

A NEW HEDGE-NETTLE (*STACHYS*: LAMIACEAE) FROM THE SOUTHERN APPALACHIAN MOUNTAINS

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ABSTRACT

A new hedge-nettle species (*Stachys*: Lamiaceae) is described from the Southern Section of the Blue Ridge Physiographic Province of the Southern Appalachian Mountains. ***Stachys appalachiana*** is a narrow endemic known from northwest North Carolina and southwest Virginia. A key for separating morphologically and geographically related taxa is provided, as well as photographs demonstrating the diagnostic characteristics of this new taxon.

ZUSAMMENFASSUNG

Eine neue Ziest-Art (*Stachys*: Lamiaceae) aus der südlichen Sektion der physiographischen Blue-Ridge-Provinz der südlichen Appalachen wird beschrieben. ***Stachys appalachiana*** ist ein Endemit, der ausschließlich aus dem Nordwesten North Carolinas und dem Südwesten Virginias bekannt ist. Ein Schlüssel zur Bestimmung morphologisch und geographisch verwandter Taxa sowie Fotos der diagnostischen Merkmale der neuen Art werden präsentiert.

RESUMEN

Se describe una nueva especie de ortiga muerta (*Stachys*: Lamiaceae) de la parte sur de la provincia fisiográfica de Blue Ridge del sur de los Montes Apalaches. ***Stachys appalachiana*** es un endemismo restringido que se conoce del noroeste de Carolina del Norte y suroeste de Virginia. Se ofrece una clave para separar taxa morfológica and geográficamente relacionados, así como fotografías que muestran las características diagnósticas de este nuevo taxon.

There are approximately forty-five native and naturalized species of hedge-nettles (*Stachys* L., Lamiaceae) in North America. The southeastern United States harbors nearly twenty species, with high levels of diversity centered in and around the southern Appalachians, and along the Atlantic Coast (Nelson 2008; Weakley 2011). Continued studies in the genus by the second author have revealed various cryptic taxa, including *Stachys iltisii* J.B. Nelson (Nelson 2008) and *S. matthewsii* G.P. Fleming, J.B. Nelson & J.F. Townsend (Fleming et al. 2011). Recent investigations into an enigmatic taxon first discovered in the Blue Ridge Mountains in 1974 indicate that an additional species should be recognized.

Stachys appalachiana D.B. Poindexter & J.B. Nelson, sp. nov. (Figs. 1, 2 G–H, 3). TYPE: UNITED STATES. NORTH CAROLINA. **Ashe Co.**: Fleetwood, along US Hwy 221, moist roadside along the South Fork of the New River, 23 Jul 1974, J.B. Nelson 294 (HOLOTYPE: NCU!; ISOTYPES: CLEMS!, NY!).

A *Stachyde latidente* et *S. hispida* et *S. eplingii* pubescentia caulina densa, lobis calycis lanceolatis patentibus, trichomatibus caulinis calycinisque glandulosis longis ad sessilibus necnon eglandulosis longis vel brevibus differt.

Perennial **herbs** usually 1–2 m tall from pale slender rhizomes, often in colonies of 5–10 individuals. **Stems** hollowed toward the base, especially on larger plants, which generally feature dead/shriveled leaves by late summer at the lowest nodes, bases and foliage also commonly moldy/mildewed by mid-late growing season; stems erect to reclining, containing soft, white pith distally; stems sparingly branched, and then from the upper one or two sterile nodes; **stem faces** commonly sunken, especially toward the base, thus forming U-shaped troughs between the angles, glabrate to sparsely pubescent with an admixture of primarily sessile, atomiferous glands and rarely stipitate glands that increase in abundance distally and just below the nodes, seldom exhibiting a few cylindrical, multicellular trichomes, which also become more common distally and at the base of the

