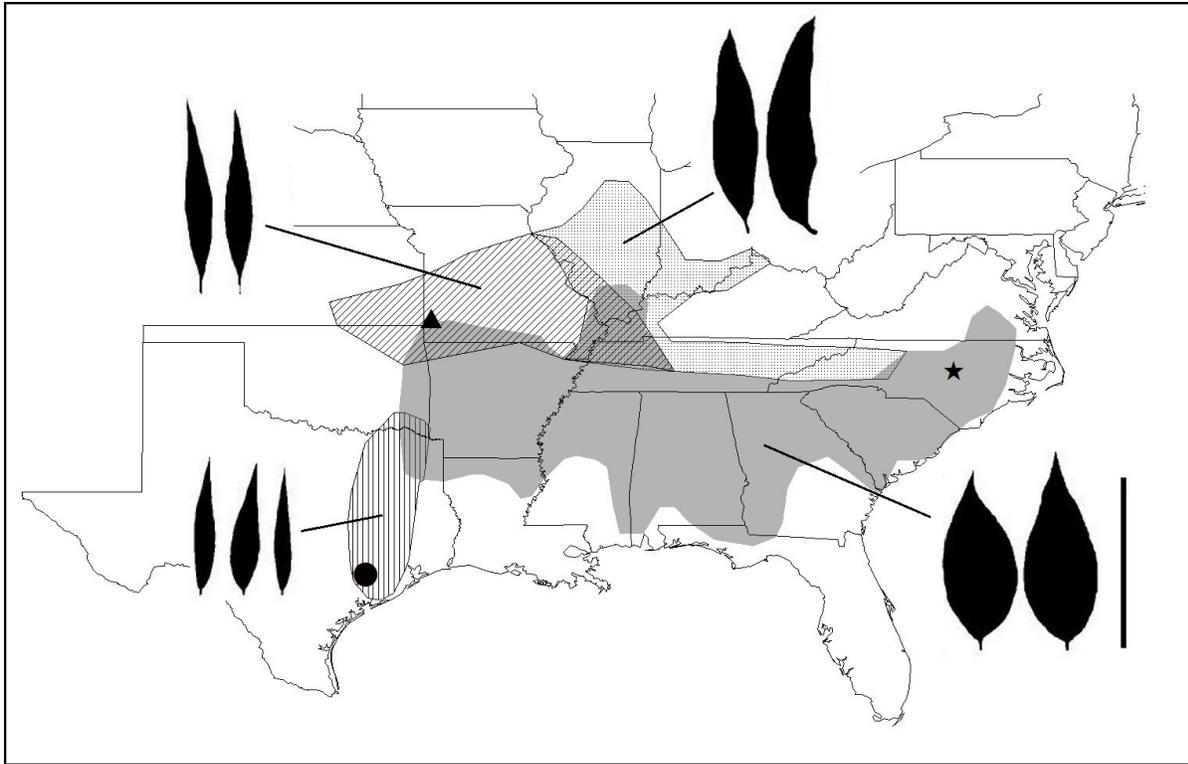


Figure 1. *Amsonia tabernaemontana* complex. Var. *tabernaemontana* (gray shaded, generalized type locality star). Var. *salicifolia* (square hatching, type locality unknown). Var. *illustris* (crosshatch, type locality triangle). Var. *repens* (horizontal hatching, type locality circle). Leaf scale bar represents 10 cm. Areas of overlap represent populations where variation in character states used to identify the taxa occur.

In the eastern part of its range *Amsonia tabernaemontana* has a sparse inflorescence (Fig 2) and elliptic leaves (Fig 1), but as the species approaches central Tennessee the leaves become progressively lanceolate (Fig. 1) and the inflorescence more compact and dense (Fig 2), while the calyx remains glabrous. Variants with these characters correspond to var. *salicifolia* (Pursh) Woodson. Toward the border of Missouri and Indiana, plants of *Amsonia* that have been traditionally recognized as both *A. tabernaemontana* and *A. illustris* begin to appear in the same populations. These populations are recognized by the presence of individuals with pubescent calyces and individuals with glabrous calyces. Leaf shape is mostly lanceolate within these populations. Within the Ozark Plateau of Missouri the populations of *Amsonia* with pubescent corolla tubes are exclusively individuals with lanceolate leaves and pubescent calyces. Likewise towards the southern portion of its range along the Texas/Oklahoma border, individuals of *Amsonia* with pubescent calyces (*A. repens*) and individuals with glabrous calyces (*A. tabernaemontana*) are found within the same population and, as mentioned above, occasionally growing from the same rootstock. Further south into Texas through the Blackland Prairies towards the Gulf Coast, the populations of *Amsonia* with pubescent corolla tubes are exclusively with lanceolate leaves and a pubescent calyx.

