

**AMBROSIA PORCHERI (ASTERACEAE):
A NEW SPECIES
FROM THE BLUE RIDGE ESCARPMENT OF SOUTH CAROLINA**

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ABSTRACT

Ambrosia porcheri McMillan & Prevost, **sp. nov.**, is described from droughty, exposed shallow soil mats on granitic domes in the Blue Ridge escarpment of South Carolina. It is distinguished from the similar *A. artemisiifolia* by its extremely narrow leaf segments, leaves covered with a sticky exudate, aromatic compounds making the plant fragrant with the odor of jasmine, and larger achenes. These features appear to adapt *A. porcheri* to the harsh habitats found on the shallow soil mats of granitic domes.

Populations of an *Ambrosia* displaying a short, highly-branched habit with very narrow leaves and a unique odor were encountered by McMillan in 2002 on two granitic outcrops in Pickens Co., South Carolina. The plants were strikingly different from populations of *A. artemisiifolia* L., which often grows on rock outcrops and associated shallow-soil glades. After two consecutive seasons of study, McMillan became convinced that they represented an undescribed taxon and enlisted the assistance of Prevost. In a thesis on the taxonomy and habitat of outcrop populations of *Ambrosia* from South Carolina, Prevost (2005) studied the morphology, chromosome number, and habitat preference of this new *Ambrosia* as well as completing shared garden and greenhouse experiments that included the closely related *A. artemisiifolia*. She concluded that the outcrop plants show distinctive morphological and ecological differences when compared to *A. artemisiifolia*. When grown under common greenhouse conditions, the outcrop plants maintained their vegetative and reproductive morphological distinctions.

While no modern authors recognize infraspecific entities within *Ambrosia artemisiifolia*, the morphology of the outcrop plants does not correspond to any of the named varieties or forms of that species (e.g., var. *paniculata* (Michx.) Blankenship), which can all be distinguished by their narrower staminate involucre. We recognize them here as a previously undescribed species.

AMBROSIA PORCHERI P.D. McMillan & L. Prevost, **sp. nov.** **TYPE: USA. South Carolina.** Pickens Co.: Poe Creek tract, SC Forestry Commission, USGS Sunset 7.5' quad, 34° 55' 39" N, 82° 52' 03" W, locally abundant annual herb along margins of shallow-soil glade and granitic dome community, 27 Sep 2003, P.D. McMillan 6973 (holotype: NCU).

This species is similar to *Ambrosia artemisiifolia* but differs in its shorter, more flat-topped stature with proportionately longer branches, puberulent, viscid stems (versus pubescent and hirsute in *A. artemisiifolia*), much narrower lobes of the leaves, larger achenes, and all portions of the plant with distinctive, jasmine-like odor.

Annual monoecious herbs from a slender taproot, stems branched, forming flat-topped plants to 7 dm high, though often much smaller, plant height to width ratio < 0.8, the plant highly aromatic, with the scent reminiscent of jasmine. **Stems** reddish brown to brown, terete, puberulent and viscid on

young growth, branches erect to gradually descending. **Leaves** subopposite to alternate, deeply bipinnatifidly dissected, 1.8–19.9 cm long, 3.1–9.6 cm wide, petiolate, pale grayish-green to green adaxially, sometimes purplish on the abaxial surface in young plants, terminal lobes of leaves oblanceolate, 1–2 mm wide, puberulent and viscid with extremely short trichomes (0.2–0.3 mm). **Staminate racemes** erect, terminal on branches. **Staminate involucre**s pale green, saucer-shaped, irregularly lobed, 2.0–2.2 mm long, 3.2–3.8 mm wide, peduncled, containing up to 20 disk florets. **Pistillate inflorescences** produced in the axils of upper leaves. **Pistillate involucre**s whitish to pale green, containing one or two florets, ellipsoid to obovoid, glabrate to glandular. **Stigma** exerted from the involucre, fused with two lobes. **Achenes** brown to blackish, obovoid, glabrous, 3.5–4.8 mm long, 1.7–2.3 mm wide with 6–7 projections near the apex. **Chromosome number**, $2n = 36$.

