MISSOURIENSIS

Journal of the Missouri Native Plant Society

Volume 12 1991 Number 2

CONTENTS

Published for the Society
at
Southwest Missouri State University

A SECOND STATION AND NEW COUNTY RECORD FOR CYPERUS RETROFLEXUS (CYPERACEAE) IN MISSOURI

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Carter & Bryson (1991) reported *Cyperus retroflexus* Buckley as a new state record for Missouri. Recently, an additional station for this species was found in Dunklin County, about 50 km from the original Mississippi County site. Here, *C. retroflexus* was locally common in a disturbed lot along an abandoned railroad right-of-way in Malden. Soil at the Dunklin County site appears similar to the Scotco sand of the previously reported Mississippi County site and is either a Malden fine sand or a Broseley loamy fine sand (United States Department of Agriculture, 1979). Searching in similar habitats in vicinity of Malden did not reveal additional populations. However, this is not surprising since it appears that most suitable habitat has been converted to agricultural and residential use.

> MISSOURI. Dunklin Co., Malden, vacant lot along abandoned railroad right-of-way at intersection of Ozark and Bunnell Streets, 20 Aug 1991, *Carter & Bryson 8929* (IBE, MICH, MO, SMU, SWSL, TAES, US, VDB, VSC).

LITERATURE CITED

Carter, R. and C. T. Bryson. 1991. A report of *Cyperus grayioides* and *Cyperus retroflexus* (Cyperaceae) new to Missouri and notes on other selected Missouri *Cyperus*. Sida 14: 475-481.

United States Department of Agriculture. 1979. Soil survey of Dunklin County, Missouri. USDA, Soil Conservation Service in Cooperation with Missouri Agricultural Experiment Station.

MISPLACED MOUNTAINS

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When we first hear of "Mountain Mints", we think of cool, high-altitude meadows. In fact, most species of *Pycnanthemum* favor warm and steamy situations, and very few are found at significant altitudes.

The genus *Pycnanthemum* Michx. is native only to North America (Mabberley, 1987). With the exception of a single Western species (Gleason, 1968), the genus is restricted to the Eastern half of the continent, extending westward only as far as the grasslands of Nebraska, Kansas, and Oklahoma. The one Western species is found only in California, in moist places in canyons below 5500 ft. (Munz, 1959). Evidently the genus is altogether absent from the Rocky Mountains. Six species are known from Missouri (Yatskievych and Turner, 1990), eight from Illinois (Mohlenbrock, 1986), and seven from the Florida panhandle (Clewell, 1985).

So why are the species of *Pycnanthemum* called "Mountain Mints"? It is still possible to make a case for their occurrence in mountains. A few species (*P. pycnanthemoides* (Leavenw.) Fern., and *P. montanum* Michx.), do occur in the highlands of the Southern Appalachians (Fernald, 1950). Some of the common species of the coastal lowlands farther north extend their ranges Southward along these uplands.

But the great majority of species occur in low-altitude, hot and muggy places. Rickett (1967) says "the English name is not appropriate; a few species grow in the mountains, but most are common in the lowlands." Since there are several species on the Atlantic coastal plain (Fernald, 1950), it even seems probable that the genus would have picked up its common name well before English-speaking people began to discover the ones in the uplands of the interior.

I propose a second possible explanation for the common name of this genus. If true, this meaning would have much more general application to the species first noted by the English-speaking colonists.

Where *P. tenuifolium* Schrad. grows in extensive roadside stands, its white flowers are massed at the summits of the stems in undulating peaks. As the highway asphalt blisters under the July sun, these plants provide us with cooling vistas of frozen mountain ranges only a few feet away. Some of the showier species even have the uppermost leaves "frosted" like glacial outflows of their snowy tops. Could the word "mountain" be a reference to the "snow-capped" appearance typical of the genus? Of course we recall that "Snow-

on-the Mountain" is the common name of *Euphorbia marginata* Pursh which has its leaves progressively whitened toward the top of the plant.

Without definitive evidence from the mouths of those who first used the common name, its original meaning cannot be pinned down. But in view of the fact that *P. verticillatum* (Michx.) Pers., *P. muticum* (Michx.) Pers., *P. pycnanthemoides* (leavenw.) Pers. var. *viridifolium* Fern. and *P. incanum* (L.) Michx. all occur in the coastal regions of the former 13 colonies (Fernald, 1950), and that all have showy inflorescences with their upper and bracteal leaves canescent, I see a strong possibility that those who first met these plants in the lowlands were much impressed with their frosty tops, and gave them a common name that is more generally appropriate within the genus than we have been thinking.