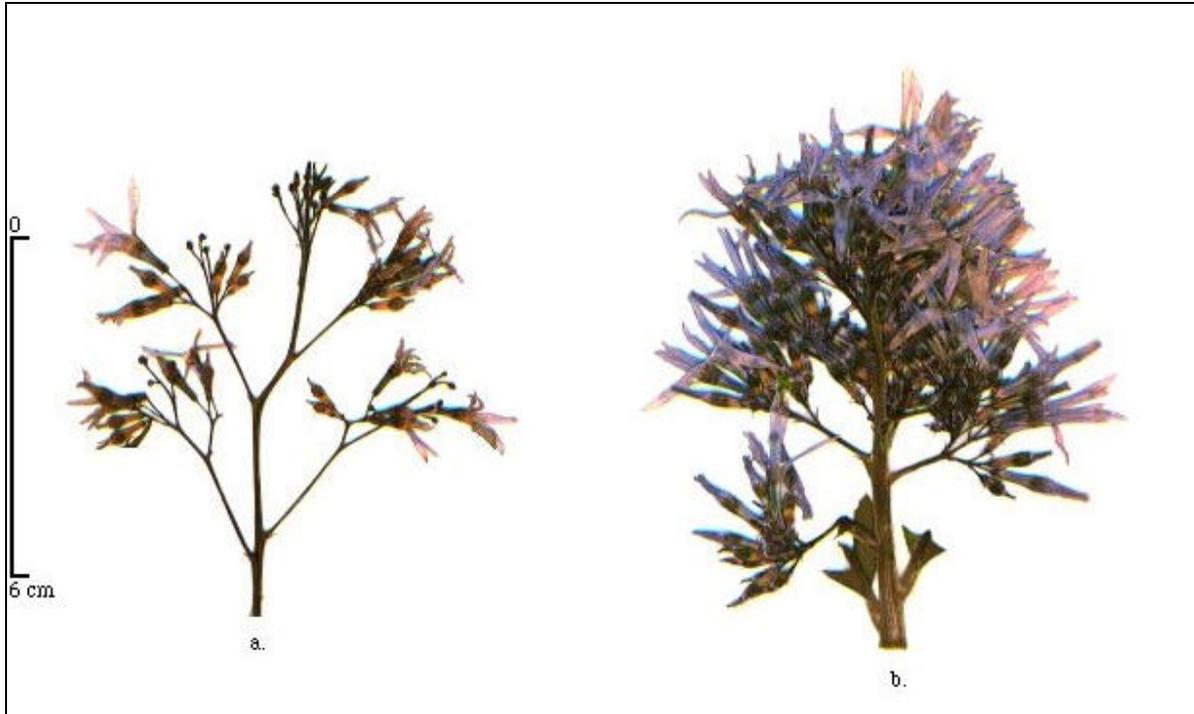


Figure 2. Typical inflorescence of (a) var. *tabernaemontana* and (b) vars. *illustris*, *repens*, and *salicifolia*.

Because *Amsonia illustris*, *A. repens*, and *A. tabernaemontana* are the only taxa of *Amsonia* that have a pubescent corolla tube, and because the taxa share a continuous distribution throughout the Southeastern United States (Fig. 1), the taxa are here viewed as similar “entities that intergrade over... regions of contact (Turner and Nesom 2000). Consequently, the taxa are here treated as variants of the same species. Subsequently, it is here proposed that *A. illustris* and *A. repens* be treated as varieties of *Amsonia tabernaemontana*. The new combinations are here made.

