NEW DISTRIBUTION RECORDS FOR GAMOCHAETA (ASTERACEAE: GNAPHALIEAE) IN THE UNITED STATES

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ABSTRACT

Gamochaeta stagnalis is reported for the first time for the United States (Arizona and New Mexico). In Arizona these plants have previously been identified as Gamochaeta purpurea and Gamochaeta falcata. The species is common in Mexico and apparently is at the northern limit of its distribution in Cochise, Pima, and Santa Cruz cos., Arizona, and Hidalgo Co., New Mexico. Gamochaeta purpurea sensu stricto also occurs in Arizona, disjunct from its main range in the eastern U.S.A. Plants of the southeastern U.S.A. previously identified in some treatments as Gamochaeta falcata are separated into two species: Gamochaeta calviceps and Gamochaeta antillana. A lectotype is chosen for G. antillana. Gamochaeta calviceps is known primarily from the southeastern U.S.A. but is reported from two collections in California. Gamochaeta coarctata is first reported for Arkansas and Virginia and further documented for California. Gamochaeta stachydifolia, a South American native, is reported from two counties in California. For each of the 12 Gamochaeta species recorded for the U.S.A., a hypothesis of nativity is given, with a brief rationale.

RESUMEN


In connection with preparation of a taxonomic treatment of the genus Gamochaeta Wedd. for the developing Flora of North America volumes, various range extensions and new records have come to light.

Gamochaeta purpurea sensu stricto in Arizona

Plants of Gamochaeta in Arizona have been identified as G. purpurea (L.) Cabr. (as Gnaphalium purpureum L.: Kearney & Peebles 1960; Lehr 1978) and G. falcata (Lam.) Cabr. (Nesom 1990). Gamochaeta purpurea sensu stricto does
indeed occur in Arizona, but further study shows that the more common plants are instead a species widespread in Mexico but previously unreported for the United States (see below). The native range of *G. purpurea* sensu stricto apparently is the eastern U.S.A., including eastern Texas, but it occurs as an adventive in many parts of the world. In the U.S.A., Arizona is the only other state in which *G. purpurea* is known to occur.


The plant of *Harrison and Kearney* 8128 (ARIZ; the LL specimen has a single stem with drawing of the habit) produced numerous decumbent, rhizome-like or caudex-like branches arising from a central axis and apparently was distinctly perennial. At least one of the plants collected by Shreve (s.n., ARIZ) also appears to have been perennial. It will be interesting to investigate whether the highly unusual modification of *Harrison and Kearney* 8128 is phenotypic or whether a distinct genetic race might be present.

*Gamochaeta purpurea* probably is native to eastern North America (see below), where it is the least weedy of its congeners, but the species apparently occurs widely through the world as an adventive. Plants of *G. purpurea* in southern Arizona (Pima Co.) occur along sandy banks of perennial streams in Sabino Canyon and Bear Canyon at the base of the Santa Catalina Mountains east of Tucson. The first known collections were made in these long-popular recreation areas in 1903, perhaps accidentally established there through heavy visitation, as the same sites are heavily infested by other, more aggressive non-native species. On the other hand, collections of *G. purpurea* also have been made in the Rincon Mts. (Pima Co.) and the Chiricahua Mts. (Cochise Co.), where the species is less likely to have been introduced by human activity. It also seems unlikely that plants of *G. purpurea* sensu stricto in scattered Mexican localities were introduced there by human activity.

A record of *Gamochaeta purpurea* from New Mexico (Allred 2003) was attributed to documentation in McIntosh (1996), which instead reported records for *Pseudognaphalium leucocephalum* (A. Gray) Anderb. The voucher for the *Gamochaeta* record in New Mexico is identified here as *Gamochaeta stagnalis* (see citation below). Documentation for a report of *Gamochaeta purpurea* from
Montana (Dorn 1984, as Gnaphalium purpureum) has not been verified. Reports of Gamochaeta purpurea from California, Oregon, Washington, and British Columbia are primarily based on G. ustulata (Nutt.) Holub (a native and relatively common species), although three other species (non-native, relatively uncommon) of the genus are now known from California: G. calviceps, G. stachydifolia, and G. coarctata.

The status of Gamochaeta stagnalis

The present report documents the occurrence of Gamochaeta stagnalis in the U.S.A., where it occurs in Arizona and New Mexico. These plants have previously been identified in Arizona mostly as Gamochaeta purpurea. In the U.S.A., G. stagnalis does not geographically overlap with any other species and its identity should now be easily ascertained. A full description is given here, since one apparently does not exist elsewhere.