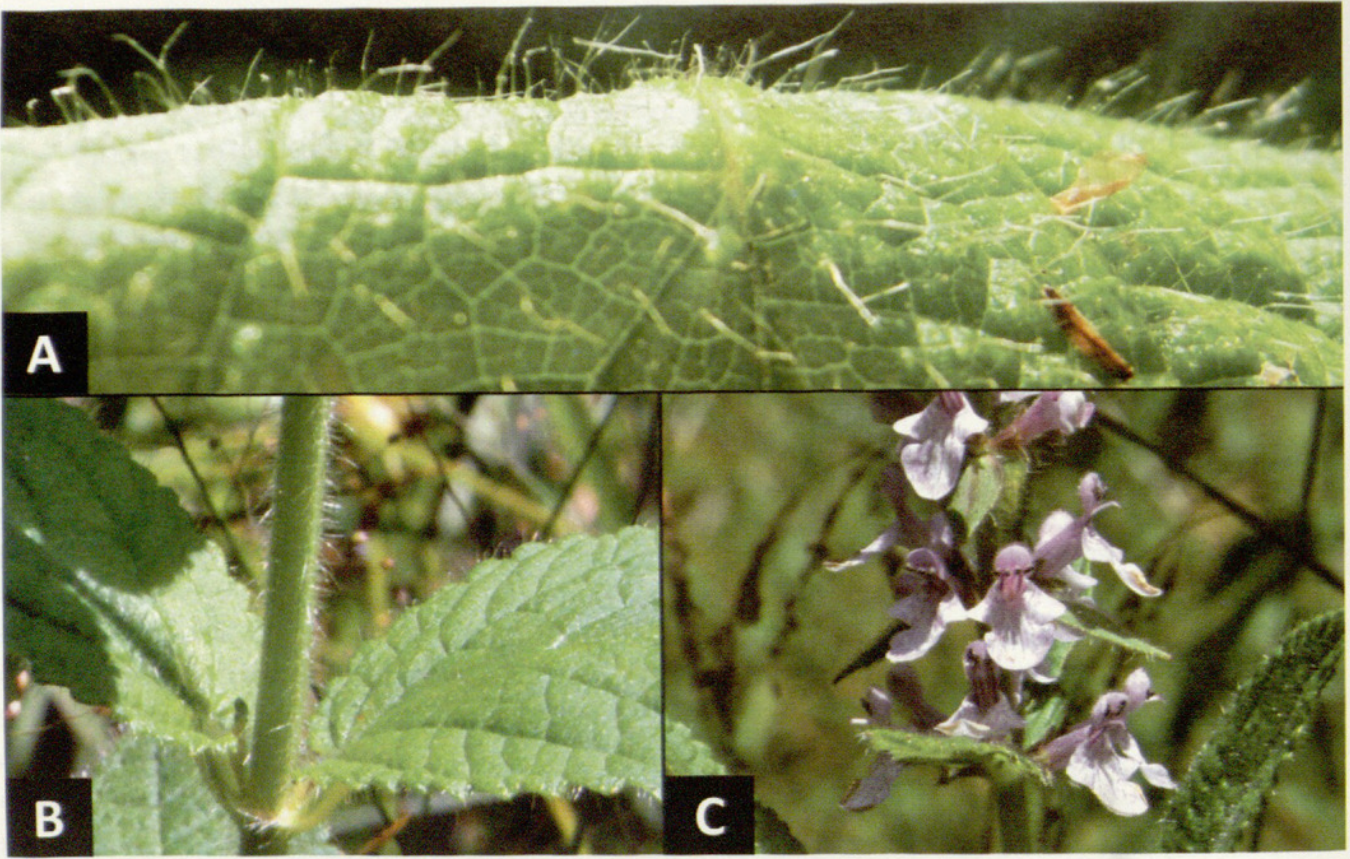


FIG. 1. *Stachys appalachiana* (based on D.B. Poindexter 09-739, BOON). A) Erect hairs of the adaxial leaf surface, B) densely hispid stem pubescence, and C) inflorescence.

stem; **stem angles** often rounded, densely pubescent with sessile glands, flattened, small one-celled stipitate glandular hairs and taller 2- to 3-celled gland-tipped flexuous trichomes, and longer, 3(–4) cylindrical-celled eglandular hairs with pointed tips and a spreading orientation, ranging from (1.5–)2–2.5(–3) mm in length with a broad basal cellular complex; **nodes**, especially the lower, densely bearded-pubescent with straight, multi-celled eglandular hairs, these ascending, spreading and retrorse, or often flattened during pressing. **Leaves** narrowly elliptic to ovate-elliptic, broadest toward middle, 8–12 x 3.5–5 cm, spreading, densely pubescent on the prominently rugose adaxial surfaces with mostly erect (antrorsely appressed in specimens) eglandular hairs, and moderately to densely pubescent (especially along the veins) on abaxial surfaces with long (stiffly erect-spreading) hairs and occasional short to sessile glandular trichomes, pubescence density increasing on leaves on distal portions of the plant, base cordate to truncate, apex acute to broadly acuminate, margin crenate-serrate with 2–3 teeth per cm, highest point of each tooth terminating a veinlet, tooth margins ciliate with spreading eglandular and stipitate glandular hairs, petioles 5–6 mm long (very rarely up to 1 cm on lower stem leaves), pubescent with eglandular and stipitate glandular hairs. **Inflorescences** commonly elongated at maturity, and densely pubescent on all faces; bracts more or less three-veined from base, rapidly reduced distally from highest sterile node, or the first one or two fertile nodes with somewhat leafy, toothed bracts; upper (distal) bracts trullate to ovate, densely ciliate; **axillary cymules** each with (3–)4(–5) flowers, verticils thus (6–)8(–10) flowered, bractlets of flowers spinulose, bristly-pubescent. **Flowers** bisexual and predominately fertile; **calyces** actinomorphic, calyx of fully opened flowers 5.7–6 mm long, tube 3–4 mm long, lobes approximately half the length of the tube, 2.0–2.4 mm long, narrowly deltoid to lanceolate at maturity, each lobe terminated with a pale, spinose tip ca. 0.1–0.2 mm long; calyx tube and lobes generally densely pubescent on the outer surface with long flexuous stipitate glandular hairs, frequent stiff hairs, and occasional sessile to subsessile glandular trichomes, less pubescent to glabrate on the inner surface, with glandular and eglandular trichomes; lobes commonly ciliate with stipitate glandular hairs, flared at anthesis and becoming somewhat