Key to the varieties of *Amsonia tabernaemontana*

1. Leaves ovate to oblong-elliptic; inflorescence loose, below to barely rising above the leaves, of 15-50 flowers; calyx glabrous; fruits 1-4 pairs per inflorescence var. **tabernaemontana**
1. Leaves narrowly elliptic to linear-lanceolate; inflorescence in compact cluster, ascending above the leaves, from 50-80 flowers; calyx glabrous to pubescent; fruits 5-10 pairs per inflorescence.
 2. Calyx glabrous var. **salicifolia**
 2. Calyx pubescent.
 3. Calyx ciliate, hairs emerging from the margins and or body of the calyx lobes, calyx tube glabrous (Fig 3); adaxial leaf midrib glabrescent; leaves 7-10 cm long; Ozark plateau and the Central forest/grassland transition zone var. **illustris**
 3. Calyx tomentose, hairs emerging from the calyx tube, calyx lobes glabrous (Fig 3); adaxial leaf midrib villous; leaves 5-7 (9) cm long; Texas Blackland Prairies to the Gulf Coast Prairie var. **repens**

AMSONIA TABERNAEMONTANA Walt., Fl. Carol. 98. 1788. **NEOTYPE** (Ward 2008): **South Carolina**. Darlington Co.: 3 Jun 1941, *B. Smith* 1114 (USCH!). Detailed discussion on the selection of type in Ward (2010).

A. *Amsonia tabernaemontana* var. *tabernaemontana*

Anonymus suffrutex Gronov., Fl. Virg. 26. 1739. **TYPE: Virginia**. No collection data, *J. Clayton* 306 (holotype: BM-Clayton Herbarium, not located, presumed lost Pringle (2004); Reveal & Jarvis 2009; Ward 2010).

Tabernaemontana amsonia L., Sp. Pl. ed. 2. 1: 308. 1762. *Tabernaemontana humilis* Salisb., Prodr. Strip. Chap. Allerton. 148. 1796. *Amsonia amsonia* (L.) Britton, Mem. Torrey Club 5: 262. 1894. **LECTOTYPE** (Reveal & Jarvis 2009): No collection data (LINN 304.5!).

Amsonia latifolia Michx., Fl. Bor. Amer. 1:121. 1803 ≡ *Ansonia latifolia* (Michx.) Raf., New Fl. 4:58. 1838. **TYPE:** In umbrosis humidis sylvarum Carolinae, *Michaux s.n.* (holotype: P!).

Amsonia tristis Smith in Rees, Cycl. 35: Amsonia No. 2. 1817. **TYPE: England**. London, from the garden of James Vere at Knightsbridge, Jun 1808, *J. Vere s.n.* (holotype: LINN-HS 449.23!).

Amsonia salicifolia Pursh var. *ciliolata* A. DC., Prodr. 8:385. 1844. **LECTOTYPE** (designated here): **Louisiana**. 1836, *L.F. Tainturier s.n.* (G-DC 136584/1!). Candolle (1844) cited two specimens — one was collected in Alabama by Torrey, and the other specimen was collected in Louisiana by Tainturier. The Tainturier specimen was selected as the lectotype because the Torrey specimen was not been located by Williams in either G or P.

Var. *tabernaemontana* is recognized by its elliptic-oblong leaves, sparse inflorescence (Fig. 2), and distribution throughout the southeastern USA (Fig 1). It is often found with glabrous stems, but a few populations in South Carolina (Colleton, Dorchester, Laurens, McCormick, and Saluda counties) have pubescent stems. Pringle (2004) and Ward (2010) have given detailed accounts of the nomenclatural history of this species.

In his treatment of the Apocynaceae, de Candolle (1844) recognized *Amsonia salicifolia* and described a new variety for the species: var. *ciliolata* A. DC. Var. *ciliolata* was described as identical to var. *salicifolia* with the exception of having ciliolate versus glabrous leaves. This taxon has subsequently been identified as *A. ciliata* var. *ciliolata* (A. DC.) Lemke & Ayers in two publications (Smith et al. 1992; Hyatt 1993) but in neither publication was the basionym cited. In accordance with Article 41.1 of the Melbourne Code (McNeill et al. 2013), the name is not valid. Examination of the type specimen clearly indicates it to be a specimen of var. *tabernaemontana*.

B. *Amsonia tabernaemontana* var. *salicifolia* (Pursh) Woodson, Ann. Missouri Bot. Gard. 15: 406. 1928. *Amsonia salicifolia* Pursh, Fl. Amer. Sept. 184. 1814. *Amsonia salicifolia* (Pursh) Raf., New Fl. 4: 58. 1838. *Amsonia tabernaemontana* var. *salicifolia* (Pursh) Woodson ex Máthé & Máthé, Bot. Közlem. 69: 148. 1982. **TYPE:** North America, May, *Lyon s.n.* (not located, Ewan 1979).

