

**GAMOCHAETA IMPATIENS, SP. NOV. (ASTERACEAE: GNAPHALIEAE),
THE USA ADVENTIVE
PREVIOUSLY IDENTIFIED AS *G. COARCTATA***

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ABSTRACT

A morphometric analysis (Freire et al. 2021) found no consistent difference between South American plants identified as *Gamochaeta americana* (Mill. 1768) Wedd. and *Gamochaeta coarctata* (Willd. 1803) Kerg. Their observation is confirmed here through examination of general collections as well as the types (from Jamaica and Uruguay, respectively). The widespread and common species in the southeastern USA, however, which mostly has been identified as *G. coarctata*, is not the same as the South American species. Instead it appears to be an adventive from South America without formal taxonomic recognition — it is described here as **Gamochaeta impatiens** Nesom, sp. nov. Of the two, only *G. impatiens* occurs in the USA but *G. americana* and *G. impatiens* both are adventive in various parts of the world.

A morphometric analysis of 99 specimens (Freire et al. 2021) found no consistent difference between plants identified as *Gamochaeta americana* (Mill. 1768) Wedd. and *Gamochaeta coarctata* (Willd. 1803) Kerg. Their observation is confirmed here through examination of general collections at MO and TEX-LL (see box below). Nor do the type collections (from Jamaica and Uruguay, respectively, plus those of other possible synonyms, Figs. 20-22, 25, 27, 28-29; see comments with Fig. 28 regarding *G. irazuensis*; see caveat and comments regarding the type of *Gnaphalium americanum*, Figs. 20-22, 23-24) suggest that more than a single species is represented, *Gamochaeta americana* the correct name for it.

My first reaction to the Freire et al. conclusion, however, was of great surprise — having seen first-hand hundreds of populations of "*Gamochaeta coarctata*" in the southeastern USA and many of *Gamochaeta americana* in Mexico, and having seen hundreds of collections of both, there was never a doubt that two entities were present. The decisive point is that Freire et al. included essentially only South American plants (3 from outside, see box below), thus their conclusion should be read as "only a single species is represented in South America." Correspondingly, my concept of *G. coarctata* has been based on USA plants.

Locations of samples studied by Freire et al. (2021)

Gamochaeta americana — Argentina, Bolivia, Brasil, Chile, Colombia, Paraguay, Uruguay, Jamaica (*Houston s.n.*, lectotype, BM), Costa Rica (*Pruski 3878, LP*)

Gamochaeta coarctata — Argentina, Bolivia, Brasil, Chile, Paraguay, Peru, Uruguay, Australia (*Victoria, Cameron 7592, SI*)

Collections studied first-hand for the present report

Mexico - 56 (MO), 84 (TEX-LL)
Caribbean - 7 (MO), 14 (TEX-LL)
Central America - 54 (MO), 25 (TEX-LL)
South America - 115 (MO), 32 (TEX-LL)
USA - hundreds from various herbaria

The Mexican plants clearly are *Gamochaeta americana* sensu Freire et al., which is continuously distributed from Mexico (Fig. 1) through Central America into South America. The widespread and common species in the southeastern USA (Fig. 2), however, which mostly has been identified as *G. coarctata* (e.g., Nesom 2006), differs in a number of features from the Mexican/Central American/South American species. There is no apparent match for it among species previously described from South America (or elsewhere) (e.g., Freire & Ihargui 1997, 2014; Freire et al. 2016) — it appears to be adventive in the USA, almost certainly from a South America origin, and without formal taxonomic recognition — it is described here as a new species.

GAMOCHAETA IMPATIENS Nesom, sp. nov. **TYPE:** USA. Georgia. Grady Co.: 11 mi S of Thomasville, common on grassy roadsides, 1 May 1965, R.K. Godfrey 65713 (FSU, Fig. 42).

Similar to *Gamochaeta americana* but with stems decumbent-ascending to nearly prostrate (vs. erect) from the first, involucres shorter and rose-tinged, outer phyllaries depressed-ovate, bisexual florets fewer, and corolla apices reddish.

Winter annuals or biennials, fibrous-rooted. **Stems** decumbent-ascending to nearly prostrate, 15–35(–50) cm, white-pannose, the vestiture usually sheath-like, like polished cloth. **Leaves** basal and caudine, basal in persistent rosettes, blades spatulate to oblanceolate-obovate, (1.5–)3–8(–12) cm × 6–15(–22) mm, gradually or little smaller distally, slightly succulent, margins often crenulate on drying, faces bicolor, adaxial glabrous or rarely glabrate, usually shiny, abaxial closely white-pannose. **Heads** initially in a dense, continuous spiciform array 2–20 cm long, later (with elongation of the stems and axillary shoots) becoming branched and interrupted (see Figs. 35–42 for developmental sequence). **Involucres** cylindric-campanulate, 2.5–3 mm high. **Phyllaries** in 4–5 series, usually purplish or rosy, elliptic-obovate to broadly ovate-elliptic, lengths 1/3–1/4 inner, apices rounded to obtuse, inner oblong, laminae brown-hyaline, glabrous or the outermost sparsely villous at the very base, apices rounded to obtuse or blunt, inner apiculate. **Bisexual florets** 2–3. **Corollas** (bisexual and pistillate) reddish at the apex. **Cypselae** tan, 0.5–0.6 mm long.

Flowering (March–) April–June (–July). Ditches, roadsides, sidewalk cracks, shaded spots around buildings and other moist, ruderal habitats; 0–200 meters.