Paratypes. USA. South Carolina. Greenville Co.: Eva Russell Chandler Heritage Preserve, abundant in thin soils on edges of granitic outcrop, 5 Aug 2020, *Bradley 10859* (USCH). Pickens Co.: All over meadow on top of Table Rock, 29 Aug 1940, *Radford & Stewart 1678* (NCU); Table Rock, dry, open soil on rock, 13 Sep 1941, *Rodgers 371* (DUKE); Table Rock State Park, along ridge on S side of Table Rock Mountain, 24 Oct 1975, *Clonts 1723* (USCH); Table Rock State Park, Governor's Rock, 6 Oct 1993, *Hill 25212* (CLEMS, USCH, USF); granite outcrop at summit of Table Rock on N side, 7 Oct 1995, *Lewis 44* (USCH); SCFC Poe Creek tract, locally very abundant along the margins of shallow-soil vegetation mats with dense graminoid vegetation on extensive granitic outcropping, 1 Oct 2002, *McMillan 6740* (CLEMS); Poe Creek Outcrop, SC Forestry Commission, abundant in graminoid-dominated shallow-soil glade, 15 Apr 2003, *McMillan 6873* (CLEMS); Poe Creek, SC State Forest, along margins of extensive granite outcrops in shallow-soil "islands" and vegetation mats, 24 Aug 2004, *McMillan 8411* (NCU); Little Pink Mountain, large glade area, 22 Sept 2004, *Boyle & Pittman 09220402* (USCH); Rocky Bald Mountain, granite outcrop, 13 Oct 2004, *Darr 1978* and *Pittman 10130415* (USCH); S-facing granitic outcrops above Lake Carlton Reservoir and N of Carlton Mountain, in Nine Times Area, 27 Oct 2005, *Pittman 10270515* and *Darr 2819* (USCH).

Etymology. The epithet *porcheri* honors South Carolina botanist, mentor, and conservation scientist, Richard D. Porcher Jr., professor emeritus at the Citadel, who has spent his lifetime in pursuit of an understanding of the plants of South Carolina and has encouraged and supported countless students of the discipline, including the authors. We recommend "Outcrop Ragweed" as the common name.

Phenology. Seeds germinate in late March and April. The seedlings often display cotyledons that are tinged with anthocyanins, appearing purplish and this purplish coloration is often found on the abaxial surface of the leaves of young leaves as well. Plants reach maturity and begin to flower in August, continuing until frost (late October).

Ecology and associated species. Plants of *Ambrosia porcheri* grow in shallow soil that forms along crevices and in mats on gently sloping to steep granitic domes in the Blue Ridge escarpment at elevations ranging from approximately 305 m to 884 m. Plants are found on south-facing, southwest, and southeast-facing exposures. These sites are mostly composed of Table Rock Gneiss (Ranson & Garihan 2001). The soil depths on which *A. porcheri* have been found range from 0.25–63 cm. These soils contain a mineral soil that is high in clay content (66.7–84.7%) and highly to moderately acidic in reaction (pH 3.9–5.4) with % organic matter ranging from 2.8–50.4% (Prevost 2005). These rock exposures are subjected to very high temperatures during the summer months.

Ambrosia porcheri is particularly abundant in undisturbed shallow-soil mats in the granitic dome habitat and appears to be ideally adapted to thrive under these difficult conditions. *Ambrosia artemisiifolia* may be found as a minor component of the granitic dome habitat but is never abundant in undisturbed soils at such sites.



Figure 1. *Ambrosia porcheri*. McMillan 6973 (holotype, NCU).



Figure 2. *Ambrosia porcheri*. Photo by E.B. Pivorun, Poe Creek State Forest, Pickens Co., South Carolina, 27 September 2009.

Common associated woody species found in this habitat include *Juniperus virginiana*, *Pinus virginiana*, *Pinus pungens*, *Quercus montana*, *Acer rubrum*, *Vaccinium arboreum*, *Callicarpa americana*, *Chionanthus virginicus*, *Ptelea trifoliata*, *Amorpha glabra*, *Vaccinium pallidum*, *Toxicodendron pubescens* and *Vitis rotundifolia*. Populations of *Ambrosia porcheri* often occur in mats devoid of woody vegetation. Common herbaceous associates include *Danthonia sericea*, *D. epilis*, *D. spicata*, *Bryodesma tortipila*, *Hypericum gentianoides*, *Croton michauxii*, *Opuntia mesacantha* ssp. *mesacantha*, *Carex pensylvanica*, *C. tosa*, *Rhynchospora recognita*, *R. saxicola*, *Aristida purpurascens*, *A. curtissii*, *Andropogon virginicus*, *Schizachyrium scoparium*, *Dichantherium commutatum*, *D. aciculare*, *D. sphaerocarpon*, *D. villosissimum*, *Symphyotrichum dumosum*, *Packera anonymsa*, *P. millefolium*, *Phemeranthus teretifolius*, and *P. mengesii*.