Amsonia tabernaemontana var. *gattingeri* Woodson, Ann. Missouri Bot. Gard. 15: 408. 1928. **TYPE: Tennessee**. Knox Co.: Islands in Cumberland River, near Nashville, Jun, *Gattinger* 2268 (holotype: MO!; isotype: GH!).

Diagnostic characters used to define var. *salicifolia* have varied, probably because none of the previous monographers of *Amsonia* (Woodson 1928, 1938; Máthé & Máthé 1982) ever cited, located, or observed the type specimen of var. *salicifolia*.

In his original description of *Amsonia salicifolia*, Pursh (1814) described the species as smooth having linear-lanceolate leaves, acute at both ends. He cited “In Carolina and Georgia, Lyon, May” as the type description. The “Lyon” in the type description refers to John Lyon (1765-1814),

noted nurseryman and botanical explorer of the American East Coast (Ewan & Ewan 1963). In 1979 Pursh's *Flora Americae Septentrionalis*, where *A. salicifolia* was originally described, was reissued as a facsimile reprint. In the reprint, Ewan (1979) included a list of the type specimens for all the names described by Pursh. For *A. salicifolia*, Ewan (1979) simply wrote "not located."

In the first thorough monograph of *Amsonia*, Woodson (1928) treated *A. salicifolia* as a variety of *A. tabernaemontana*, creating the new combination *A. tabernaemontana* var. *salicifolia* (Pursh) Woodson. Woodson regarded the taxa conspecific based on their shared pubescent corollas and glabrous follicles. He distinguished the two varieties using leaf morphology, var. *tabernaemontana* with ovate to oblong-lanceolate leaf blades, and var. *salicifolia* with lanceolate to linear-lanceolate leaf blades. Woodson (1928) also described a third variety of *A. tabernaemontana*, var. *gattingeri* Woodson. He defined var. *salicifolia* and var. *gattingeri* as both having lanceolate to linear-lanceolate leaf blades. He distinguished the two varieties by their inflorescence morphology, with var. *salicifolia* having a sparse inflorescence and var. *gattingeri* having a dense inflorescence. Woodson (1938) subsequently expanded his concept of var. *salicifolia* to include a dense inflorescence when he synonymized var. *gattingeri* under var. *salicifolia*. Correll and Johnston (1970) followed Woodson's (1938) treatment and recognized var. *gattingeri* as a synonym of var. *salicifolia*. However, in the most recent treatment of the *A. tabernaemontana* complex, Máthé & Máthé (1982) recognized var. *salicifolia* and var. *gattingeri* as distinct from one another, using the same "sparse" vs. "dense" inflorescence criterion.

As recognized here, the concept of var. *salicifolia* follows Woodson's (1938) diagnosis, where he defined the taxa as having lanceolate to linear-lanceolate leaf blades, dense inflorescence, and glabrous calyces.

In his original description of *Amsonia salicifolia*, Pursh (1814) reported its distribution as "Carolina and Georgia." Although lanceolate- to linear-lanceolate-leaved specimens occur sporadically throughout the American Southwest, the distribution of var. *salicifolia* is centered in Tennessee, Illinois, and Indiana (Fig. 1).

C. *Amsonia tabernaemontana* var. *illustris* (Woodson) J.K. Williams, **comb. et stat. nov. *Amsonia illustris* Woodson, Ann. Missouri Bot. Gard. 16: 407. 1929. **TYPE: Missouri.** Jasper Co.: Gravelly beds near Webb City, 15 Jul 1909, *E. J. Palmer 2438* (holotype: MO!).**

Vars. *illustris* and *repens* might appear synonymous given that they both possess pubescent calyces and lanceolate leaves, and the smaller leaves and geniculate rootstock described by Shinners (1951) to separate the taxa are not consistent characters. However, while both taxa possess pubescent calyces, the distribution of their pubescence is not similar. Observations of several hundred herbarium specimens reveal that the sepal hairs of var. *illustris* are ciliate, emerging from the margins of the calyx lobes (Fig 3a), and occasionally from the body of the calyx lobe, while the sepal hairs of var. *repens* are tomentose and emerge from the calyx tube (Fig. 3b). The calyx lobes themselves are glabrous. Although a nuanced character the difference between the two taxa is consistent with the geographic distinction of var. *illustris* and var. *repens* (Fig. 1). Observations also indicate that the adaxial leaf midrib of var. *repens* is consistently villous, while in var. *illustris* the midrib is glabrous to glabrescent.