1. Stems decumbent-ascending to nearly prostrate from the first; distal 1/3 of the lamina of the inner phyllaries rosy to light reddish-brown hyaline, the whole involucre often with a distinctly purplish or rosy cast; involucres 2.5–3 mm high; outer phyllaries depressed-ovate, apex rounded, inner with rounded apex; bisexual florets 2–3; corolla apices reddish; leaves glabrous and shiny adaxially, the basal persistent **Gamochaeta impatiens**
1. Stems first erect, sometimes becoming decumbent-ascending; distal half of the lamina of the inner phyllaries brown and sharply delimited in color from the proximal portion, the whole involucre often with a distinctly brownish cast; involucres 3–4 mm high; outer phyllaries ovate to oblong-lanceolate, apex mostly acute or acuminate, inner with acute apex; bisexual florets (2–)3–7; corolla apices yellow; leaves usually glabrescent adaxially, sometimes becoming shiny, the basal often not persistent **Gamochaeta americana**

Freire et al. described the bisexual and pistillate florets of *Gamochaeta americana* as "purplish at apex, but I have not seen a single collection with such coloration (all instead are pale yellow to white). In my study, the consistently reddish color of *Gamochaeta impatiens* floret apices is diagnostic.

Leaves of *Gamochaeta americana* are characteristically strongly bicolored, with adaxial surfaces glabrous to glabrate, but in western Mexico (mostly Durango, Chihuahua, and Sonora), there is a tendency for the adaxial surfaces to be persistently hairy, sometimes resulting in a weakly bicolored appearance. Similar plants also appear sporadically in other parts of Mexico, and Dillon & Sagastegui (1991) noted that similar variation also occurs in South America.

Gamochaeta impatiens is without a doubt native to South America, the center of diversity and evolution of the genus. Its recent establishment and spread and its taxonomic recognition in the eastern USA are similar to *G. argyrinea* Nesom and *G. chionesthes* Nesom (Nesom 2004a), both of which are quickly spreading adventives in the USA, neither formally recognized from South America, both first described and typified from the USA. A preliminary phylogenetic analysis (Urtubey et al. 2016) suggests that *G. argyrinea* and *G. chionesthes* are more closely related to each other than either is to *G. americana/coarctata*. In any case, each of the three USA adventives noted here is unequivocally distinct in morphology.

Gamochaeta americana has been reported as an adventive species in many parts of the world (e.g., Freire et al. 2021), as has *G. coarctata*. Such records must be reexamined, as some are for *G. impatiens* — the following, for example.

Gamochaeta impatiens. Swaziland. Grahamstown Nature Reserve, short grass, in sand, 1900 ft, 20 Dec 1977, Bayliss 8336 (MO); Howieson's Poort near Grahamstown, short grass, 1900 ft, 4 Jan 1978, Bayliss 8442 (MO); Hhohho Dist., Masilela area, on Maphalaleni road along Mucucena Hills, SE of Masilela Peak near Ararat School, highland grassveld near huge granite outcrop, 1150 m, 27 Jan 1994, Smook 8910 (MO). **New Zealand.** North Island, Waitemata Co., Mairangi Bay, Montrose Terrace, roadside, 8 Dec 1973, Bangerter 5122 (MO); Auckland, Lonely Track Road, Albany, cleared areas of scrub, ca. 80 m, 20 Dec 1976, Garder 1389 (MO); North Island, Bay of Islands Co., Russell State Forest, ca. 4.5 km SE of Waikare, ca. 100 m, 30 Nov 1972, Orchard 3758 (MO); Westland, 22 km S of Punakaiki, roadside, 6 Dec 1988, Webb 468745 (MO).

The description of *Gamochaeta coarctata* in the Flora of China (Yousheng & Bayer 2011) places the species as *G. impatiens*: outer phyllaries "purplish or rosy, ... apices rounded to obtuse; ... inner phyllaries [with] apices rounded to obtuse or blunt; ... corollas of all florets usually purplish distally." "Naturalized in Guizhou and Taiwan."