Plants annual from a short, very slender to filiform taproot, less commonly from very shallow fibrous roots. Stems single and erect or 2–8 and decumbent-ascending, 2.5–20(–35) cm long, densely and loosely arachnoid-tomentose. Leaves mostly cauline, oblanceolate-spatulate to narrowly oblanceolate or nearly linear, 1–4 cm long, 2–6(–10) mm wide, basal usually not persistent, cauline oblanceolate, slightly reduced upward in size, equally loosely tomentose above and beneath or the adaxial surface glabrescent and greener. Capitulescence a capititate cluster (in smallest plants) of heads or an interrupted series of small glomerules subtended by divergent-ascending bracts similar to the upper cauline leaves, sometimes branching at lower nodes. Involucres campanulate, 2.5–3 mm high, conspicuously imbedded in loose tomentum, the outer bracts basally hairy; inner phyllaries narrowly oblong-lanceolate, with rounded-obtuse, whitish lamina, usually purple above the stereome and along proximal margins of the lamina, outer phyllaries ovate-triangular, translucent; receptacles deeply concave to crateriform. Florets: bisexual (2–)3(–4); all corollas purplish-tipped.

Flowering (Mar–)Apr(–May). Sandy, often moist soil, washes and permanent streams, canyon bottoms, flower beds, riparian, desert grassland, juniper-grassland, creosote bush-mesquite-cholla, oak woodland; 900–1750 m; Ariz., N.Mex.; Mexico (Sonora, Chihuahua, Coahuila, Nuevo León, Baja California Sur, Sinaloa, Durango, Zacatecas, San Luis Potosí, and other states to the south). Specimens examined: ARIZONA. Cochise Co.: floodplain of Miller Canyon, 0.8 mi by road W of Hwy 92, under Quercus emoryi in open woodland, 14 Apr 1991, Bowers 3426 (ARIZ); Dragoon Mts., Noonan Canyon, SE slope of S-facing saddle, 5080 ft, with Fouquieria, 29 Apr 1983, Caffey-Moquin 396 (UNM)
Localities for *Gamochaeta stagnalis* in Arizona and New Mexico are at the northwestern extremity of its overall range, where flowering is restricted to the end of the cool season. The species is common and widespread in Mexico, from Baja California Sur, Sonora, and Chihuahua southward and eastward to Jalisco and Colima, Nuevo León, San Luis Potosí, and Veracruz, where it occurs at elevations of 200–1800(–2600) meters in rocky or gravely soil, including stream beds and other periodically wet sites, in areas of thorn-scrub, tropical deciduous, or oak woodland, usually in open or disturbed sites. In Mexico it flowers December through May but sometimes continues longer in wet seasons.

Plants of *Gamochaeta stagnalis* are recognized by their annual duration, usually from a filiform taproot, oblanceolate leaves equally tomentose on the lower and upper surfaces, interrupted capitulecence, small, basally tomentose heads, and phyllaries conspicuously purplish at the stereome/lamina junction and along the proximal margins of the lamina. It is similar to and probably closely related to *G. antillana* (below).
The status of *Gamochaeta antillana*

*Gamochaeta antillana* (Urb.) Anderb., a common species in the southeastern U.S.A., was combined in concept with *Gamochaeta calviceps* (Fern.) Cabr. and identified as *Gamochaeta falcata* (Lam.) Cabr. by Nesom (1990). Godfrey (1958) separated *G. calviceps* and identified the other species as *G. falcata*. It is now clear that two taxa occur in this region, and they are now known to be widely sympatric, countering Godfrey’s notion that they might be treated as geographic varieties.


Cabrera (1961) cited collections of *Gamochaeta subfalcata* from Texas and Florida, extending the range far from northeastern Argentina, as circumscribed by the original citations (Cabrera 1941). Freire and Iharlegui (1997) also identified this species in the U.S.A. as *G. subfalcata*, and it seems inescapable that *C. antillana* and *G. subfalcata* are synonyms. *Gamochaeta antillana* is known to occur in Alabama, Arkansas, Florida, Georgia, Louisiana, North Carolina, Oklahoma, Mississippi, South Carolina, Tennessee, Texas, and Virginia; also in South America, Europe, and New Zealand.