LITERATURE CITED

Clewell, A. F. 1985. Guide to the Vascular Plants of the Florida Panhandle. Florida State University Press, Tallahasse, FL. 605 pp.

Fernald, M. L. 1950. Gray's Manual of Botany. Eighth Edition. American Book Company, New York, NY. lxiv, 1632 pp.

Gleason, H.A. 1968. Illustrated Flora of the Northeastern United States and adjacent Canada. vol. 3. Hafner Publishing Company, New York, NY. lxxv, 482 pp.

Mabberly, D.J. 1987. The Plant Book. Cambridge University Press, Cambridge, England. xii, 706 pp.

Mohlenbrock, R. H. 1986. Guide to the Vascular Flora of Illinois, revised ed. Southern Illinois University Press, Carbondale, IL. xi, 507 pp.

Munz, P. 1959. A California Flora and Supplement. University of California Press, p. 716.

Rickett, H.W. Wild Flowers of the United States. vol. 2: The Southeastern States, part 2. McGraw-Hill Book Company, New York, NY. vi, 688 pp.

Yatskievych, G. and J. Turner. 1990. Catalogue of the Flora of Missouri. Monogr. Syst. Bot. Missouri Bot. Gard. 37: i-xii, 1-34.

NEW AND NOTEWORTHY MISSOURI VASCULAR PLANTS

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ABSTRACT: *Scutellaria epilobiifolia* is confirmed from Missouri. *Ribes americanum* is reported new to the state, and the discovery of an extant station for *Salix discolor* is reported. Additional stations are reported for five taxa of statewide concern: *Anemone cylindrica, Psoralea argophylla, Carex arkansana, C. bicknellii* var. *opaca* and *C. trichocarpa*; the historical distribution and current status of *C. arkansana* and *C. trichocarpa* are discussed.

Recent field work in conjunction with ecological assessments of natural areas in northern and western Missouri have resulted in the discovery of stations for eight new or noteworthy native vascular plants. In the following account of each taxon, species concepts and nomenclature follow Steyermark (1963); where nomenclatural changes have been proposed since that publication, the concepts of Yatskievych and Turner (1990) are included.

Anemone cylindrica A. Gray (Ranunculaceae) Thimbleweed. This is a characteristic species of loess hill prairies in extreme northwestern Missouri. Steyermark (1963) mapped it from Atchison, Holt, Jackson and Nodaway counties, remarking that it is "the rarest species in Missouri" - presumably referring only to the genus. Thimbleweed is listed as "Watch List" on the Missouri Department of Conservation's Rare and Endangered species list (1991). It is widely distributed in areas north of Missouri.

In July 1991 we discovered a new population of Thimbleweed in a large remnant prairie in Harrison County in northern Missouri. Here at least 30 plants grew in two locations along lower slopes above a series of small drainage ravines. This is the first station outside of the loess hills region of northwestern Missouri. The plants grew in Shelby loam soils; these soils are derived from glacial till and alluvial sediments as opposed to the loessal soils comprising the

substrate for other Missouri populations of this taxon. This site has a long history of haying and intensive grazing; in recent years the owners have taken some steps to manage for the prairie community on the site. The thimbleweed was largely confined to areas that were subjected to a controlled burn this spring. It was associated with another typical loess hill prairie species, *Psoralea argophylla*, which is discussed below.

> Voucher specimen: MISSOURI: Harrison Co.: Dunn Ranch, a large prairie remnant ca 5 miles west of Eagleville. On lower slopes above small drainage ravines west of entrance road; associated with *Psoralea argophylla*. NWI/4 SE1/4 sec. 32, T 66 N, R 28 W. 2 July 1991. *Ladd 15109* (MO).

Carex arkansana Bailey (Cyperaceae). According to Steyermark (1963), this species occurs in "wet river bottom prairies, prairie swales, and openings in oak woods". He mapped and listed the Missouri distribution from Bates, Jasper, Linn, and Livingston counties. Wilson (1984) did not list this species, but it was recently added to the state list as "Status Undetermined" (Missouri Department of Conservation 1991).