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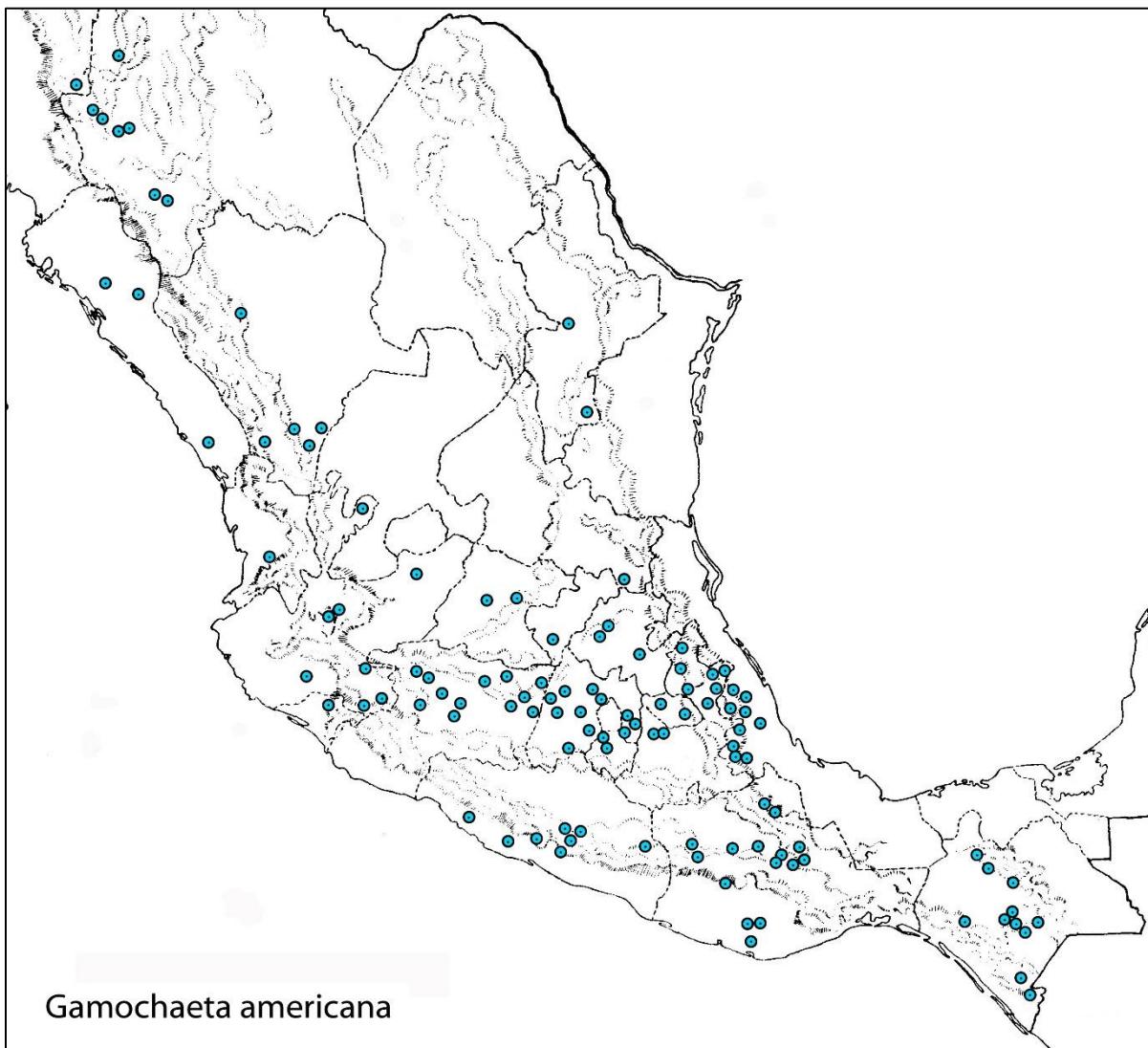


Figure 1. Distribution of *Gamochaeta americana* in Mexico. Records are mostly from ARIZ, MEXU, MO, TEX-LL, and US. The distribution continues through Central America into South America.

In Mexico, flowering all year. Pine, oak, and pine-oak woods, rain forest slopes, wet meadows, alpine meadows, rocky slopes, roadsides, cultivated areas; (750–)1100–3200(–3600) meters [(2450–)3600–10,500(–12,000) feet]. The range of habitats and elevations for *Gamochaeta americana* in Mexico is very different from that of *Gamochaeta impatiens* in the USA.

