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MONOGRAPH OF THE GENUS *SILPHIUM*

I. *Silphium compositum* MICHAUX (COMPOSITAE)<sup>1, 2</sup>

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ABSTRACT

*Silphium compositum*, a polymorphic species of southeastern United States, is recognized to consist of the following subspecies: ssp. *compositum*, ssp. *reniforme*, ssp. *venosum*, and ssp. *ovatifolium*. The subspecies are distinguished primarily by leaf and achene characters, and are sympatric in some areas. Descriptions, synonymy, distribution maps and citation of representative specimens of the taxa are included.

*Silphium compositum* is found in southeastern United States in the Appalachian Mountains, on the Piedmont, and on the Atlantic Coastal Plain. Plants occur generally throughout this area, but are usually not very abundant at any one location. The species occurs as small populations generally composed of five to twenty scattered individuals along woodland borders. In many populations there are commonly plants with no flowering stalks.

NOMENCLATRURAL HISTORY

The first published name attributed to specimens of *Silphium compositum* was *S. laciniatum*, described by Walter (1788) as a plant with pinnately sinuate leaves from the Carolinas. This epithet had been assigned previously by Linnaeus to a species of the mid-western prairies of North America and was thus illegitimate.

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<sup>1</sup>This paper is taken from a dissertation submitted to the Graduate School of The Ohio State University in partial fulfillment of the requirements for the degree of Doctor of Philosophy. This study was supported by a grant to T. R. Fisher from the National Science Foundation (NSF-GB-3853).

<sup>2</sup>Manuscript received December 4, 1969.

<sup>3</sup>This is the first paper in a monographic series on the genus *Silphium*. The work was done in what was the Department of Botany and Plant Pathology of The Ohio State University under the direction of T. R. Fisher. Succeeding papers will be authored by several other people also working under Dr. Fisher's guidance.

Michaux (1803) described the taxon *S. compositum* as a species with sinuate-pinnatifid or ternately compound basal leaves, ranging from the Carolinas to Florida. He listed Walter's *S. laciniatum* in synonymy with *S. compositum*.

Elliott (1824) described *Silphium terebinthinaceum*, characterized by reniform, slightly lobed leaves, from the Appalachian mountains—from North Carolina to Alabama. The epithet *terebinthinaceum* had earlier been applied by Jacquin (1770) to a similar species of the wet prairies of the midwest. Elliott evidently mistook the reniform-leaved *Silphium* of the mountains for the robust ovate-leaved taxon of the prairies. Rafinesque in 1830 listed a *Silphium reniforme* in his Medical Flora, and Nuttall (1841) later provided a description. Nuttall suggested that this taxon was "allied to *S. terebinthinaceum*."

In the *Flora of North America*, Torrey and Gray (1842) described three varieties of *S. compositum*: *michauxii*, based on Michaux's specimen and description; *reniforme*, based on Rafinesque's specimen and Nuttall's description; and *ovatifolium*, based on Chapman's specimen. These varieties were primarily distinguished by differences in leaf morphology.

Small's treatment (1933) of the genus *Silphium* resulted in six species of the *S. compositum* complex being included in the section *Composita*. The varieties of Torrey and Gray (1842) were given specific status, and in addition three new species were described. The taxa recognized by Small were *S. compositum*, *S. reniforme*, *S. ovatifolium*, *S. venosum*, *S. orae*, and *S. lapsuum*. Small (1898) described *S. venosum* from the St. Mary's River valley in southeastern Georgia as a species apparently restricted to the pine barrens in the area around the Okefenokee Swamp and differing from *S. compositum* in both leaf and achene characters. *Silphium orae*, described by Small (1933) as a species of the coastal plain of North and South Carolina, was also separated from *S. compositum* on the basis of leaf morphology. Scabrous leaf surfaces distinguished *S. lapsuum* Small (1933), occurring in the sand hills near the Fall Line of Georgia and South Carolina, from the other taxa.

In the most recent treatment of the genus, Perry (1937) reduced *S. orae* Small to a form of *S. compositum*, and *S. reniforme* to varietal rank under *S. compositum*. *Silphium venosum* Small and *S. ovatifolium* (T. & G.) Small were retained with specific status. *Silphium lapsuum* Small was listed in synonymy under *S. compositum*.

Extreme variability in the morphology of *S. compositum* has been noted by several authors since the species was first described. Elliott (1824) commented on the variation in the species, particularly in leaf shape and venure. Curtis (1837) also noted the differences in degree of leaf dissection, but he commented that only one species was represented, because of similarity in leaf-blade shape and inflorescence morphology. Torrey and Gray (1842) described *Silphium compositum* as "well-marked in habit and character, although polymorphous in foliage," and considered this taxon worthy of varietal recognition. Perry (1937) also noted the morphological diversity in this species complex and retained three specific and two sub-specific taxa.