We recently discovered an extensive population of *C. arkansana* in a wet prairie hay pasture in Chariton County; here it grew in matrix of *Spartina pectinata*, associated with *Apocynum sibiricum, Asclepias incarnata, Carex caroliniana, C. cristatella, Leersia oryzoides, Lycopus americanus*, and *Vernonia fasciculata*.

> Voucher specimen: MISSOURI: Chariton Co.: Bentley Prairie, an annually hayed wet prairie along a small tributary of the Chariton River, ca. 1 mile east of Salisbury; in wet prairie associated with *Spartina pectinata*. NW 1/4 NW1/4 sec. 12 ,T 53 N, R 17 W. 1 July 1991. *Ladd 15102* (MO).

Because of the lack of information regarding the current status of the plant in Missouri, an enumeration of specimens examined by the authors is given below. Additionally, herbarium searches at NEMO and SEMO indicate that no Missouri specimens of *C. arkansana* are archived at those institutions.

> BARTON Co.: north of Jasper, open field, *Castaner 7413* (WARM).
>
> BATES Co.: Rockvile, open low area, *Castaner 3440* (WARM).
>
> CEDAR Co.: Monegaw Prairie, swale, *Ladd 12213* (MO).
>
> LINN Co.: Grand River, bottom prairie, *Steyermark 65672* (MO).

STODDARD Co.: Along hwy 60, wet ditch, *Summers et al 6898* (MO); also *Ladd et al 13613* (MOR).

VERNON CO.: Marmaton River, low area, *Castaner 683* (MO, WARM); Schell Osage WA, wet meadow, *Oskins 336* (WARM); Schell Osage WA, open area along road, *Castaner 5034* (WARM, UMC); Deerfield, low area along highway, *Castaner 6852* (WARM); South of Deerfield, wet prairie, *Solecki 952* (SMS); Along Douglas Branch, wet prairie, *Reese 1755* (SMS); Southwest of Stultz Lake, disturbed wet prairie, *Reese 1735* (SMS); Marmato Wet Prairie, *Ladd 13212* (MO)

Carex arkansana is a well-defined and distinctive species. It is a conservative wetland plant characteristic of prairie swales and wet prairie systems. Steyermark's (1963) attribution of the habitat to include openings in oak woods is perplexing. All of our field observations and the label data on all herbarium specimens we have examined are indicative of wet prairie systems. Smith (1988) has recently reduced this species to synonymy under *C. muhlenbergii* Schk., but this move is in our opinion unsupportable.

C. bicknellii Bailey var. *opaca* Hermann (Cyperaceae). This species was first reported from Missouri by Castaner (1989), based on a collection from a roadside in southeastern Barton County. In June the senior and junior authors discovered a small population growing in a swale at Hunkah Prairie in western Barton County, where the plants grew in a low area along a small drainage in an extensive upland prairie.

Castaner (1989) provides a good morphological description and account of the confusion surrounding this plant. Except for the slightly smaller perigynia with nerved ventral faces, the plants do not seem particularly close to *C. bicknellii*: their gross morphology is more evocative of *C. brittoniana*, a species that occurs in Texas and Oklahoma. Whatever its designation, this taxon appears to us to be a characteristic and distinctive entity, and may well be worthy of recognition as a separate species. This taxon should also be considered for inclusion on the sate Rare and endangered species list.

Voucher specimen: MISSOURI: Barton Co.: Hunkah Prairie, a 160 acre upland prairie preserve within an extensive prairie system, ca 2 miles northeast of Mindenmines. Sec. 27, T 32 N, R 33 W. 9 June 1991. *Ladd 15065* (MOR). [specimen determined by Anton Reznicek, University of Michigan].

Carex trichocarpa Muhlenb. *ex* Willd. (Cyperaceae). This large, distinctive, hairy-fruited sedge is a characteristic species of fens and calcareous seeps

in the northern Midwest ranging north and east through New England and Canada. Missouri is the southwesternmost limit of the species' range. It is classified as Rare by the Missouri Department of Conservation (1991).

A small sterile colony of *C. trichocarpa* was discovered along the edge of a degraded, four acre fen just south of the Iowa state line in Schuyler County. This fen displays evidence of past disturbance, particularly from grazing and water level changes as result of post-settlement perturbations in local hydrology. *Ribes americanum*, and *Salix discolor* also occur at this site and are discussed later in this paper. The *Carex trichocarpa* was restricted to a slightly elevated peaty zone along the eastern edge of the fen, and was not observed in the open saturated mucky portions of the fen interior.