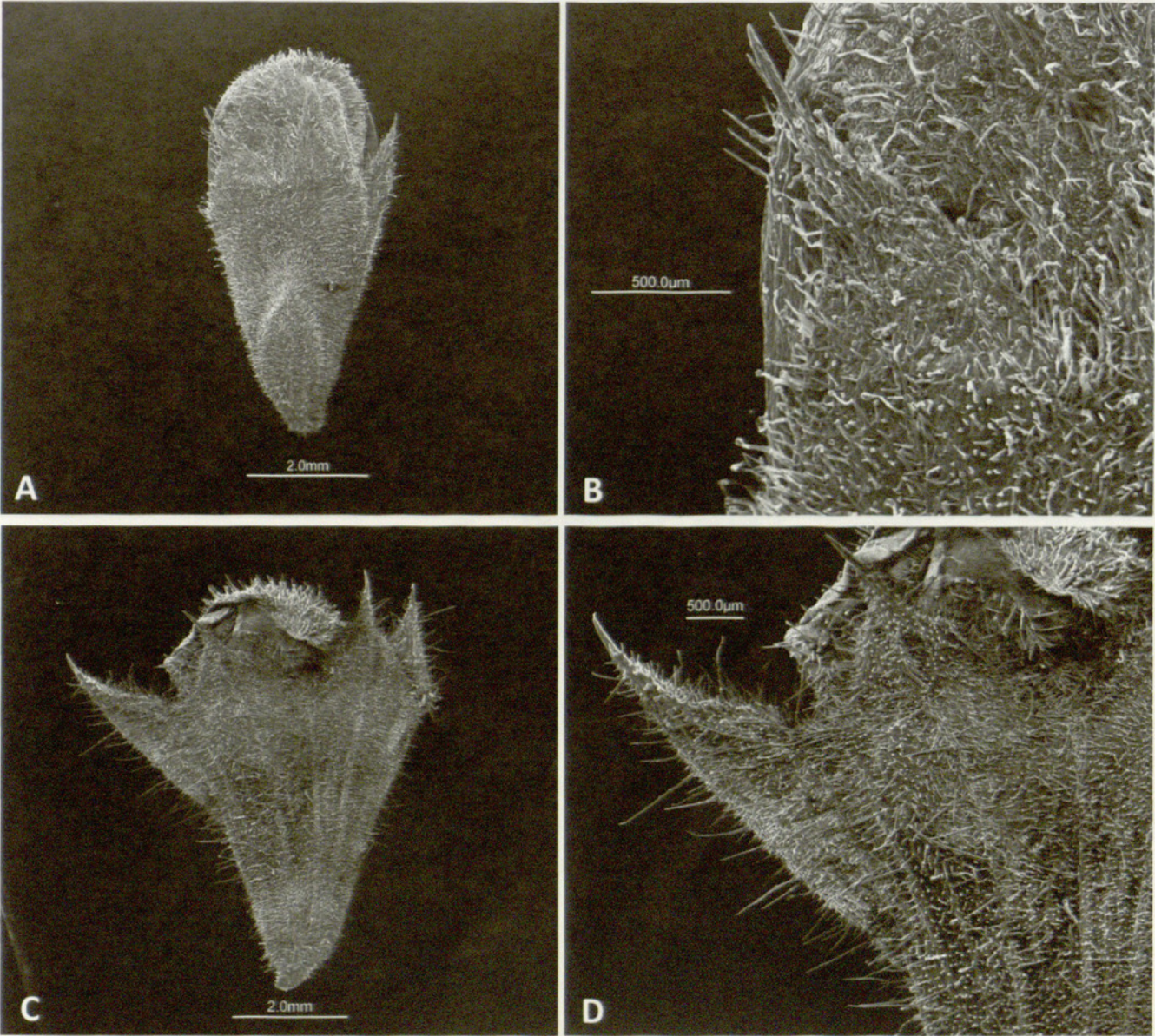


FIG. 2. SEM images of *Stachys* calyces. A–B) *Stachys latidens* (D.B. Poindexter 05-1287, BOON) exhibiting narrowly deltoid lobes and short stipitate glandular pubescence. C–D) *Stachys eplingii* (T.F. Wieboldt 9461, USCH) with broadly deltoid lobes and a mixture of eglandular and short stipitate to atomiferous glandular hairs.

spreading (recurved) with mature fruit; **corollas** tubular, 10–12 mm long from the base to the tip of the upper lip (galea); tube bright pink, pubescent with appressed eglandular hairs, 7–8 mm long, saccate toward the base on the ventral side, glabrous internally except for a pronounced oblique annulus comprised of soft-flexuous, somewhat clavate flattened hairs, its basal point just posterior to the pouch; galeae up to 3.5 mm long and nearly solid pink, usually rounded, but occasionally emarginate apically, surface with eglandular multicellular hairs and margins with both eglandular and long stipitate glandular trichomes; lower lip declined 80°–90° at full anthesis, 5–6 mm long, featuring prominent pink-purple blotches and lines on a pale background, with greater concentrations of anthocyanins along the margins, abaxially with a patch of eglandular trichomes. **Mericarps** dark brown, 1.6–2 mm x 1.2 mm, minutely verrucose, often with fungal hyphae that appear as tri-chome-like projections.