In this treatment of the species complex, it is proposed that *Silphium compositum* is composed of four subspecies: ssp. *compositum*, ssp. *reniforme*, ssp. *venosum*, and ssp. *ovatifolium*. Experimental evidence to support this realignment was presented elsewhere (Sweeney, 1968).

#### TAXONOMIC TREATMENT

*Silphium compositum* Michaux, Fl. Bor. Am. 2: 145. 1803.

Perennial with woody taproot; 1-3 m in height; basal leaves petiolate, blades elliptic to reniform in outline, often with prominent red veins, glabrous on the upper surface, glabrous or scabrous on the lower; leaf blades entire to variously dissected, and in some becoming compound, margin sometimes serrate or doubly toothed; cauline leaves few and reduced in size, petiolate, lobed but not compound. Flowering stalk few- to many-branched, branching mainly in the upper half of the stalk; involucre 1-3 cm in width, composed of 2 or 3 series of imbricated, ciliate-margined phyllaries, ray flowers 5-10, light yellow to lemon-yellow, 0.5-1.5 cm long; disc flowers numerous, variable in number, yellow; achenes obovate to orbicular in outline,

6–14 mm long, hirsute on the adaxial surface, narrow- to wide-winged, with a V- or U-shaped sinus at the apex, the wing tips acuminate to obtuse.

#### KEY TO THE SUBSPECIES OF SILPHIUM COMPOSITUM

- Flower heads several to many, and dense; involucre with achenes at maturity usually less than 2 cm in diameter; achene wing less than 2 mm wide.
- Basal leaf blades ovate, usually longer than wide, leaf blade palmately to pinnately sinuate to compound; phyllaries shorter than the mature achenes
- ..... 1. *S. compositum* ssp. *compositum*
- Basal leaf blades reniform, frequently wider than long; leaf blade entire to lobed more than half-way to the mid-rib; phyllaries longer than the mature achenes
- ..... 2. *S. compositum* ssp. *reniforme*
- Flower heads, few, and sparse; involucre with achenes at maturity usually 2 cm or more in diameter; achene wing 2 mm or more wide.
- Achene wing tip acute; leaf blade usually as long as wide; petiole equalling or longer than the midrib
- ..... 3. *S. compositum* ssp. *venosum*
- Achene wing tip obtuse; leaf blade usually longer than wide; petiole equalling or shorter than the midrib
- ..... 4. *S. compositum* ssp. *ovatifolium*

1. *Silphium compositum* Michx. ssp. *compositum* comb. nov.  
*Silphium compositum* Michx. Fl. Bor. Am. 2: 145. 1803.  
 TYPE: "in sylvis maritimis, a Carolina ad Floridanum," s. d., *Andre Michaux s.n.* (HOLOTYPE: P 3728, photograph of holotype, personal collections of author!).  
*S. laciniatum* Walt. Fl. Carol. 217. 1788. non L. 1753.  
*S. compositum* Willd. Sp. Pl. 2331. 1803.  
*S. sinuatum* Banks ex Pursh, Fl. Am. Sept. 2: 577. 1816. *pro syn.*  
*S. elatum* Pursh, Fl. Am. Sept. 2: 579. 1816. *pro syn.*  
*S. psuedo-laciniatum* Fras. in herb. L'Her. ex DC, Prodr. 5: 512. 1836. *pro syn.*  
*S. canadensis* Curtis, Bost. Jour. Nat. Hist. 1: 103. 1837. *pro syn.*  
*S. terebinthinaceum* var. *sinuatum* Curtis<sup>4</sup>, Bost. Jour. Nat. Hist. 1: 127. 1837.  
*S. nudicaule* Curtis, Bost. Jour. Nat. Hist. 1: 127. 1837. *nom. nud.*  
*S. compositum* Michx.  $\alpha$  *michauxii* T. & G. Fl. N. Am. 2: 276. 1842. T. & G.  
*S. collinum* Greene, Pittonia 4: 44. 1899.  
*S. orae* Small, Man. S.E. Fl. 1411. 1933.  
 TYPE: North Carolina: [New Hanover Co.] Sandy country about Wilmington, s.d., *M.A. Curtis s.n.* (HOLOTYPE: NY!).  
*S. compositum* Michx. f. *orae* (Small) Perry, Rhodora 39: 295. 1937.