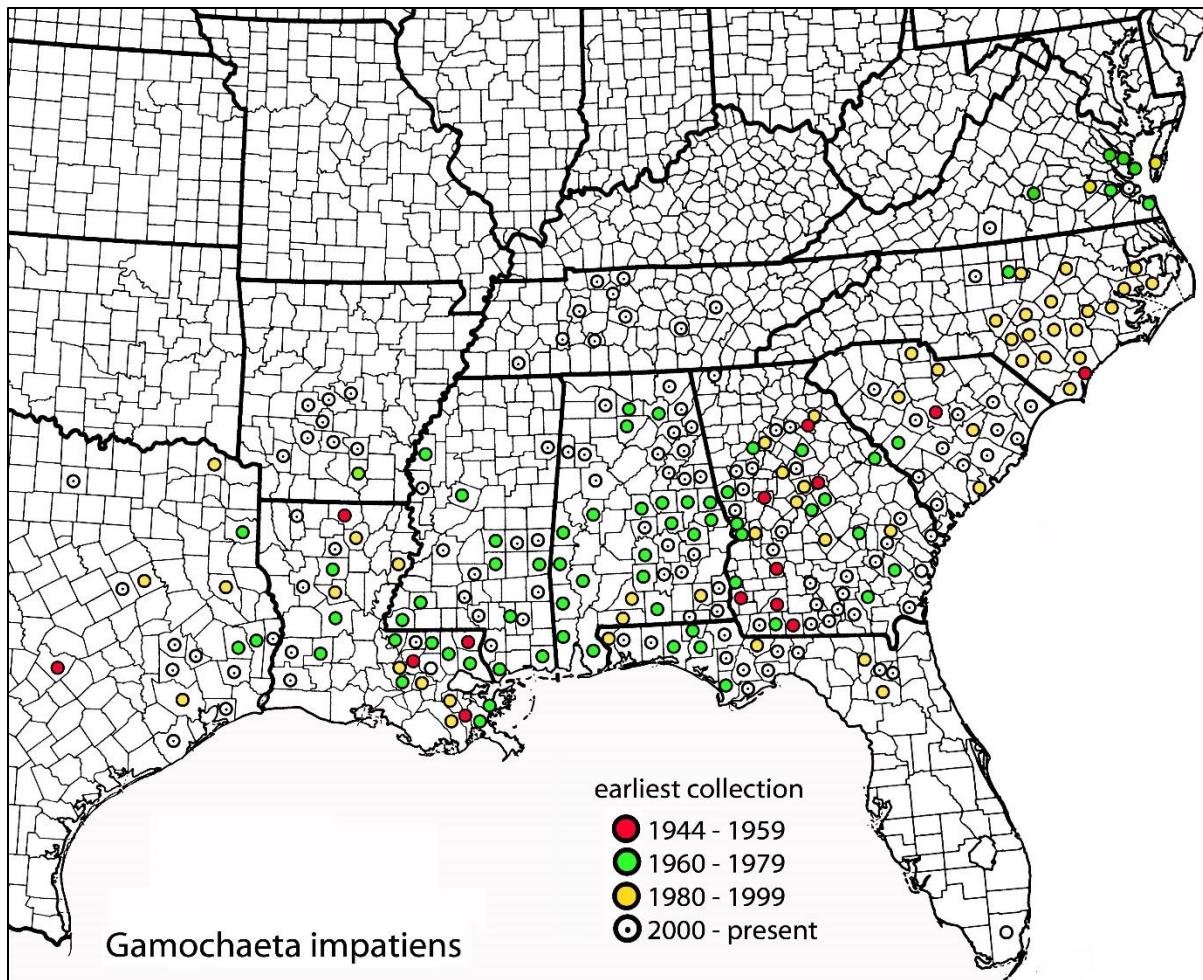


Figure 2. Distribution of *Gamochaeta impatiens* in the USA, showing earliest collection dates by county (see Appendix for data). Since its establishment in the 1940's, the species has become continuously distributed across 1200 miles of Gulf and Atlantic coastal plain and continues to move inland. It also has become naturalized in California (Nesom 2004b; CalFlora 2022).

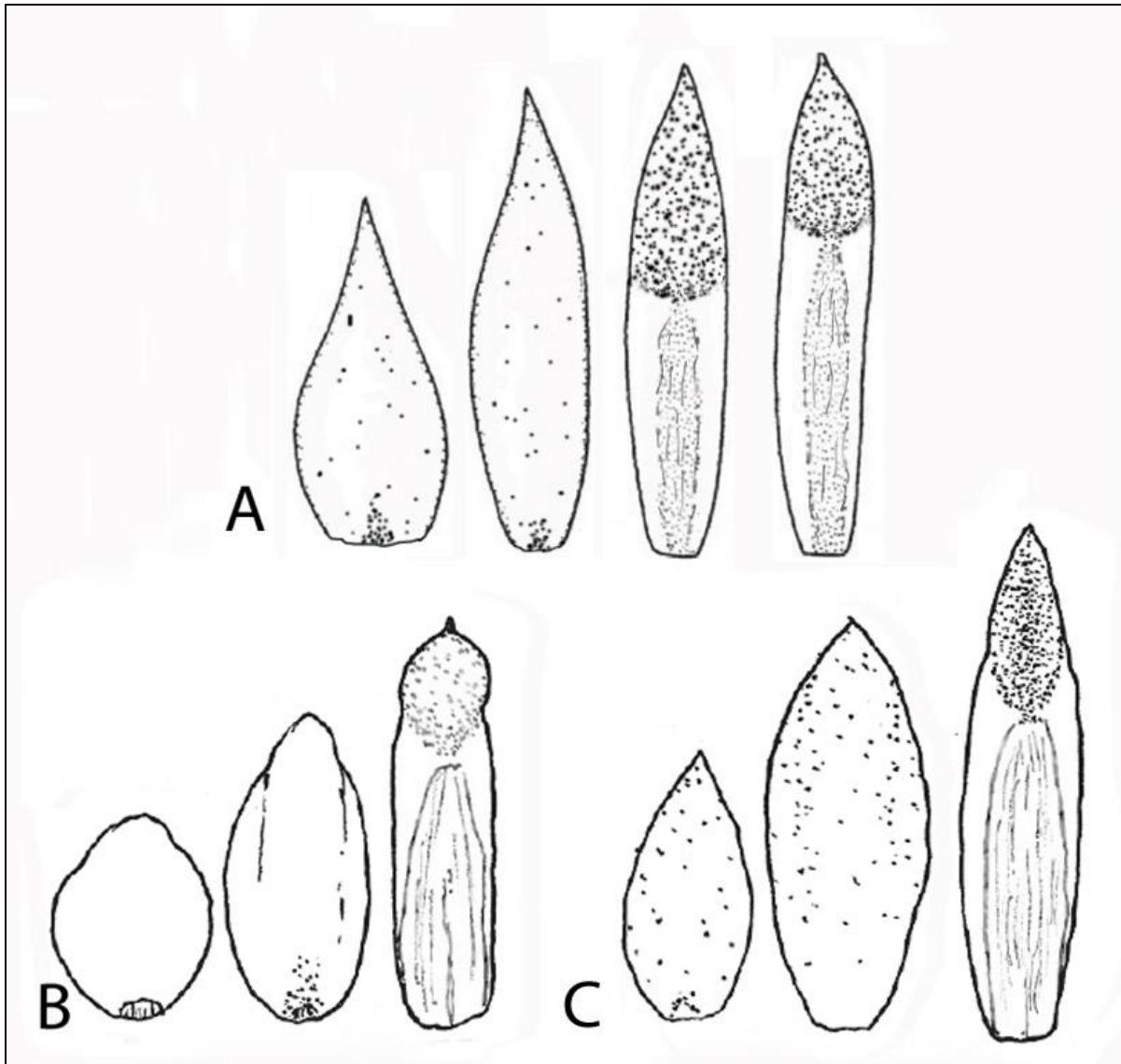


Figure 3. Phyllary outlines, outer (left) to inner (right). A. *Gamochaeta americana* (adapted from Freire et al. 2021, Fig. 4D). B. *Gamochaeta impatiens*. C. *Gamochaeta americana*. B and C from Nesom 2004.



