

DISTRIBUTION OF THE MILLIPED *VIRGOIULUS MINUTUS* (BRANDT, 1841):
FIRST RECORDS FROM MISSISSIPPI, OKLAHOMA, AND TEXAS
(JULIDA: BLANIULIDAE)

Chris T. McAllister¹, Rowland M. Shelley², Henrik Enghoff³, and Zachary D. Ramsey¹

ABSTRACT.—*Virgoiulus minutus* (Brandt 1841) (Julida: Blaniulidae), the only indigenous representative of the family in the New World, occurs, or can be expected, in parts or all of 24 states east of the Central Plains plus the District of Columbia; it is documented for the 1st time from Mississippi, Oklahoma, and Texas. The northern-, southern-, and westernmost localities are in Berrien County, Michigan; Putnam County, Florida; and Angelina/Rusk Counties, Texas, respectively. New England, Utah, Wyoming, Canada, and Mexico are deleted from the range, and specific localities are reported to augment previous generalized citations; those from Mexico represent misidentifications of *Nopoiulus kochii* (Gervais, 1847), an introduced European species that is recorded from Mexico City, Distrito Federal. Records of *V. minutus* from Pennsylvania, Virginia, South Carolina, Georgia, Alabama, West Virginia, Ohio, Illinois, Michigan, and Missouri are the 1st definite localities from these states; a sample from “Anechar,” believed to be a misspelling of “Arrochar,” a neighborhood in Staten Island, is considered the 1st definite record from New York. The published statement of occurrence in Delaware in general is the only known record of an indigenous diplopod from this state.

Key words: *Virgoiulus minutus*, *Nopoiulus minutus*, *Nopoiulus kochii*, *Blaniulidae*, *Mississippi*, *Texas*, *distribution*.

Shelley et al. (2005) observed that the discovery of a single individual of many milliped species from the region between the Mississippi River and the Central Plains, where distributions are usually poorly known, can alter knowledge so significantly that published documentation is in order. This was necessary with the polydesmidans *Scytonotus granulatus* (Say) (Polydesmidae) and *Pleuroloma flavipes* Rafinesque (Xystodesmidae) (Shelley et al. 2004, 2005), and is now necessary for the blaniulid julidan *Virgoiulus minutus* (Brandt). Distribution statements for this species in most modern accounts are either general lists of states without specific localities or brief summary range descriptions. As part of the 1st author’s ongoing survey of myriapods in the “Ark-La-Tex” region, *V. minutus* was reported from 17 new counties in Arkansas by McAllister et al. (2003), and the milliped has recently been discovered in southeastern Oklahoma and 4 counties in eastern Texas; coupled with a preserved sample from Angelina County, Texas, these represent new state records. As the only detailed locality data for *V. minutus* are those of McAllister et al. (2003), it is desirable to publish these and other unreported

sites to fully document its distribution; to this end the 2nd author borrowed material from the ensuing list of repositories, which contained the 1st samples from Mississippi.

Williams and Hefner (1928), Chamberlin and Hoffman (1958), Loomis (1968), and Shelley (1978a, 1978b) considered *V. minutus* (then referenced as *Nopoiulus minutus*) to be a European introduction, but we believe that *V. minutus* is an endemic Nearctic species and the only indigenous blaniulid in the New World, for the following reasons. To begin with, the milliped has never been encountered in Europe, as have all the known Palearctic introductions, nor, in fact, outside the coherent range depicted in Figure 1. Second, while *V. minutus* does occur in urban environments, particularly in the Southeast, it also is found well removed from human influence, in contrast to the introduced North American blaniulids that occur exclusively in association with man either in urban environments or in agricultural areas where they sometimes feed on crops, especially fruits like strawberries. Finally, the distribution pattern of *V. minutus* (Fig. 1) counters those of all widely introduced millipeds in North America, which occur across

¹Biology Department, Texas A&M University–Texarkana, Texarkana, TX 75505.

²Research Lab, North Carolina State Museum of Natural Sciences, 4301 Reedy Creek Road, Raleigh, NC 27607.

³Natural History Museum of Denmark, University of Copenhagen, Universitetsparken 15, DK-2100 Copenhagen, Denmark.