Leaf blades generally ovate, much dissected, often palmately to pinnately compound, base cordate to sagittate, margin entire to serrate, the upper surface glabrous, the lower glabrous to slightly scabrous; petioles as long as midrib; flowering stalk much-branched, with many heads, involucre 1.0–1.5 cm wide, ray flowers 5–7, up to 1 cm long; achenes 6–9 mm long, equalling or exceeding the phyllaries in length at maturity; achene wing up to 1 mm wide, with long acute to acuminate wing tips on either side of a V-shaped sinus, occasionally with an aristate awn near the sinus.

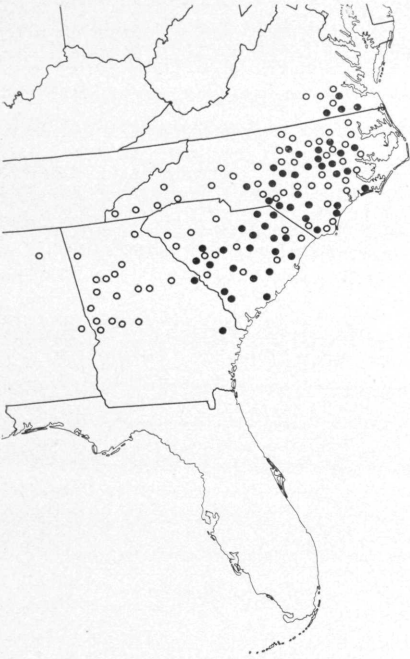
*Habitat*.—In sandy soil along the borders of or in pine or pine-hardwood forests.

*Distribution*.—Coastal plain and piedmont in southeastern Virginia, eastern and central North and South Carolina, and central Georgia, and eastern Alabama (fig. 1).

The typical specimens of subspecies *compositum* are found on the coastal plain of North and South Carolina, and are characterized by very dissected or even compound leaves (fig. 2) and acuminate achenes which extend a short distance beyond the phyllaries at maturity. Intermediates with ssp. *reniforme* are found mainly on the piedmont of South Carolina and Georgia and on both the coastal plain and piedmont of North Carolina. These intermediates are characterized by moderately dissected leaves (fig. 3) and acute achene wing tips which usually do not exceed the phyllaries in length at maturity.

*Representative specimens*.—ALABAMA: dry sterile open woods, 18 Aug 1886, *Chas. Mohr s.n.* (US). GEORGIA: Bryan Co.: 40 mi w of Savannah, s.d., *Alphonse Wood s.n.* (NY). Floyd Co.: no data, Sept 1891, *Chapman s.n.* (US). Richmond Co.: dirt road off 78, 9.7 mi e of Columbia Co. line, 19 June 1958, *J.A. Duke 1908* (UNC). NORTH CAROLINA: Beaufort Co.: pine savannah, 2 mi nnw of Leggetts Crossroads, 6 July 1958, *A.E. Radford 36351* (UNC).

<sup>4</sup>Curtis, in his description of *S. terebinthinaceum* var. *sinuatum*, did not specify whether he referred to *S. terebinthinaceum* Jacq. or *S. terebinthinaceum* Ell. (= *S. compositum* ssp. *reniforme*). Both taxa appear to fit Curtis' concept of *S. terebinthinaceum* and both are found on the piedmont in North and South Carolina. However, Curtis remarked that the typical form is "abundant in the upper districts" (Curtis, 1837). This would suggest that he meant *S. terebinthinaceum* Ell., as it is more common there than is the other taxon. There is no doubt that *S. terebinthinaceum* var. *sinuatum* refers to *S. compositum* ssp. *compositum*. Curtis stated that this sinuate variety was not sufficiently different from the typical form to be granted specific status. This again suggests that he was referring to *S. terebinthinaceum* Ell.



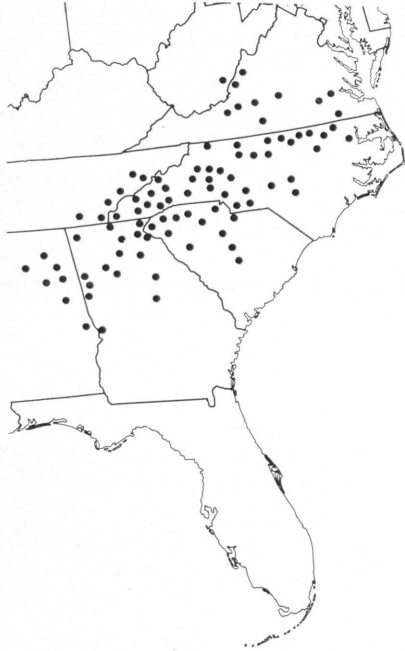
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FIGURE 1. Distribution of *Silphium compositum* ssp. *compositum*. Dots represent ssp. *compositum*; circles represent intermediates with ssp. *reniforme*.