Figure 4. *Gamochaeta americana*. Hidalgo, Mexico (MO).



Figure 5. *Gamochaeta americana*. Hidalgo, Mexico (MO).



Figure 6. *Gamochaeta americana*. Hidalgo, Mexico (MO).



Figure 7. *Gamochaeta americana*. Hidalgo, Mexico (MO).



Figure 8. *Gamochaeta americana*. Oaxaca, Mexico. iNaturalist photo by Eugenio Padilla (eugenio_padilla), 15 November 2020.



Figure 9. *Gamochaeta americana*. Chiapas, Mexico. iNaturalist photo by Diego Manzano Méndez (diegoman), 23 May 2020



Figure 10. *Gamochaeta americana*. Michoacan, Mexico. iNaturalist photo by Ricardo Arredondo T. (elrayman210), 19 February 2019.



Figure 11. *Gamochaeta impatiens*. Chapel Hill, North Carolina. iNaturalist photo by Margarita Lankford (mlankford), 20 April 2020.



Figure 12. *Gamochaeta impatiens*. Mobile Co., Alabama. iNaturalist photo by Howard Horne (howardhorne), 13 April 2018.



Figure 13. *Gamochaeta impatiens*. San Diego Co., California. iNaturalist photo by "snakeinmypocket." May 2020.



Figure 14. *Gamochaeta impatiens*. Alabama, USA (MO).



Figure 15. *Gamochaeta impatiens*. Alabama, USA (MO).



Figure 16. *Gamochaeta impatiens*. Alabama, USA (MO).



Figure 17. *Gamochaeta impatiens*. Alabama, USA (MO).



Figure 18. *Gamochaeta impatiens*. Alabama, USA (MO).



Figure 19. *Gamochaeta impatiens*. Alabama, USA (MO).

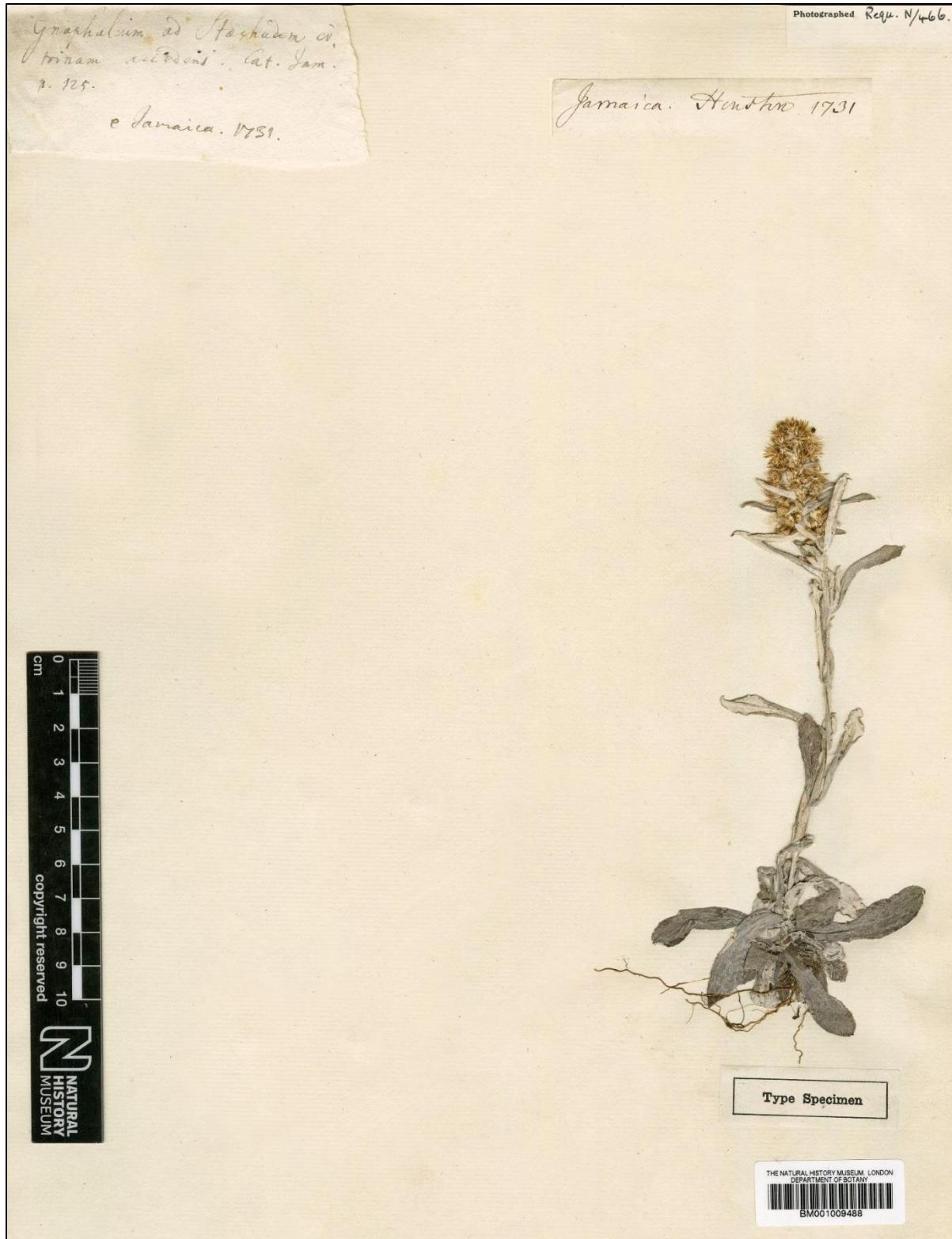


Figure 20. *Gnaphalium americanum*. Jamaica. Lectotype, Houston s.n. (BM). The gray adaxial leaf surfaces of the type are not characteristic of the species, but other plants from Jamaica have typical morphology (see Figs. 23 and 24).