*Gamochaeta antillana* is closely similar to *G. stagnalis* but the plants often are generally taller (6–40 cm vs. 2.5–20(–35) cm in *G. stagnalis*) and the basal leaves are oblanceolate with the cauline quickly becoming linear (in *G. stagnalis*, the cauline leaves and those subtending the clusters of heads are oblanceolate). *Gamochaeta antillana* occurs in humid climates and habitats while *G. stagnalis* is a species of arid climate and habitat. Further study of the distinction between these two taxa is needed.

a. Involucres 3–3.5 mm, lightly arachnose only at the base or not at all; capitulescence interrupted at least distally, main axis visible to terminal heads; phyllaries in 5–7 series, outer and middle ovate-triangular with sharply acute-acuminate apices, 1/3–1/2 as long as the inner, none with purplish color; flowering May–Jul

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**Gamochaeta calviceps**

a. Involucres 2.5–3 mm, seated in tomentum; capitulescence initially cylindric and uninterrupted, at least distally, main axis obscured by clustered heads; phyllaries in
Gamochaeta calviceps in California

Gamochaeta calviceps occurs widely in the southeastern U.S.A. The first known North American records outside of that region are reported here. It is known to occur in Alabama, Arkansas, California, Florida, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Texas, Virginia, as well as South America, Europe, and New Zealand. As noted above, G. calviceps and G. antillana constitute the plants in the eastern U.S.A. most commonly identified in the past as Gamochaeta falcata.

CALIFORNIA. Contra Costa Co.: Tilden Regional Park Botanic Garden, Wildcat Canyon; a rapidly spreading weed that probably came with plant material from Delano, Kern Co., 27 Jun 1975, True 7872A (TEX). San Diego Co.: Peninsular Ranges, near Riverside Co. line, E of I-15 off Pala Road along Rancho Heights Rd, 1364 ft, chaparral, mostly past flower, 24 Jun 2003, Spjut and Marin 15384 (BRIT, UCR).

Gamochaeta stachydifolia in California

This species is known to me by two collections from central California, the localities separated by about 200 kilometers. The 1990 collection suggests that it has probably is naturalized in that region and should be expected at more localities. The plants are recognized by their slender-taprooted habit (probably annual), oblanceolate and concolorous leaves, cylindric capitulescence, acute to acute-acuminate outer and middle phyllaries, inner phyllaries with brownish-hyaline, rounded-apiculate lamina, and yellowish-tipped florets. The GH collection (Mason 6991) was annotated by Peter Michael in 1990 as Gamochaeta berteriana (DC.) Cabr., but this identification is problematic, as G. berteriana apparently is perennial, thicker stemmed, and bears heads in capitate clusters; it is native to high elevation habitats in Chile (type: Chile, 1833, Bertero 8222, B, photo-TEX!). Freire and Iñarlegui (1997) noted that the range of G. stachydifolia includes Argentina, Brasil, and Uruguay.


Plants annual, slender taprooted. Stems 4–15 cm high, erect, single from the base, densely and loosely gray-white tomentose-arachnoid. Leaves basal and cauline, basal mostly withered and withering by flowering, oblanceolate, 1–2 cm long, 2–4 mm wide, cauline similar to basal, oblanceolate, commonly folded, subclasping but not auriculate, 2–3 cm long, 3–6 mm wide, continuing nearly unreduced into lower inflorescence but none longer than heads, dark apical
mucro often evident, evenly gray-white tomentose-arachnoid on both surfaces. **Capitulescence** a continuous cylinder 2–3(–4) cm long, 10–12 mm wide (pressed). **Involucres** campanulate, 3.5–4 mm high; phyllaries in 4–5 gradate series, outer ca. 1/3 as long as innermost, outer and middle narrowly ovate-triangular, apically acute to acute-acuminate, lightly tomentose at the very base, innermost oblong, stereome ca. 1/2 length, lamina brownish-hyaline, apically rounded-aponiculate; receptacles shallowly concave. **Florets**: bisexual 2–4; all corollas yellowish. **Cypselae**: mature fruits not seen.

Collections examined. **CALIFORNIA.** Amador Co.: Sierra Nevada foothills, hill above Ione, 25 Apr 1932, Mason 6991 (GH, LL). Butte Co.: ca. 1/4 mi S of the Feather River, ca. 0.4 mi W of Pacific Heights Road, ca. 4.5 mi SW of Oroville, T18, R3E, ne/S3, riparian woodland (destroyed), 100 ft, uncommon, inconspicuous, growing on dry, bare disturbed, sandy soil in the borrow area, 28 Apr 1990, Ahart 6466 (MO).

**Gamochaeta coarctata** in Arkansas, California, and Virginia

*Gamochaeta coarctata* (Willd.) Kerg. was previously noted to occur in California (Nesom 1990), but it was identified as *Gamochaeta americana*. In view of the rapid spread and pervasive occurrence of this species in the southeastern U.S.A., it seems likely that it also is becoming increasingly common in California. It is common throughout Louisiana, and its representation in southern Arkansas probably is already significantly greater in herbaria than the single record reported here. I have seen the following specimens.