FIGURE 2. Specimen of *S. compositum* ssp. *compositum*, 1/5 $\times$ . (#1301 in the collection of T. R. Fisher, Biology Department, Bowling Green State University, Bowling Green, Ohio).

FIGURE 3. Specimen intermediate between ssp. *compositum* and ssp. *reniforme*, 1/5 $\times$ . (#1327 in the collection of T. R. Fisher).

FIGURE 4. Distribution of *S. compositum* ssp. *reniforme*.

Bladen Co.: White Lake, 14 Aug 1938, *R.K. Godfrey 6019* (GH). Buncombe Co.: Ashville, Aug 1896, *C.S. Williamson s.n.* (PH). Columbus Co.: sandy margin of swamp forest between US 74 and 76, n of Grist, 17 Oct 1958, *C.R. Bell 15328* (UNC). Durham Co.: Duke Forest, open dry soil, 20 Aug 1932, *H.L. Bloomquist 111* (US). Edgecombe Co.: Savannah, 3.2 mi s of Battleboro, 23 Sept 1958, *A.E. Radford 40591* (UNC). Franklin Co.: pine-oak woods, 0.5 mi nnw of Nash-Franklin Co. line, 10 July 1956, *H. E. Ahles and R. S. Leisner 16504* (UNC). Hoke Co.: sandy flat pine woods, 1.8 mi w of Hoke-Cumberland Co. line (4.9 mi east of Lobelia), 26 June 1957, *H. E. Ahles and J. Haesloop 29651* (UNC). New Hanover Co.: Wilmington, 2 Oct 1908, *E.B. Bartram s.n.* (PH); Wilmington, dry sand in pine barrens, Aug 1892, *C.S. Williamson s.n.* (PH). Orange Co.: open dry soil, Duke Forest, 20 Aug 1932, *H.L. Bloomquist 5330* (PH). Polk Co.: dry woods, hogback, 3000 ft, s.d. *D.C. Peattie 1246* (F). Wake Co.: dry sandy bank by woods, 12 mi w of Cary, 27 June 1927, *K.M. Weigand and W.E. Manning 3328* (GH); in dry woods, near Raleigh, 20 Aug 1936, *Bartley and Pontius 483* (NY). SOUTH CAROLINA: Aiken Co.: sandy hills, 9 Aug 1898, *H. Eggert s.n.* (NY). Berkeley Co.: sand ridge pine woods, 8 mi sw of Monck's Corners, 11 Aug 1939, *R.K. Godfrey and R.M. Tryon, Jr. 1394* (PH, GH, NY, US). Darlington Co.: sandhills n of Hartsville, 18 July 1941, *B.E. Smith 825* (UNC). Florence Co.: in open woodland, Florence, 15 May 1930, *H.N. Moldenke 6011* (NY). Horry Co.: dry woods, Myrtle Beach, 23 Aug 1946, *F.H. Sargent 108* (US). Orangeburg Co.: open white sandy oak-pine woods, 1 mi e of Eutawville, 24 July 1939, *R.K. Godfrey and R.M. Tryon 817* (US). VIRGINIA: Greensville Co.: dry sandy woods and thickets near James River Junction, 19 Aug 1936, *M.L. Fernald, L. Griscom and B. Long 6724* (GH). Nansemond Co.: dry sandy pineland sw of Marsh Hill School, s of South Quay, 23 Aug 1940, *M.L. Fernald and B. Long 12878* (GH). Nottoway Co.: 2 mi w of Burkeville, sandy clay pine land, 7 Aug 1960, *R. Kral 11122* (UNC). Sussex Co.: bank on edge of dry woods, 6 mi n of Waverly, 1 Sept 1934, *S.F. Blake 11864* (GH, US).

2. *Silphium compositum* Michx. ssp. *reniforme* (Raf. ex Nutt.) Sweeney & Fisher *comb. nov.*

*S. reniforme* Raf. Med. Fl. 2: 263. 1830. *nom. nud.*

*S. reniforme* Raf. ex Nutt. Trans. Am. Philos. Soc. n. ser. 7: 342. 1841.

TYPE: s.d. *C.S. Rafinesque s.n.* (LECTOTYPE: PH!).

*S. terebinthinaceum* Ell. Sk. 2: 463. 1824. *non* Jacq. 1770.