Figure 21. *Gnaphalium americanum*. Closer view of the lectotype.



Figure 22. *Gnaphalium americanum*. Detail from the lectotype (BM).



Figure 23. *Gnaphalium americanum*. Jamaica. Anderson & Sternberg 3479 (US).



Figure 24. *Gnaphalium americanum*. Jamaica. Liogier 12851 (US).



Figure 25. *Gnaphalium coarctatum*. Montevideo, Uruguay. Holotype, Commerson s.n. (P-LAM). This is the holotype of *Gnaphalium spicatum* Lam. (1788), an illegitimate homonym, not P. Miller 1768. *Gnaphalium coarctatum* Willd. was proposed by Willdenow in 1803 as a substitute name for *G. spicatum* (see Pruski & Nesom 2004).



Figure 26. *Gnaphalium coarctatum*. Detail from the holotype.

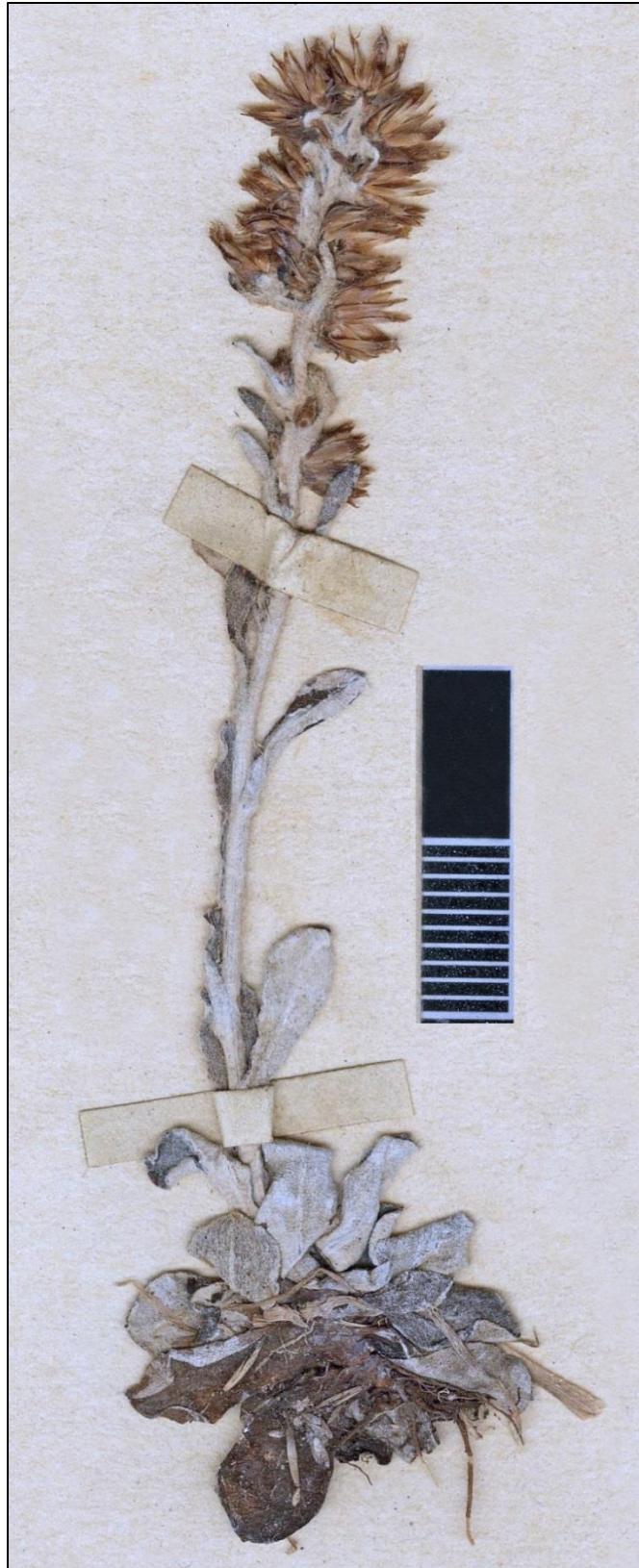


Figure 27. *Gnaphalium consanguineum* Gaudichaud (1825). Falkland Islands. Lectotype, Gaudichaud s.n. (P). Listed by Freire et al. as a synonym of *Gamochaeta americana*.



Figure 28. *Gamochaeta irazuensis* Nesom (1990). Costa Rica. Holotype, Allen 702 (F).



Figure 29. *Gamochaeta irazuensis*. Details from the holotype. These are plants from the Cordillera de Talamanca region of Costa Rica, strongly perennial with dense, silvery-white vestiture on abaxial leaf surfaces and with sheath-like caudine vestiture. The name was included without comment as a synonym of *G. americana* by Freire et al. (2021).



Figure 30. *Gamochaeta americana*. Jalisco, Mexico, Palmer 219 (US).