> Voucher specimen: MISSOURI: Schuyler Co.: Wet peaty soil at western edge of degraded fen south of small creek along Iowa/Missouri state line, ca. 1.4 miles due east of Chariton River. W1/3 of southern offset of sec. 22 and NE1/4 NW1/4 NW 1/4 sec. 27, T 67 N, R 16 W. 3 July 1991. *Ladd 15129* (MO).

There is considerable uncertainty regarding the current status and historical distribution of this plant in Missouri. Steyermark (1963) cited specimens from Maries and Reynolds counties; we have examined both of these vouchers, which are archived at MO. Wilson (1984) designated the species as Rare, and listed it from Jackson, Mercer, Platte, Reynolds, and Maries counties. The addition of several counties not cited by Steyermark apparently is the result of records in the Missouri Department of Conservation's Natural Heritage Database. Additionally, Orzell (1983a,b) cited another location in Reynolds County, and Nigh (1988) cited a location in Carter County. The following account summarizes our current knowledge of the status and distribution of *C. trichocarpa* in Missouri.

> CARTER Co.: Cited from a fen along Cave Fork Creek by Nigh (1988).
>
> JACKSON Co.: The Missouri Heritage Program lists records from Little Blue (*Pough s. n.*, 1888, (GH) and Courtney (*Bush 12400*, 1932, MO, #2202136). We have not attempted to examine the Gray Herbarium specimen. Extensive searching at the Missouri Botanical Garden herbarium failed to locate the Bush specimen.
>
> MARIES CO.: Cited from Little Tavern Creek by Steyermark (1963) (*Steyermark 73685*, 1952, MO, #3053624); we have examined this specimen. According to the Heritage Program database, a duplicate of this specimen is at the Field Museum in Chicago. This specimen presumably forms the basis for the cita-

tion in Wilson (1984). Note that Orzell (1983a,b) states that this site has been destroyed; recent searches of this site by Heumann confirmed that there is no longer any *C. trichocarpa* at the site, which has been severely degraded.

MERCER Co. The Heritage Program database lists a specimen from near Saline (*Kellogg 26179*, 1934, MO); this specimen could not be located.

PLATTE Co. The Heritage Program database lists a specimen from along the Platte River 3 miles east of Camden Point (*Steyermark 67698*, 1949, MO, #17031); this specimen could not be located.

REYNOLDS Co. Steyermark (1963) cited a specimen from the West Fork Black River (*Steyermark 71972*, 1951, MO, #1704121); we have examined this specimen. Orzell reported it from Botkin Fen (1983b) and Grasshopper Hollow (1983a, b); there is a recent specimen from the prairie Fen at Grasshopper Hollow (*Ladd 15029*, MO).

Based on this information, it appears that extant populations of *C. trichocarpa* are verified only from Carter, Schuyler, and two locations in Reynolds counties. The historical distribution of the species in Missouri is more uncertain. It is interesting to note that all of the collections forming the basis for the records cited by Wilson (1984) but not by Steyermark (1963) were made well prior to the publication of Steyermark's work - several by Steyermark himself - yet none were cited in the flora. This raises the possibility that Steyermark knew of the collections, and had perhaps examined them and found them to be incorrectly determined. It seems relevant that the only specimens located at the Missouri Botanical Garden were those cited by Steyermark in his flora.

Personnel from the Missouri Botanical Garden have informed us that when a previously cited specimen cannot be located, it almost invariably is because the specimen was misidentified and has been annotated and refiled. It is interesting to note that many early collections labeled as this species have been misidentified: all of the material filed as *C. trichocarpa* at the University of Missouri-Columbia herbarium, for example, was found to be incorrectly determined - mostly as *C. bushii*. Based on these data, the basis for confirming the historical presence of *C. trichocarpa* from Jackson, Mercer, and Platte counties is tenuous. The newly discovered station in Schuyler County may be the first verified record from the Glaciated Plains section of Missouri. The verified range in the Ozark region includes Carter and Reynolds counties, with a documented historical record from Maries county. The apparent rarity of this species in the state is confirmed by the complete lack of Missouri specimens at NEMO, SEMO, SMS,

UMC, and WARM.