*S. compositum* Michx. *β reniforme* (Raf. ex Nutt.) T. & G. Fl. N. Am. 2: 276. 1842.

Basal leaf blades generally reniform, entire to somewhat dissected (usually less than half-way to the midrib), base cordate to sagittate, margin entire to serrate, the upper surface glabrous to somewhat scabrous; petioles often longer than the midrib; flowering stalk usually less branched than in ssp. *compositum*, with several to many heads; involucre 1.5–2.0 cm wide; ray flowers 6–8, 1 cm or more long; achenes 6–9 mm long, shorter than the phyllaries at maturity, achene wing up to 1 mm wide with short acute wing tips or merely short awns on either side of a wide and shallow V-shaped sinus, rarely with an aristate awn near the sinus.

*Habitat*.—On shale, sandy clay or sandstone slopes at the edge of hardwood, pine-hardwood, or occasionally pine forests.

*Distribution*.—Mountains of eastern Tennessee; mountains and piedmont regions of southern Virginia, western and central North Carolina, western South Carolina, and northern Georgia; and dissected plateau of northeastern Alabama (fig. 4).

The typical specimens of ssp. *reniforme* (fig. 5) are found in the mountains of eastern Tennessee and western North Carolina, and in Virginia. In the piedmont area, ssp. *reniforme* is sympatric with ssp. *compositum*, and plants from that area approach the ssp. *compositum-reniforme* intermediates mentioned above.

*Representative specimens*.—ALABAMA: Clay Co.: dry sterile open woods in the mountains, 2 Aug 1896, *C. Mohr s.n.* (US). Cullman Co.: along fences, 25 Sept 1898, *H. Eggert s.n.* (NY). Lee Co.: Auburn, upland woods, 16 July 1899, *F.S. Earle 2099* (NY, PH). GEORGIA: Dekalb Co.: Stone Mt., 11 Aug 1900, *C.L. Pollard and W.R. Maxon 478* (NY, US). Fannin Co.: Blue Ridge Mts., 22 July 1909, *H.H. Smith 2450* (F). Rabun Co.: Canyon at Tallulah Falls, alt 1600', 4 Aug 1893, *J.K. Small s.n.* (F, NY). NORTH CAROLINA: Alamance Co.: woodland and waste ground, 7 mi sw of Bellemont on N.C. hwy 49, 17 July 1956, *C.R. Bell 4121* (UNC). Alleghany Co.: open woods along the Blue Ridge Pkwy 4 mi from the Va. line, 2 Aug 1956, *L.E. Hicks and F. Bartley 2250* (US, UNC). Buncombe Co.: dry woodlands near Biltmore, N.C., 3 Aug 1895, *Biltmore Herbarium 4595b* (GH, US, NY, UNC). Burke Co.: Burke, s.d. *M.A. Curtis s.n.* (NY, GH). Henderson Co.: dry oak woods, Fletcher, 15 Sept 1926, *F.W. Hunnwell 9952* (GH). Macon Co.: open woods, summit of Tatoola Mts., alt 5000', near Highlands, 30 Aug 1882, *J.D. Smith s.n.* (GH, F). Swain Co.: dry barren field, Bryson City, 2000', 4 Sept 1931, *E.L. Core and W.M. Sharp s.n.* (WVA). SOUTH CAROLINA: Anderson Co.: dry sandy woods, Anderson, 27 Aug 1919, *J. Davis s.n.* (TENN). Oconee Co.: oak-hickory forest near SC 107, 7 mi w of Jocassee, 2 Sept 1956, *A. E. Radford 17712* (UNC). TENNESSEE: Blount Co.: pine woods between Abram's Creek and Chilhowee Mt., Montvale, 29 June 1930, *S.A. Cain s.n.* (TENN). Cocke Co.: within 3 mi of Wolf Creek Sta. 30–31 Aug 1897, *T.H. Kearney Jr. 784* (NY, US). Polk Co.: in dry woods, Tryon, 24 Aug 1921, *D.C. Peattie 1368* (UNC). VIRGINIA: Bath Co.: on disintegrating shale, vicinity of Millboro in the Allegheny mts., alt 500 m, 31 Aug 1906, *E.S. Steele s.n.* (NY, F, GH, US). Botetourt Co.: dry shaly hill-sides ca 7.2 mi w by n of Eagle Rock, 23 Aug 1946, *C.E. Wood Jr. 6647* (GH). Dinwiddie Co.: border of dry pine woods about 1 mi ne of Burgess, 13 Sept 1937, *M.L. Fernald and B. Long 7700*