Figure 31. *Gamochaeta americana*. Mexico, Schnée s.n. (US).



Figure 32. *Gamochaeta americana*. Chiapas, Mexico, Breedlove 8908 (US).



Figure 33. *Gamochaeta americana*. Jalisco, Mexico, McVaugh 10328 (US).



Figure 34. *Gamochaeta americana*. Edo. México, Mexico, Matuda 28242 (MEXU).



Figure 35. *Gamochaeta impatiens*. Gwinnett Co., Georgia. Zomlefer 1506 (GA). Early inflorescence.



Figure 36. *Gamochaeta impatiens*. Upson Co., Georgia. Godfrey 58428 (FLAS). Early inflorescence.



Figure 37. *Gamochaeta impatiens*. Dale Co., Alabama. Diamond 15176 (AUA). Early inflorescence.



Figure 38. *Gamochaeta impatiens*. Lee Co., Georgia. Godfrey 58441 (FLAS). Early inflorescence.

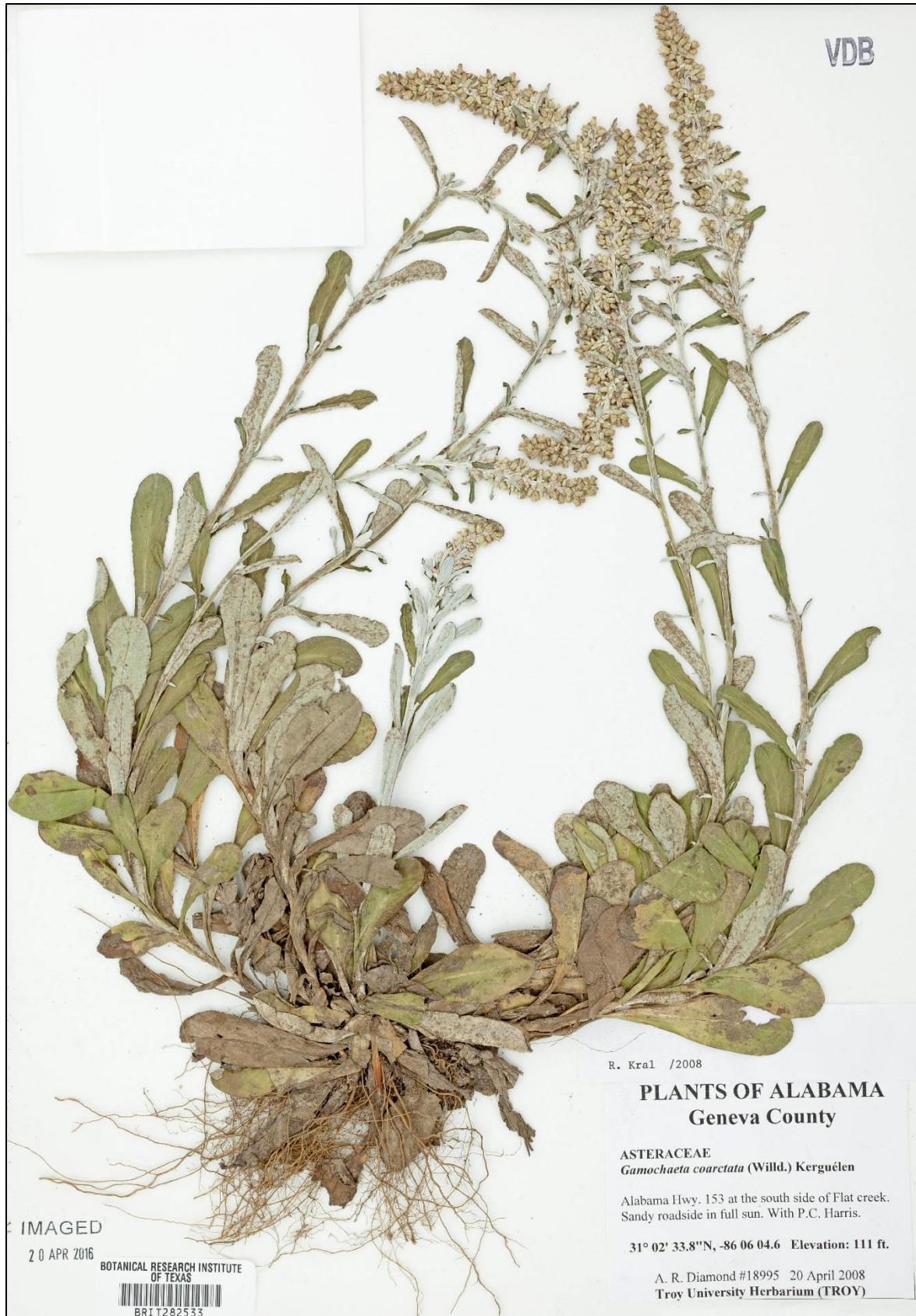


Figure 39. *Gamochaeta impatiens*. Geneva Co., Alabama. Diamond 18995 (VDB). Mid inflorescence.



Figure 40. *Gamochaeta impatiens*. Sumter Co., Alabama. Kral 23811 (VDB). Mid inflorescence.



Figure 41. *Gamochaeta impatiens*. Clinch Co., Georgia. Carter 20822 (GA). Late inflorescence.



Figure 42. *Gamochaeta impatiens*. Grady Co., Georgia. Holotype, Godfrey 65713 (FSU). Late inflorescence, after elongation of primary stems and lateral branches.