Psoralea argophylla Pursh (Fabaceae) Silverleaf Scurf Pea, Silvery Psoralea. This is another characteristic taxon of loess hill prairies in northwestern Missouri. Steyermark (1963) maps the distribution for the same four counties as the previously discussed Anemone cylindrica, plus Ralls County. The plant is on the Missouri Rare and Endangered Species list as Watch List (Missouri Department of Conservation 1991).

Several colonies of the plant occur on lower slopes along a series of drainage ravines in a large unplowed, heavily grazed prairie remnant in Harrison County. Here the plants associated with *Anemone cylindrica*, as well as growing somewhat further up the slopes in regions showing more grazing impact.

Yatskievych and Turner (1990) list this plant under the name *Psoralidium argophyllum* (Pursh) Rydb., but indicate that it more properly belongs in the genus *Pediomelum*, for which the new combination *Pediomelum argophyllum* (Pursh) Grimes has recently been published (Grimes 1990). Smith (1988) expresses reservations about forming generic segregates within *Psoralea*.

> Voucher specimen: MISSOURI: Harrison Co.: Dunn Ranch, a large prairie remnant ca 5 miles west of Eagleville. On lower slopes above small drainage ravines west of entrance road; associated with *Anemone cylindrica*. NW1/4 SE1/4 sec. 32, T 66 N, R 28 W. 2 July 1991. *Ladd 15110* (MO, MOR)

Ribes americanum Miller (Grossulariaceae) Wild Black Currant. This species occurs through much of the northern Great Plains and northern Midwest, as well as eastward and westward. Barkley (1977) maps this species from along the northern Missouri border in Fremont and Taylor counties, Iowa, and Mohlenbrock and Ladd (1978) map a record from Pike County, Illinois, along the eastern border of Missouri. According to Smith (1988), previous reports from Arkansas (Demaree 1943) are erroneous.

We discovered a small population of Wild Black Currant growing in open saturated peaty muck in the middle portions of a degraded fen along the Missouri/Iowa line in Schuyler County. A few stems were observed in one small area of the fen: at least two of these were fertile. The plants were surrounded by and growing among *Typha latifolia*; other associates included *Apios americana, Cardamine bulbosa, Cornus obliqua*, and *Lycopus americanus*. This is the first verified report from Missouri, although Fernald (1950) listed Missouri in his range description. Neither Steyermark (1963) nor Yatskievych and Turner (1990) include reference to this taxon as a valid or excluded species in Missouri.

The fen habitat for the plant is typical; Swink and Wilhelm (1979) list a

typical Chicago Region habitat as "calcareous springy places." The plants' long-term survival potential at Missouri site is uncertain; hydrological perturbations and possibly lack of fire have resulted in a proliferation of *Typha latifolia*, and the single population of *Ribes americanum* is largely swamped by encroaching Typha.

> Voucher specimen: MISSOURI: Schuyler Co.: Saturated peaty muck near middle portion of degraded fen south of small creek along Iowa/Missouri state line, ca. 1.4 miles due east of Chariton River. W1/3 of southern offset of sec. 22 and NE1/4 NW1/4 NW1/4 sec. 27, T 67 N, R 16 W. 3 July 1991. *Ladd 15130* (MOR).

Salix discolor Muhlenb. (Salicaceae) Pussy Willow. According to Steyermark (1963), the only Missouri record for this species is an 1892 collection from near Dumas in Clark County in extreme northeastrn Missouri. The Missouri Department of Conservation's Natural Heritage Database also lists a record from Dent County, but this is apparently based on a misidentified specimen of *S. humilis* at the Missouri Botanical Garden. The plant is designated as "Extirpated" by the Missouri Department of Conservation (1991).

A small, shrubby plant of Pussy Willow was discovered along the shaded margins of a fen along the Iowa state line in Schuyler County. This is the same fen that contains the *Carex trichocarpa* and *Ribes americanum* discussed previously in this paper, although neither was directly associated with the willow.

> Voucher Specimen: Schuyler Co.: moist mucky soil along northwestern edge of degraded fen south of small creek along Iowa/Missouri state line, ca. 1.4 miles due east of Chariton River. W 1/3 of southern offset, sec. 22 and NE 1/4 NW 1/4 sec. 27, T. 67 N, R. 16 W. 3 July 1991. *Ladd 15127A* (MO).