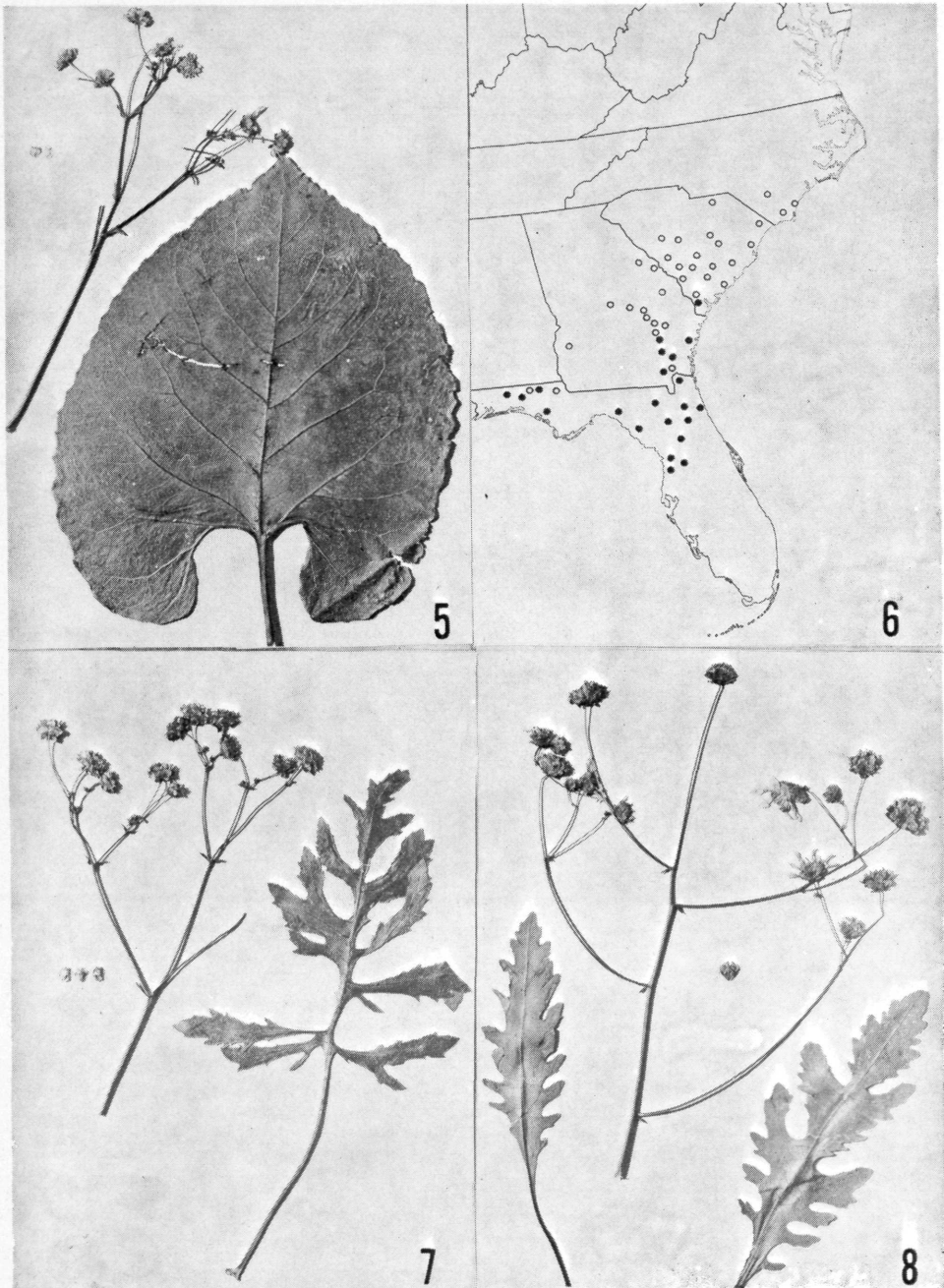


FIGURE 5. Specimen of *Silphium compositum* ssp. *reniforme*,  $1/5\times$ . (#92 in the collection of T. R. Fisher).

FIGURE 6. Distribution of *S. compositum* ssp. *venosum* (circles) and ssp. *ovatifolium* (dots).

FIGURE 7. Specimen of *S. compositum* ssp. *venosum*,  $1/5\times$ . (#1254 in the collection of T. R. Fisher).

FIGURE 8. Specimen of *S. compositum* ssp. *ovatifolium*,  $1/5\times$ . (#1245 in the collection of T. R. Fisher).