**ARKANSAS.** Bradley Co.: “Southern Bluff” ca. 2.3 mi NW (by air) of the center of Warren, 26 Jun 1976, Locke 2002 (BRIT). **CALIFORNIA.** Humboldt Co.: Canyon Creek, 6 mi SE of Blue Lake, hillside pasture in logged area, local and scarce, 1200 ft, 1 Aug 1936, Tracy 15057 (NCU, TEX). Sacramento Co.: weed in irrigated alfalfa field, Aschwanden farm, 3 mi W of Galt, 10 Aug 1953, Tucker 2674 (SMU). Stanislaus Co.: San Joaquin Valley, near Ceres and Turlock, 2 mi WSW of Keyes, uncommon annual weed in almond orchard, 80 ft, 8 Jul 2000, Sanders 23532 (BRIT). **VIRGINIA.** Northampton Co.: north end of Hog Island, inner dune, 1 Jul 1996, McAvoy 1603 (DOV).

Further comments on biology and nomenclature of *Gamochaeta coarctata* are given in two other papers in this issue (Nesom 2004; Pruski & Nesom 2004).

**Nativity of North American *Gamochaeta* species**

Assessment of the nativity of North American species of *Gamochaeta* is problematic. Most *Gamochaeta* species are native to South America, and most of the North American species characteristically occur in ruderal habitats, commonly in company of known non-native species of various families. Some, if not all, of the North American *Gamochaeta* species occur as weeds in parts of the world other than South America (although inconsistencies in identification and application of names make it difficult to accurately evaluate overall distributions of the widespread species). Thus by behavior and association, all ruderal *Gamochaeta* species in North America might also be expected to be non-native. The mode of introduction of those clearly non-native is not known.
Circumstantial evidence, however, suggests that some of the North American *Gamochaeta* species are native. *Gamochaeta purpurea* and *G. ustulata* were described from collections made early in the history of the U.S.A., presumably before non-native colonizers became abundant; others are known only from more recent collections. Several species are distributed over broad latitudinal and ecological range, suggesting that geographic differentiation may have occurred; the geographic range (and presumed genetic variability) of others is more restricted. Four of the species suggested as native on a geographic-ecological basis form two species pairs (the two of each pair with strong morphological similarities: *G. purpurea* and *G. sphacilata*, *G. argyrinea* and *G. ustulata*), suggesting that the evolutionary differentiation was autochthonous. *Gamochaeta pensylvanica*, *G. antillana*, and *G. stagnalis* are similar among themselves and possibly closely related; their nativity is uncertain, but at least it seems likely that *G. stagnalis* is native. For those non-native, evidence is strong that they are naturalized (sensu Nesom 2000a).

For each of the *Gamochaeta* species recorded for North America (north of Mexico), a hypothesis of nativity is given, with a brief rationale. Distribution maps for *G. purpurea*, *G. argyrinea*, *G. ustulata*, *G. chionesthes*, *G. simplicicaulis*, and *G. coarctata* are provided in Nesom (2004).

**Gamochaeta purpurea** (L.) Cabr.—Native: widespread in the eastern U.S.A. over a broad latitudinal and ecological range; early collections from known range in the U.S.A.; possibly closely related to *G. sphacilata*, which apparently occurs natively over a wide area, including South America and Mexico, into southwest Texas. *Gamochaeta purpurea* sensu stricto is found over a wide area of peninsular Florida, but *G. argyrinea* and *G. chionesthes*, both segregated from the concept of *G. purpurea* in the U.S.A., are restricted to the northern counties of the state (a loan of specimens from USF was extremely helpful in establishing this).

**Gamochaeta sphacilata** (Kunth) Cabr.—Native: widespread from South America to the U.S.A., occurs in essentially undisturbed habitats at mid and relatively high-elevation in Mexico and the northern extension of its range in trans-Pecos Texas; possibly closely related to *G. purpurea*, which apparently is native to the eastern U.S.A.

**Gamochaeta argyrinea** Nesom—Native(?): widespread in the eastern U.S.A. over a considerable latitudinal and ecological range and also known from Puerto Rico; early collections from known range in the U.S.A.; probably closely related to *G. ustulata*, which apparently is native to the western U.S.A.

**Gamochaeta ustulata** (Nutt.) Holub—Native: distinctive habitat and geographic range in Pacific coast states, over a wide latitude, mostly in coastal and near-coastal habitats; early collections from known range in the western U.S.A.; closely similar and probably closely related to *G. argyrinea*, which perhaps is native to the eastern U.S.A.
Gamochaeta chionesthes—Non-native: relatively scattered and recent collections in the southeastern U.S.A. (see Nesom 2004). It possibly has been identified in South America by a misapplied name (*G. americana*?); possibly closely related to *G. simplicicaulis*, a native of South America.