At the type locality many species otherwise typical of the coastal plain are present in the same habitat, including *Drosera brevifolia*, *Sporobolus junceus*, *Platanthera nivea*, *Gymnopogon brevifolius* and *Arnica acaulis*. The presence of plants adapted to dry and moist environments is due in part to the myriad of soil depths and the presence of seasonal seepage along parts of the shallow-soil habitats.

Distribution. *Ambrosia porcheri* appears to be endemic to a small area of Pickens Co., South Carolina, from Table Rock west and south to Poe Creek Outcrop and at one location in Greenville Co., South Carolina. Large populations occur at the type location at Poe Creek State Forest and at Table Rock State Park. Smaller populations are found in the Nine Times area on Little Pink Mountain, Cedar Rock Mountain, and Rocky Bald Mountain in Pickens County and at Eva Chandler Heritage Preserve in Greenville County.

Conservation status. Due to the small number of populations and limited area of occurrence, ranks of G1 and S1 are suggested for *A. porcheri*. Because of the limited habitat and threats due to overuse of the areas through recreation, disturbance by timbering activities of the largest populations, and potential hybridization threats from the related *A. artemisiifolia* following disturbance, we believe this species should be immediately evaluated for listing under the federal Endangered Species Act and should be tracked by the South Carolina Department of Natural Resources.

Discussion. Granitic outcrops in the southeastern USA have high levels of endemism (Wyatt 1997). Many of the endemics are closely related to a more adaptable or widespread species whose range overlaps that of the endemic but does not occur solely or primarily in the granitic outcrop habitats (Murdy 1966; Murdy 1968; Murdy et al. 1970). Species pairs such as *Rhynchospora saxicola* (restricted to granitic outcrops) and *R. recognita* (wide ranging in various open habitats) and *Portulaca smallii* (confined to granitic outcrops) and *P. pilosa* (wide ranging and often weedy) seem to mirror the species pair formed by *Ambrosia porcheri* and the widespread and often weedy *A. artemisiifolia*. These species pairs seem to indicate peripatric speciation events on outcrops at the edge of the range or habitat of more widespread species. The larger achene size in *Ambrosia porcheri* compared to *A. artemisiifolia* also seems to fit the species pair phenomena seen in other groups with the larger achene limiting longer-distance dispersal away from the preferred habitat (Wyatt 1997). The smaller, more easily dispersed achenes of *A. artemisiifolia* might allow for better dispersal into other widespread weedy habitats.

Key to the *Ambrosia* species of the Carolinas - adapted from Prevost (2005)

1. Heads sessile, leaves entire, lanceolate with 2 teeth near base ***Ambrosia bidentata***
1. Heads peduncled, leaves variously dissected or lobed.
 2. Leaves 3- or 5- lobed, occasionally entire ***Ambrosia trifida***
 2. Leaves 1–2x pinnatifid.

3. Perennial, leaves opposite, sessile to subsessile **Ambrosia psilostachya**
3. Annual, leaves opposite towards the base, alternate higher on the stem and on branches, petiolate.
4. Achene < 3.5 mm long and < 1.9 mm in diameter; plant height:width ratio > 0.8; stems pubescent to hirsute, trichomes 0.2–1.8 mm long; leaves not sticky; terminal leaf lobe > 2.9 mm wide; plants with rank odor; plants in various habitats **Ambrosia artemisiifolia**
4. Achene > 3.5 mm long and > 1.9 mm in diameter; plant height:width ratio < 0.8; stems puberulent and viscid, trichomes 0.2–0.3 mm long; terminal leaf lobe < 2.9 mm; leaves sticky; plants with jasmine-like odor; plants restricted to granitic outcrops **Ambrosia porcheri**

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