(GH, US, NY). Southampton Co.: dry pine woods w of Adams Grove, 14 Sept 1937, *M.L. Fernald and B. Long 7701* (GH). WEST VIRGINIA: Greenbrier Co.: Meadow Creek Mt. near Neola, Monongohela National Forest, 24 July 1959, *R.B. Clarkson 2815* (WVA).

3. *Silphium compositum* Michx. ssp. *venosum* (Small) Sweeney & Fisher comb. nov.

*S. venosum* Small, Bull. Torr. Bot. Club 25: 478. 1898.

TYPE: Georgia: Charlton Co.: in the St. Mary's River Swamp, below Trader's Hill, June 12-15, 1895, *John K. Small* s.n. (HOLOTYPE: NY! ISOTYPE: F!).

*S. lapsuum* Small, Man. S.E. Fl. 1411. 1933.

TYPE: Georgia: Richmond Co.: dry oak savannah, Augusta, July 17, 1898, *A. Culbert* s.n. (HOLOTYPE: NY! ISOTYPE: N.Y!).

Basal leaf blades generally ovate, deeply dissected or pinnately compound, base attenuate to sagittate, margin entire to serrate, upper surface glabrous, lower surface slightly to very scabrous; petioles usually equalling or shorter than the midrib; flowering stalk little- to much-branched, with several heads; involucre 1.5-2.5 cm wide; ray flowers 7-9, about 1 cm long; achenes 8-12 mm long, longer than the phyllaries at maturity; achene wing 1-2 mm wide, with acute to acuminate wing tips, on either side of a V-shaped sinus, occasionally with an aristate awn near the sinus.

*Habitat*.—In sand or sandy clay soil, along the borders of or in pine or pine-hardwood forests.

*Distribution*.—Coastal plain of southeastern North Carolina, South Carolina, southern Georgia, and northern Florida (fig. 6).

Subspecies *venosum* (fig. 7) is sympatric with ssp. *compositum* in the northern part of its range and with ssp. *ovatifolium*, in the southern part. In morphological characters, ssp. *venosum* is intermediate between these two taxa, having the large heads and achenes of ssp. *ovatifolium*, and the acute wing tips and dissected leaves of ssp. *compositum*. However, it appears to be distinct enough in its morphology and distribution to warrant subspecific status.

*Representative specimens*.—FLORIDA: Holmes Co.: longleaf pine hill forest, 3 mi w of Ponce de Leon, n of new hwy #90, 23 Aug 1957, *E.S. Ford 5374* (UNC). Jackson Co.: at the s gate of Marianna Caverns State Park, 25 June 1960, *R.S. Mitchell 332* (FSU). GEORGIA: McDuffie Co.: area of Fall Line sand hills, vicinity of Thomson, 9 Sept 1908, *H.H. Bartlett 1442* (IND). Richmond Co.: 5 mi sw of Augusta, frequent in longleaf pine sand hills, 15 June 1959, *R. Kral 9063* (FSU). Tattnall Co.: upland woods border, ½ mi e of Reidsville on US 280, 12 June 1961, *H.E. Ahles and A. Mueller 54130* (UNC). NORTH CAROLINA: Bladen Co.: wooded slope 2.3 mi s of Bladen-Cumberland Co. line on NC 87, 22 June 1957, *H. E. Ahles and J. Haestloop 29329* (UNC). SOUTH CAROLINA: Aiken Co.: no data, 12-15 Sept 1909, *W.W. Eggleston 5039* (NY). Allendale Co.: black jack oak woods, 2.6 mi nnw of Allendale on SC 28, and 3.8 mi ene on Co. rt. 39, 13 May 1956, *H.E. Ahles and C.R. Bell 12583* (UNC). Clarendon Co.: oak-hickory forest near US 301, 7 mi ne of Manning, 11 June 1957, *A.E. Radford 24601* (UNC). Georgetown Co.: pineland forest, North Santee, 13 June 1957, *A.E. Radford 25055* (UNC). Horry Co.: beside swale, US 17 near 70th St., N. Myrtle Beach, 19 Oct 1957, *J.A. Duke 0163* (UNC). Jasper Co.: upland oak-hickory woods, 9.7 mi n of Ridgeland on US 17, 12 May 1956, *H.E. Ahles and C.R. Bell 12497* (UNC). Lexington Co.: sandy burned-over clearing, 14 mi s of Columbia, 7 Aug 1939, *R.K. Godfrey and R.M. Tryon 1317* (NY, US, GH). Sumpter Co.: pine barrens near cane savanna, 25 May 1914, *Witmer Stone 401* (PH).