Appendix. *GAMOCHAETA IMPATIENS* — DATES OF FIRST COLLECTIONS, BY STATE AND COUNTY**Alabama**

Autauga 2017
 Baldwin 1971
 Blount 2013
 Bullock 2008
 Butler 1966
 Chambers 1967
 Chilton 1976
 Choctaw 1966
 Clarke 1971
 Conecuh 1985
 Coosa 1974
 Covington 1970
 Crenshaw 2006
 Cullman 1975
 Dale 1997
 DeKalb 2008
 Elmore 1975
 Escambia 1995
 Fayette 2008
 Geneva 1959
 Hale 1966
 Henry 2008
 Houston 1972
 Lamar 2010
 Lawrence 2013
 Lee 1969
 Lowndes 1975
 Macon 1967
 Marshall 1966
 Mobile 1972
 Montgomery 2009
 Morgan 1974
 Pike 2006
 Randolph 1975
 Russell 1959
 Saint Clair 2003
 Sumter 1965
 Talladega 2006
 Tallapoosa 1976
 Tuscaloosa 1958
 Washington 1975

Arkansas

Bradley 1976
 Clark 2005
 Cleveland 1991
 Dallas 2005
 Garland 2007

Hempstead 2010
 Hot Spring 1973
 Pulaski 2007
 Saline 2007

Florida

Alachua 1988
 Bradford 2012
 Calhoun 2014
 Columbia 1990
 Escambia 1957
 Gadsden 1983
 Gulf 1966
 Holmes 1967
 Jackson 1958
 Leon 1948
 Miami-Dade 1977
 Okaloosa 2002
 Santa Rosa 1996
 Union 2012
 Walton 1967
 Washington 1967

Georgia

Appling 2006
 Atkinson 2013
 Baldwin 1956
 Barrow 2012
 Bibb 1991
 Brooks 2013
 Butts 1987
 Camden 2006
 Catoosa 2012
 Chattahoochee 1969
 Clarke 1947
 Clay 1978
 Clinch 2013
 Cook 2005
 DeKalb 1995
 Dodge 1981
 Early 1959
 Evans 1992
 Fayette 2010
 Fulton 1964
 Grady 1965
 Gwinnett 2007
 Harris 2013
 Jasper 2013
 Jones 1981

Lanier 2013
 Lee 1959
 Lowndes 2010
 Lumpkin 2001
 Macon 2013
 Madison 1980
 Marion 1980
 McIntosh 2017
 Meriwether 2013
 Mitchell 1959
 Montgomery 1976
 Morgan 1968
 Muscogee 1965
 Richmond 1977
 Sumter 2013
 Talbot 2013
 Thomas 1959
 Tift 2009
 Troup 1970
 Twiggs 1967
 Upson 1959
 Ware 1966
 Wayne 1975
 Wilkinson 1968

Louisiana

Ascension 1995
 Beauregard 2007
 Calcasieu 2015
 East Baton Rouge 1958
 Grant 1995
 Iberville 1973
 Jefferson Davis 1973
 Jefferson 1948
 LaFourche 1988
 Livingston 1970
 Ouachita 1984
 Plaquemines 1960
 Rapides 1977
 St. Bernard 1973
 St. Charles 1980
 St. Helena 1970
 St. Tammany 1976
 Tangipahoa 1963
 Tensas 1981
 Union 1959
 Washington 1933
 Webster 1978
 West Baton Rouge 1992
 West Feliciana 1973
 Winn 1976

Mississippi

Bolivar 1960
 Clarke 1968
 Forrest 1967
 Franklin 1968
 Hancock 1973
 Hinds 1997
 Holmes 1967
 Jackson 1975
 Marion 2012
 Monroe 1997
 Pearl River 1995
 Scott 1968
 Simpson 2012
 Smith 1967
 Wayne 2014
 Wilkinson 1968

North Carolina

Beaufort 1996
 Bladen 1992
 Brunswick 1988
 Craven 1994
 Cumberland 1988
 Duplin 1989
 Durham 1988
 Guilford 2010
 Harnett 1989
 Hoke 1990
 Hyde 1996
 Johnston 1990
 Lenoir 1992
 Moore 1987
 New Hanover 1949
 Orange 1977
 Pender 1989
 Robeson 1995
 Sampson 1990
 Washington 1996

South Carolina

Aiken 1962
 Allendale 2017
 Beaufort 2006
 Calhoun 2009
 Charleston 1992
 Clarendon 1989
 Colleton 2017
 Dillon 2015
 Georgetown 2018
 Lancaster 1989

Laurens 2017
Lee 2020
Lexington 2000
McCormick 2016
Newberry 1990
Oconee 2013
Orangeburg 2001
Richland 1958
Spartanburg 2012
Sumter 2007
Union 2016
York 1993

Tennessee

Bedford 2013
Cheatham 2020
Cumberland 2021
Decatur 2018
Hardeman 2017
Humphreys 2021
Lewis 2020
Montgomery 2019
Robertson 2021
Warren 2018
Williamson 2021

Texas

Brazoria 2005
Chambers 2005
Freestone 1995
Hardin 2004
Harris 1994
Harrison 1975
Jasper 1978
Montgomery 2004
Nacogdoches 1992
Newton 2007
Red River 1993
San Jacinto 2002
Travis 1944
Tyler 1969
Walker 2004
Wise 2004

Virginia

Hampton 1969
King & Queen 1977
Mathews 1977
Middlesex 1977
Newport News 2014
Northampton 1996
Pittsylvania 2012
Prince Edward 1967
Prince George 1994
Surry 1973
Virginia Beach City 1962