Additional specimens seen: **UNITED STATES. NORTH CAROLINA. Alleghany Co.:** near Edmonds, 0.26 km N of NC Hwy 18, over ultra-mafic substrate, 8 Jul 2009, D.B. Poindexter 09-739 (BOON); same location, 10 Aug 2009, D.B. Poindexter 09-909 (BOON). **Watauga Co.:** roadside-field border, 1.7 mi SE of Boone on US 321-221, 25 Jul 1958, H.E. Ahles 47582 (NCU). **VIRGINIA. Carroll Co.:** E side of US 221, ca. 0.25 mi N of jct. with US 58 on NE side of Hillsville, 18 Jul 1995, J.B. Nelson 16753 (USCH); same location, 18 Jul 1996, J.B. Nelson 17583

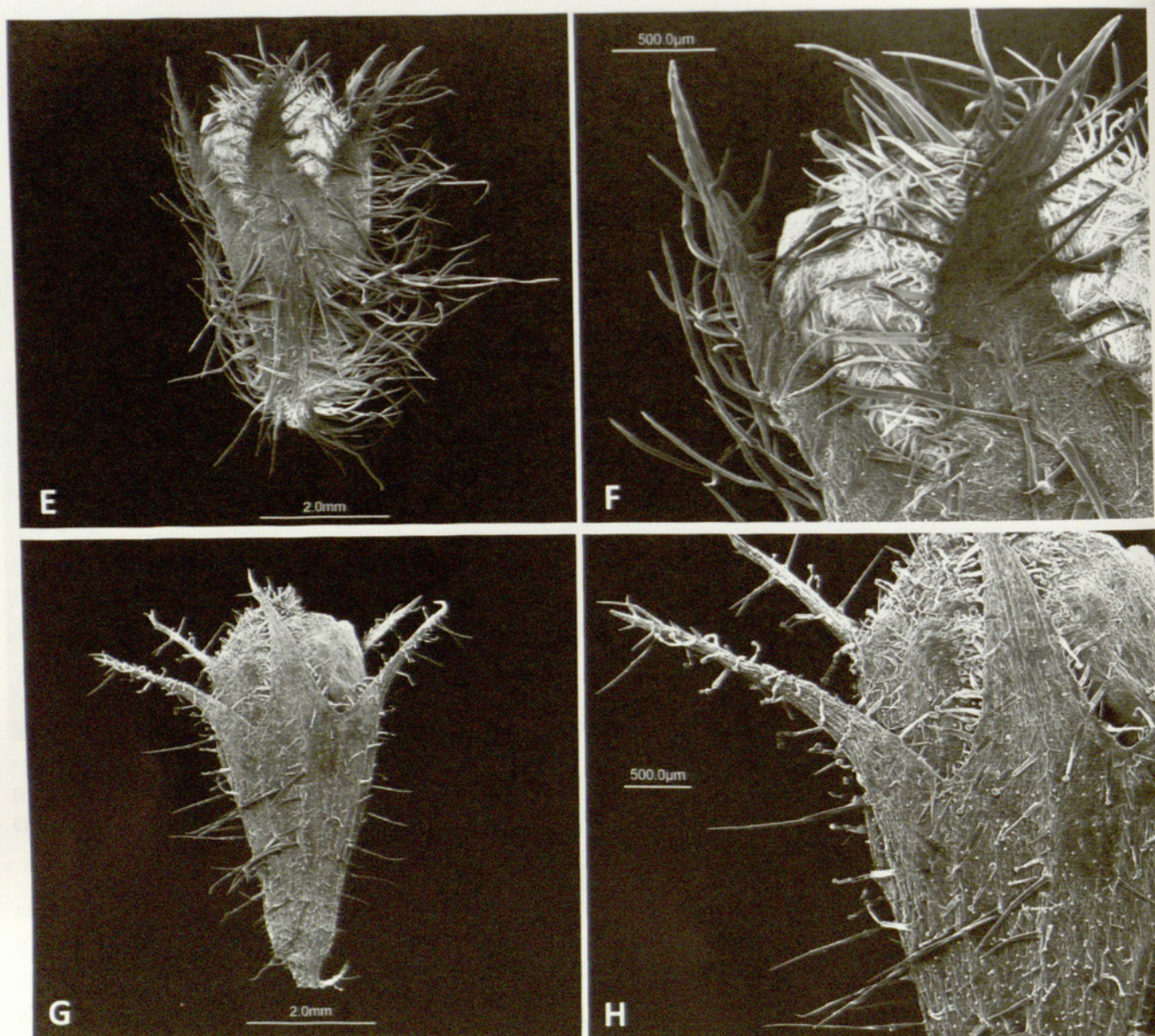


FIG. 2 (continued). SEM images of *Stachys* calyces. E–F) *Stachys hispida* (D.B. Poindexter 05-1287, BOON) demonstrating erect, narrowly lanceolate lobes densely covered in long hispid trichomes and sparse sessile glands. G–H) *Stachys appalachiana* (D.B. Poindexter 09-790, paratype, BOON) with characteristic flaring, narrowly lanceolate lobes and a mixture of long to sessile glandular and eglandular hairs.