4. *Silphium compositum* Michx. ssp. *ovatifolium* (T. & G.) Sweeney & Fisher comb. nov.

*S. compositum* Michx.  $\gamma$  *ovatifolium* T. & G. Fl. N. Am. 2: 277. 1842.

TYPE: Florida: *s.d.* [*A.W.*] *Chapman 138*. (HOLOTYPE: NY!).

*S. ovatifolium* (T. & G.) Small, Fl. S.E. U.S. 1242. 1903.

Basal leaf blades generally ovate to elliptic, entire to lobed, occasionally dissected, base usually attenuate to truncate, rarely cordate, margin entire, occasionally serrate, both upper and lower surfaces glabrous; petioles usually shorter than the midrib; flower stalk little-branched, with few to several heads, involucre 2.0-3.0 cm wide, ray flowers 7-8, 1.0-1.5 cm long; achenes 9-14 mm long, longer than the phyllaries at maturity; achene wing 1.5-2.0 mm wide, with obtuse or slightly acute wing tips on either side of a narrow U-shaped sinus.

*Habitat*.—In sand along the edge of pine or pine-hardwood forests.

*Distribution*.—Coastal plain in southern South Carolina, southeastern Georgia, and central and northern Florida (fig. 6).

In the southern extreme of its range, ssp. *ovatifolium* (fig. 8) is very distinct and does not show any intergradation with ssp. *venosum*. In Georgia and South Carolina, however, ssp. *compositum*, ssp. *venosum*, and ssp. *ovatifolium* all occur within close proximity of each other, and intermediates can be found.

*Representative specimens*.—FLORIDA: Alachua Co.: w outskirts, High Springs, in pine-turkey oak barrens, 24 May 1958, *R. Kral 6571* (UNC, GH, FSU). Bay Co.: scrub oak sand ridge, Tyndall Air Force Base near the headquarters, 8 May 1959, *R.K. Godfrey 58594* (FSU). Citrus Co.: 6 mi sse of Dunnellon on longleaf pine-turkey oak sand ridge, 16 June 1958, *R. Kral 6896* (UNC, FSU). Columbia Co.: no data, June-July 1898, *A.S. Hitchcock* s.n. (F). Hernando Co.: frequent in pine-lands, dry sandy soil with *Berlandiera*, Chinsegut Hill, s-facing slope, 23 July 1961, *O. Lakela 24431* (FSU). Marion Co.: in dry sandy woods, Irvine, 29 Apr 1930, *H.N. Moldenke 1088a* (NY). Okaloosa Co.: open pine-oak woods, Yellow River hills, w of Laurel Hill, 2 Aug 1961, *R.K. Godfrey 61274a* (FSU). Walton Co.: dry pine woods, June, *A.H. Curtiss*

1384 (NY, PH, F, KANU, US); dry pine barrens near Argyle, 16 July 1897, *A.H. Curtiss 5941* (UNC, US, NY, GH). GEORGIA: Brantley Co.: open pine-palmetto forest, Waycross State Forest, n shore of "Big Creek",  $\frac{1}{2}$  mi below Laura S. Walker State Park dam, 10 mi east of Waycross, 6 Aug 1960, *M.L. Kuns 25* (WIS). McIntosh Co.: low turkey oak slope, 2 mi n of Fort Barrington road, Wesley Lake road, in vicinity of sand ridge along Altamaha River, 7 Oct 1962, *J.R. Bozeman and A.E. Radford 2199* (UNC). SOUTH CAROLINA: Jasper Co.: sand hill by Co. rd 41, w of Barton and 0.5 mi s of jct. with Co. rd 23, 11 Sept 1956, *C.R. Bell 5111* (UNC).

## ACKNOWLEDGMENTS

The author gratefully acknowledges the advice and encouragement of Dr. T. Richard Fisher during this study. Gratitude is also extended to Dr. John Speer for assistance with several photographs, and to Mr. Joseph Harvey for preparation of the maps. I also wish to thank the curators of the following herbaria for their kindness in loaning specimens and photographs:

Chicago Natural History (Field Columbian) Museum (F)  
 Florida State University (FSU)  
 Gray Herbarium, Harvard University (GH)  
 Indiana University (IND)  
 New York Botanical Garden (NY)  
 Philadelphia Academy of Natural Sciences (PH)  
 United States National Herbarium (US)  
 University of Kansas (KANU)  
 University of North Carolina (UNC)  
 University of Tennessee (TENN)  
 University of West Virginia (WVA)  
 University of Wisconsin (WIS)

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