Scutellaria epilobiifolia A. Ham. (Lamiaceae) Marsh Skullcap. This species was attributed to Missouri solely on the basis of an 1885 Bush collection from Jackson County, without further locality data. Steyermark (1963) expressed doubts about the validity of the location data for this collection. Yatskievych and Turner (1990) retain this taxon in the Missouri flora as *S. galericulata* L.; it is listed as "Extirpated" in the state Rare and Endangered species list (Missouri Department of Conservation 1991). As far as we can determine, the plant has not been recollected in Missouri in the past 106 years. It is widely distributed in the northern United States and Canada.

In July two widely separated populations of this plant were located in significant wetlands in northern Missouri. At a marsh in Mercer County, the plants were scattered through a wet prairie/freshwater marsh interface, adjacent to a *Scirpus fluviatilis/Sparganium eurycarpum* dominated marsh. Missouri Depart-

ment of Conservation botanists Tim Nigh and Tim Smith located a population in a Clark County marsh; here the plants were locally frequent, associated with *Carex* sp. and *Polygonum sagittatum*.

Voucher specimens: MISSOURI: Mercer Co.: Lowry Marsh, a high quality wetland complex ca 2 miles north of Princeton, ca 0.5 miles east of Weldon Fork of Grand River. NW1/4 NW1/4 sec. 6, T 65 N, R 24 W. 1 July 1991. *Ladd 15117* (MO, MOR). Clark CO.: Goose Pond, a wetland complex ca 0.5 mi. southeast of Wayland. E1/2 SE1/4 sec. 32, T 65 N, R 6 W. 17 July 1991. *Smith 3119* (MO).

ACKNOWLEDGEMENTS

Appreciation is expressed to Mike Skinner, Southwest Missouri State University; Tim Smith, Holly Wheeler and George Yatskievych, Missouri Department of Conservation; David Castaner, Central Missouri State University; and Gerould Wilhelm, The Morton Arboretum, for their assistance and suggestions.

LITERATURE CITED

Barkley,T. M., ed. 1977. *Atlas of the Flora of the Great Plains*. Iowa State University Press, Ames, IA.

Castaner, D. 1989. Missouri Carex notes 4. *Carex bicknellii* var. *opaca* in Missouri. Missouriensis 10: 13-15.

Demaree, D. 1943. A catalogue of the vascular plants of Arkansas. Taxodium 1: 1-88.

Fernald, M. L. 1950. *Gray's Manual of Botany*, Eighth Edition. American Book Company, New York.

Grimes, J. W. 1990. A revision of the new world species of Psoraleeae (Leguminosae: Papilionoideae). Memoirs of the New York Botanical Garden 61: 1-114.

Missouri Department of Conservation. 1991. *Rare and Endangered Species of Missouri Checklist*. Missouri Department of Conservation, Jefferson City, MO.

Mohlenbrock, R. H. and D. M. Ladd. 1978. *Distribution of Illinois Vascular Plants*. Southern Illinois University Press, Carbondale.

Nigh, T. A. 1988. *Missouri Natural Features Inventory: Carter, Oregon, Ripley, and Shannon Counties*. Missouri Department of Conservation, Jefferson City.

Orzell, S. L. 1983a. *Natural Area Inventory and Floristic Analysis of Fens in Selected Southeastern Missouri Counties*. M. S. Thesis, Southern Illinois University, Carbondale.

_____. 1983b. Notes on rare and endangered Missouri fen plants. Transactions of the Missouri Academy of Science 17: 67 -71.

Smith, E. B. 1988. *An Atlas and Annotated List of the Vascular Plants of Arkansas*, revised edition. Published by the author, Fayetteville, AR.

Steyermark, J. A. 1963. *Flora of Missouri*. Iowa State University Press, Ames, IA.

Swink, F. and G. Wilhelm. 1979. *Plants of the Chicago Region*, Third Edition. The Morton Arboretum, Lisle, IL.

Wilson, J. H., ed. 1984. *Rare and Endangered Species of Missouri*. Missouri Conservation Commission. Jefferson City.

Yatskievych, G. and J. Turner. 1990. Catalogue of the flora of Missouri. Missouri Botanical Garden Monographs in Systematic Botany 37: 1-345