(USCH). **Floyd Co.:** bog near intersection of Blue Ridge Parkway and Rt. 639, 22 Jun 1981, D.W. Ogle s.n. (VPI). **Grayson Co.:** bog on Meadow Creek, W of Rt. 622, just N of jct. of Rt. 617, 31 Aug 1982, D.W. Ogle s.n. (VPI); same location, 19 Jul 1994, J.B. Nelson 16770 (USCH); same location, 16 Jul 2009, D.B. Poindexter 09-789 (BOON); same location and date, J.B. Nelson 27699 (USCH); Parson's Bog near Baywood, 2 Jul 1983, D.W. Ogle s.n. (VPI); W side of Meadow Creek on the E side of Delhart Rd. (VA 622), 1.05 mi SE of US 58, 16 Jul 2009, J.B. Nelson 27697 (USCH); same location and date, D.B. Poindexter 09-790 (BOON).

DISCUSSION

Distribution and Habitat.—*Stachys appalachiana* is a narrow endemic restricted to a few populations in the Southern Blue Ridge Physiographic Province (Fenneman 1938) of the Southern Appalachian Mountains (sensu Braun 1950). Collections of this taxon have been made in only six counties, Alleghany, Ashe, and Watauga, NC, and Carroll, Floyd, and Grayson, VA (Fig. 4). This species should also be sought in neighboring montane counties.

It is well known that the southern Appalachians harbor a wealth of rare taxa, comprised of both northern species that have been able to persist in this region following Pleistocene glacial recession, and other taxa that



FIG. 3. Holotype of *Stachys appalachiana* (J.B. Nelson 294, NCU).