D. *Amsonia tabernaemontana* var. *repens* (Shinners) J.K. Williams, **comb. et stat. nov. *Amsonia repens* Shinners, Field & Lab. 19: 126. 1951. **TYPE: Texas.** Wharton Co.: 2 mi W of El Campo along Hwy 59, infrequent in pasture adjoining highway, 29 Mar 1949, *Cory 55089* (holotype: SMU!).**

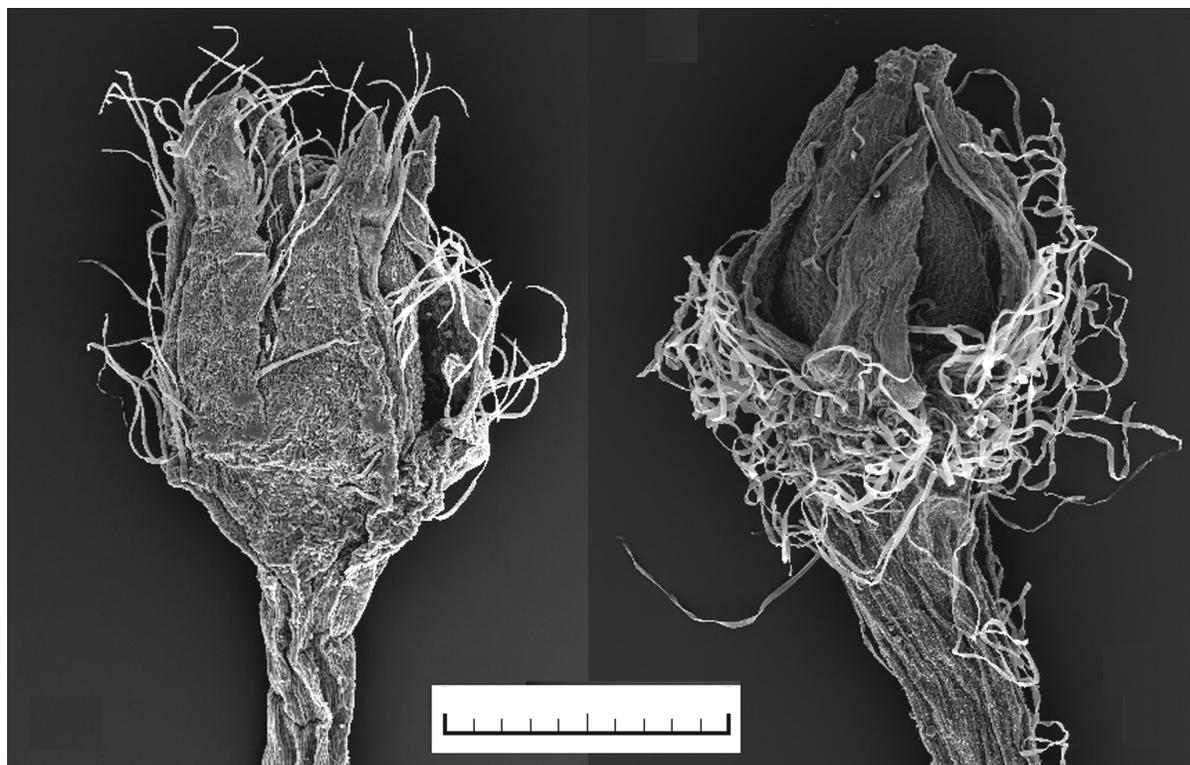


Figure 3. Scanning electron microscopy photograph of the calyx of (left) var. *illustris* and (right) var. *repens*. The images were taken at 64x using 30Kv by the author. The scale bar equals 10 mm.

Amsonia repens Shinnery was previously treated as a variety of *A. tabernaemontana* in Turner et al. (2003). Unfortunately, when Turner et al. (2003) proposed the new combination they did not reference the basionym. Article 41.1 of the Melbourne code (McNeill et al. 2013) states that new combinations are not validly published unless "accompanied by a reference to the basionym." The variety is here validly published with the inclusion of its basionym.

As described above, var. *repens* is distinguished from var. *illustris* by the distribution of the calyx hairs (calyx tube vs. calyx lobes) and its distribution (Fig. 1) in southern Oklahoma and Texas (vs. northern Oklahoma and Missouri).

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