Gamochaeta simplicicaulis (Willd. ex Spreng.) Cabr.—Non-native: scattered and recent collections in the southeastern U.S.A., the earliest known in 1957–1959, when it was discovered in nine counties of North Carolina and South Carolina (Nesom 1999, 2000b). Widely distributed in South America and known from early collections there; recorded as adventive in other parts of the world before its discovery in North America.

Gamochaeta coarctata (Willd.) Kerg.—Non-native: collections from the U.S.A. before about 1970 are rare. Small (1933) did not include this distinctive species in his treatment of the Southeastern flora. Godfrey (1958) noted that he knew the species (as *Gnaphalium spicatum* Lam.) from collections from around Wilmington, North Carolina, and from Florida, “in and around Tallahassee, thence westward to Pensacola.” Perhaps the earliest collection or one of the earliest was made in 1949 in Wilmington (*Godfrey 49341*, originally identified as *Gnaphalium purpureum*, SMU, NCU), where it was “abundant in vacant lots and weedy places”; it was collected again in Wilmington in 1950 (*Godfrey 50362*, SMU), identified as an “unusual form” of *Gnaphalium purpureum*. The range of *G. coarctata* in the southeastern U.S.A. is now apparently much more continuous than indicated by existing collections (personal observation), suggesting a recent and rapid expansion. The type of *Gnaphalium coarctatum* and its synonym *Gnaphalium spicatum* was described from Uruguay from a collection made in the 1700s (Pruski & Nesom 2004), and it seems likely that the species is native to South America. It is documented as adventive in other parts of the world.

Gamochaeta pensylvanica (Willd.) Cabr. (synonyms: *Gnaphalium spathulatum* Lam. [non Burm. f.], *Gnaphalium peregrinum* Fernald)—Non-native(?): common in the southeastern U.S.A. (nearly restricted to Atlantic Coast and Gulf Coast states); common in eastern South America and throughout the world as a weed. Similar and perhaps related to *G. antillana*, for which the nativity also is uncertain but suggested to be North American and Antillean. On balance, however, it seems likely that *G. pensylvanica* arrived early as an adventive in North America, especially in view of its apparent complete fidelity to ruderal habitats on this continent and its near-cosmopolitan occurrence as a weed. In Willdenow’s proposal of the name *Gnaphalium pensylvanicum*, he noted that the ‘habitat’ was in Virginia and in Pennsylvania, north of its characteristic range in the U.S.A. My guess is that it was collected as a ballast waif in Philadelphia prior to 1809, the year of Willdenow’s proposal. The species is shown only in Pennsylvania County by Wherry et al. (1979), who noted that it is “introduced” in the state; it was not included at all in a later summary of the
Pennsylvania flora (e.g., Rhoads & Block 2000). The type of *Gnaphalium spathulatum*, described by Lamarck in 1788, was from plants cultivated at the “Jardin du Roi” in Paris; Lamarck noted that he did not know the origin of the garden plants but that Commerson had found a similar form near Buenos Aires. In his description of *Gnaphalium peregrinum*, Fernald (1943) noted that *G. spathulatum* was a later homonym (non Burm. f. 1768) and probably the same species as *G. peregrinum*, but because of his uncertainty regarding the identity of the plant in the type photo (*G. spathulatum* Lam.), he chose a new type for the new name. Burman’s name (Prodromus florum capensis 25. 1768) is validated by citation of a figure in Breyne’s Prodromi (tab. 18, fig. 3. 1738) and accompanying legend (p. 29)—it apparently is a species of *Helichrysum*.

**Gamochaeta antillana** (Urb.) Anderb.—Native(?): common in the southeastern U.S.A., most in coastal states; described from Cuba in 1915, known from most islands of the Antilles, South America, and apparently weedy in other parts of the world. Closely similar to and possibly closely related to *G. stagnalis*.

**Gamochaeta stagnalis** (I.M. Johnst.) Anderb.—Native(?): common in northern Mexico and reaching southern Arizona and southwestern New Mexico, where it flowers in early spring in desert habitats. Probably closely related to *G. antillana* but different in geography and ecology.

**Gamochaeta calviceps** (Fern.) Cabr.—Native(?): described in 1935 from Virginia and known mostly from recent collections in eastern North America (states of the Atlantic Coast and Gulf Coast); apparently widespread in South America other parts of the world.

**Gamochaeta stachydifolia** (Lam.) Cabr.—Non-native: known in North America only from two counties in central California. Native to South America.

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**REFERENCES**