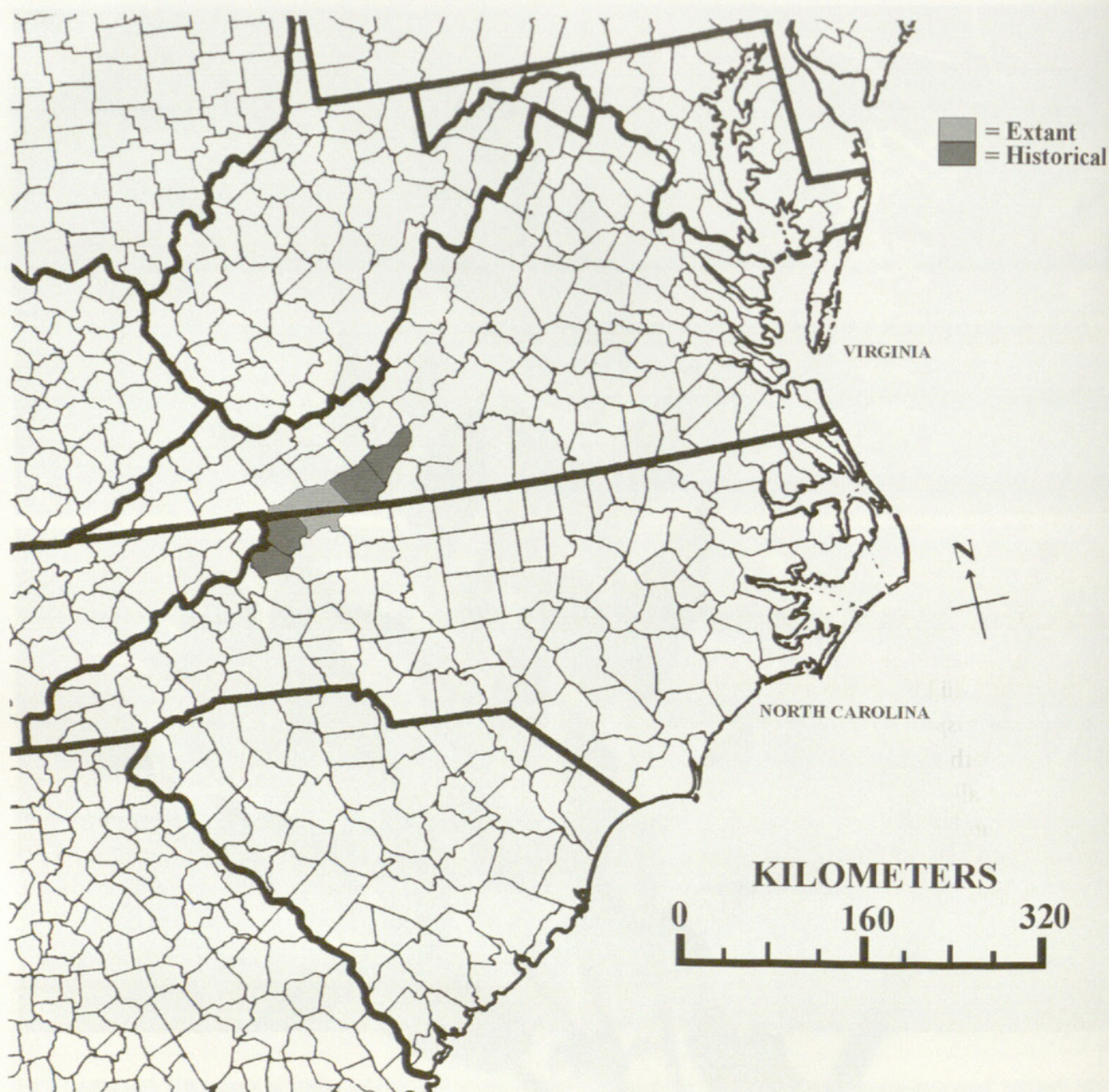


FIG. 4. Current and historical distribution of *Stachys appalachiana*.

are endemic to this area (Harper 1947; Wood 1970; Murdock 1994; Pittillo 1994). Species-level endemism in *Stachys* of the southern Appalachians is not novel. *Stachys clingmanii* Small was described from Clingman's Dome in the Great Smoky Mountains and is also endemic to the same physiographic area, yet not sympatric with *S. appalachiana* (Small 1903; Weakley 2011). *Stachys latidens* Small ex Britton is also primarily confined to the southern Appalachians and rarely occurs in adjacent Piedmont regions. It is not the purpose of this paper to provide a discourse on southern Appalachian endemism, but it is interesting to note that other cryptic endemics have been recently described from comparable taxonomically difficult genera (e.g., *Eutrochium steelei* (E.E. Lamont) E.E. Lamont) (Lamont 1990).

Stachys appalachiana is found primarily in open bogs and fens, exhibiting an apparent affinity for soils derived from mafic or ultramafic substrates, although not restricted to these soils. It is also known from wet areas and flood plains near or adjacent to tributaries with ample sunlight. In ideal habitats, *Stachys appalachiana* may become quite tall, leaning upon surrounding vegetation. Most associates are somewhat ubiquitous (e.g., *Eutrochium fistulosum* (Barratt) E.E. Lamont, *Lyonia ligustrina* (L.) DC. var. *ligustrina*, *Phalaris arundina-*

cea L., *Salix sericea* Marshall, *Rubus pensilvanicus* Poir., *Teucrium canadense* L., and *Verbesina alternifolia* (L.) Britton ex Kearney). However, this species has been noted by the authors to co-occur with other uncommon taxa in the southern Appalachians, such as *Campanula aparinoides* Pursh var. *aparinoides*, *Calamagrostis canadensis* (Michx.) P. Beauv. var. *canadensis*, *Carex trichocarpa* Muhl. ex. Willd., *Filipendula rubra* (Hill) B.L. Rob., *Galium asprellum* Michx., *Lilium canadense* L. var. *editorum* Fernald, *L. grayi* S. Watson, *Thalictrum macrostylum* Small & A. Heller, and *Veronicastrum virginicum* (L.) Farw. Flowers of *Stachys appalachiana* are visited by numerous insect species including honeybees and other hymenopterans. Like other hedge-nettles (and many other labiates), mericarps of this species are often susceptible to frugivory by the hemipteran *Sehirus cinctus* (P. Beauv.) (Sites & McPherson 1982).

Taxonomic Distinctiveness.—Taxonomic delineations in *Stachys* have been primarily based on morphological characters such as calyx lobe shape (deltoid vs. lanceolate), petiole lengths of mid-stem leaves, number of flowers per verticil, and pubescence patterns of the calyx, stem faces (of the uppermost sterile internode), and stem angles (e.g., Small 1903; Mulligan & Munro 1989; Nelson 2008; Weakley 2011).

Stachys appalachiana is distinctive in its combined possession of a wetland habitat preference, leaf blades elliptic, crenate to serrate, flowers 8–10 per verticil, calyx lobes lanceolate flaring (with long flexuous glandular and stiff eglandular hairs), adaxial leaf surfaces with very abundant, soft erect hairs, abaxial leaf surfaces sparingly stipitate glandular, stem angles with prominent and abundant stiff and retrorse hairs (including long stipitate glandular hairs), and stem faces glabrate with relatively few glandular or eglandular trichomes (Figs. 1–2).

Stachys eplingii J.B. Nelson and *S. latidens* are sympatric with *S. appalachiana*, while the more geographically removed *S. hispida* Pursh has been most frequently confused with this new species. These four entities are distinguished with comparative ease.

Calyces of all four taxa differ in pubescence patterns and lobe shape (Fig. 2). More specifically, *Stachys eplingii* and *S. latidens* generally exhibit broader, more deltoid calyx lobes, with a primarily short stipitate glandular pubescence (*S. eplingii* also possesses spreading eglandular trichomes). *Stachys appalachiana* and *S. hispida* have demonstrably more strongly lanceolate calyx lobes, with *S. appalachiana* characterized by its short to long stipitate glandular trichomes and more thinly distributed hispid eglandular hairs. *Stachys hispida* lacks long stipitate glands (with usually only atomiferous glands if any) and the calyx is predominately cloaked with very long, stiff trichomes. Another prominent character that is highly useful for segregating these congeners from *Stachys appalachiana* is pubescence patterns of the adaxial leaf surface. *Stachys appalachiana* invariably demonstrates an erect and substantial pubescence (Fig. 1), while its counterparts have appressed and typically less abundant trichomes.

The following discussion outlines the salient features of the aforementioned sympatric and/or morphologically similar species that could be confused with *Stachys appalachiana* (see Table 1 for comparison). *Stachys eplingii* is a plant of wetlands, with leaf blades ovate, crenate-crenulate, flowers 8–10 per verticil, calyx lobes deltoid, abaxial leaf surfaces exhibiting a heavily short stipitate glandular pubescence, stem angles prominently pubescent with spreading and retrorse hairs, and with stem faces consistently and densely short stipitate or otherwise glandular pubescent. *Stachys hispida* may occur in a variety of habitats, with leaf blades elliptical, serrated, flowers 6 per verticil, calyx lobes lanceolate, abaxial leaf surfaces never glandular, stem angles prominently long pubescent, and stem faces glabrous (or occasionally with very sparse sessile glands). *Stachys latidens* can be found in dry-mesic, open to forested habitats, with leaf blades elliptical, serrated, flowers 6 per verticil, calyx lobes deltoid, abaxial leaf surfaces scarcely or never glandular, stem angles featuring relatively short retrorse, eglandular broad-based trichomes, and stem faces largely glabrous or with sparse sessile glands.

Conservation Status.—Five populations were visited in the summers of 2009 and 2010. Plants from at least two of the older collection sites, specifically those from Ashe Co., NC (type locality) and Carroll Co., VA are no longer extant. Only three sites of the five areas visited have confirmed viable populations that seem to be thriving and healthy. These sites include two areas along Delhart Rd. (SR 622; Grayson Co., VA) and the newly discovered population at Savannah Church Bog (Alleghany Co., NC). Other cited populations from Watauga Co.,

TABLE 1. Comparison of sympatric and morphologically similar species of *Stachys*.

Character	<i>S. latidens</i>	<i>S. eplingii</i>	<i>S. hispida</i>	<i>S. appalachiana</i>
Distribution	Broadly Southern Appalachian, mostly at mid- to high elevation, rare in the Piedmont, GA-PA	Sporadic in the Southern and Central Appalachians, WV, VA (rare in w NC)	Rare in the NC. Mainly lowlands, Piedmont and Ridge and Valley	Narrow endemic of mid-elevations in the Southern Appalachians (sw VA and nw NC)
Habitat	Upland forests and clearings	Wetlands	Various	Wetlands
Leaf blades	Serrate	Crenate-crenulate	Serrate	Crenate to serrate
Stem faces	Glabrous or with sparse sessile glands	Densely short stipitate glandular	Glabrous or with sparse sessile glands	Glabrate with scattered glandular and eglandular trichomes
Stem angles	Short retrorse, broad-based eglandular trichomes	Spreading and retrorse eglandular trichomes, and often short stipitate glandular trichomes	Long spreading-retrorse eglandular trichomes	Long, mostly retrorse trichomes and long flexuous and short stipitate glandular trichomes
Calyx lobes	Deltoid to deltoid-lanceolate, erect	Broadly deltoid, erect	Lanceolate, erect	Lanceolate, flaring
Calyx pubescence	Short stipitate glandular to glabrate	Densely short stipitate and sessile glandular, with hispid eglandular trichomes	Densely long eglandular trichomes, sparse sessile glands	Long stipitate and short to sessile glandular, with hispid eglandular trichomes
Flowers/verticil	6	8–10	6	8–10

NC, and Grayson Co., VA, were not investigated, and may still be present. Future monitoring is imperative, especially considering the observed population extirpation at some historic sites.

Since only three populations are currently known to be extant, this taxon should be provisionally treated as S1 or “critically imperiled” on a State Rank Status basis in both NC and VA. Furthermore, *Stachys appalachiana* should tentatively receive the Global Rank Status of G1 or “critically imperiled” (as defined in Buchanan & Finnegan 2010).

Nomenclature.—As alluded to by the specific epithet, “Appalachian Hedge-nettle” seems to be an appropriate colloquial name for this entity.

Etymology.—The sparse distribution of this plant in the Blue Ridge Physiographic Province of the Southern Appalachians, and the fortuitous availability of “*appalachiana*” are responsible for the applied epithet.

KEY TO STACHYS APPALACHIANA AND MORPHOLOGICALLY AND GEOGRAPHICALLY RELATED SPECIES
(modified from Nelson 2008 and Weakley 2011)

- 1. Petioles well-developed (mid-stem leaves with petioles typically greater than 15 mm), 1/3 or more the length of the blade.
 - 2. Calyx tube and lobes with few or no glandular hairs.
 - 3. Upper stems slender, commonly branched, stem angles glabrous to sparsely pubescent; calyx glabrous to sparsely pubescent, lobes commonly recurved in fruit; _____ *S. tenuifolia* Willd.
 - 3. Upper stems slender to stout, mostly unbranched unless injured, stem angles hispid to hispidulous; calyx hispid to hispidulous, lobes generally straight in fruit.
 - 4. Leaf blade base truncate; stem pubescence spreading; high elevation (ca. 1000–2020 m) _____ *S. clingmanii*
 - 4. Leaf blade base rounded; stem pubescence mostly retrorse; low to middle elevations (ca. 100–800 m) _____ *S. hispida* (long-petioled forms)
 - 2. Calyx tube and lobes with abundant sessile and/or stipitate glandular hairs.

- 5. Leaf blades dentate or nearly so; blade apices acuminate _____ *S. clingmanii*
- 5. Leaf blades serrate to crenate-serrulate; blade apices acute.
 - 6. Mid-stem leaf blades ovate to broadly ovate, base cordate, margins crenulate _____ *S. cordata*
 - 6. Mid-stem leaf blades elliptic-oblong, base rounded to slightly cordate, margins crenate to serrate _____ *S. nuttallii* Shuttlew. ex Benth.
- 1. Petioles short (mid-stem leaves with petioles typically less than 15 mm) to essentially absent.
- 7. Stem angles conspicuously pubescent with long spreading and/or retrorse eglandular hairs.
- 8. Calyx lobes lanceolate, about ½ length of tube.
 - 9. Upper stem faces, inflorescence axis, and calyx moderately or densely glandular-pubescent; calyx lobes spreading/flaring in fruit; flowers 8–10 per verticil _____ *S. appalachiana*
 - 9. Upper stem faces and inflorescence axis glabrous, calyx with none or very few glandular trichomes, if present, mostly restricted to calyx lobes; flowers 6 per verticil _____ *S. hispida*
- 8. Calyx lobes deltoid, less than ½ length of tube.
 - 10. Stem faces glabrous, angles mostly spreading eglandular pubescent _____ *S. matthewsii*
 - 10. Stem faces pubescent, angles often spreading and/or glandular pubescent.
 - 11. Leaf blades ovate to lanceolate; flowers 8–10 per verticil _____ *S. eplingii*
 - 11. Leaf blades elliptic; flowers 6 per verticil _____ *S. nuttallii* (short-petioled forms)
- 7. Stem angles glabrate or inconspicuously pubescent, pubescence restricted to short, retrorse eglandular hairs.
 - 12. Leaf margins serrate-crenate; inflorescence bracts abruptly reduced upward from first flowering verticil, never foliose _____ *S. latidens*
 - 12. Leaf margins sharply serrate; inflorescence bracts gradually reduced upward from first flowering verticil, thus foliose _____ *S. subcordata* Rydb.

Second Author's note.—In the summer of 1974 I was a brand new graduate student at Clemson University, having been taken under the care and direction of John E. Fairey, III. My experience with hedge-nettles up to that point had been limited to seeing herbarium specimens and images in publications, and I was thrilled to take part in one of Professor Fairey's pilgrimages to Morgantown and West Virginia University. Our trip in July of that summer thus had two aims: Fairey's reconnoitering and some business with his former professor, Earl Core, and my collecting hedge-nettles (among other things). Interestingly, Core had located a hedge-nettle in Pocahontas County, West Virginia that he was saving for me, a plant eventually described as a new taxon, *Stachys eplingii*.

The morning of July 23 surely broke bright and beautiful at Clemson, and we reached Ashe County well after lunch-time. On not much more than a whim, we parked along the side of US 221 (at what I mistakenly indicated was the New River proper, but was actually the South Fork of the New River) to botanize. The scent of mowed hay, the sound of meadowlarks, and the gorgeous mountain scenery had me in a trance...and by golly, there was a hedge-nettle down there in the grass, a big, pink-flowered, profoundly hairy one. (In retrospect, it seems that the type locality was very degraded habitat, no doubt what was left of a meadow bog, now the base of a road shoulder at a cow pasture.)

So there it was: my first hedge-nettle in the field, and what has turned out to be a new species. I'm not sure if this little story has a moral attached to it, but there are at least two messages. The first is one we keep hearing, in that the need for botany is far from over, and that there are plenty of discoveries yet to be made in our own back yards. The second message is for students, young or old, who have chosen to study botany: hold tightly to the excitement and interest you have for plants, for you have embarked on a marvelous journey of discovery!

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