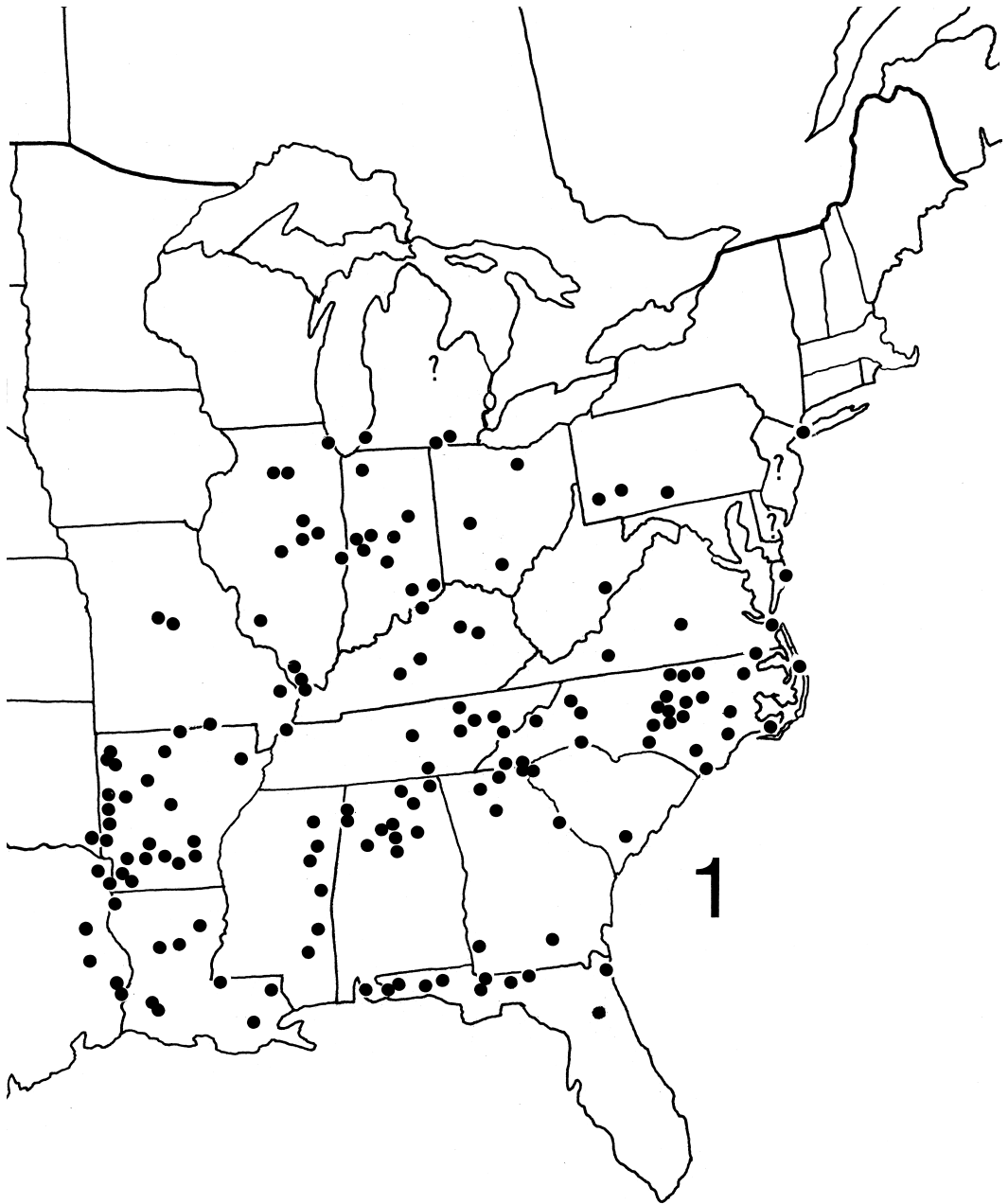


Fig. 1. Distribution of *Virgoiulus minutus*. The question marks in New Jersey and Delaware indicate general records from these states; that in Michigan denotes the questionable record from Saginaw County (Snider 1991).

the continent to varying degrees and north into Canada, as opposed to a large, coherent area in a single general region. If *V. minutus* were introduced, we would expect it to occur across the continent—for example in New England, California, the Pacific Northwest,

and Canada—and exclusively in association with man in cities and towns. Consequently, the distribution pattern in *V. minutus*, in both urban and rural habitats in one broad, definable area east of the Central Plains, is not that of an introduced milliped but rather, we think,

definitive evidence that it is indeed an indigenous species.

Enghoff and Shelley (1979) first raised the possibility that *V. minutus* might be native, and Enghoff (1984a:400) stated that "if not introduced, it is the only indigenous blaniulid in America." In an account of the introduced blaniulid *Nopoiulus kochii* (Gervais, 1847), Shelley (1988) reported that *V. minutus* is endemic to the Nearctic, and Hoffman (1999) stated that *Virgoiulus* was presumed to be endemic to southeastern North America. Five other blaniulids are known from this continent, all native European species that have been introduced by man and now occur to varying extents across the U.S., Canada, and Mexico, primarily in urban habitats (Chamberlin and Hoffman 1958, Enghoff and Shelley 1979, Enghoff 1984a, 1984b, Shelley 1988, 1990, 2002, Hoffman 1999): *Archiboreoiulus pallidus* (Brade-Birks, 1920), *Blaniulus guttulatus* (Fabricius, 1798), *Proteroiulus fuscus* (Am Stein, 1857), *Choneiulus palmatus* (Němec, 1895), and *N. kochii*. These blaniulids are all narrow, fragile, cylindrical ("juliform") diplopods whose widths are roughly equivalent to the lead of a mechanical pencil, and *V. minutus* is distinguished, even in juvenile stages, by the arrangement of the ocelli in a single row and by the extremely short, microscopic, pleurotergal setae that are invisible under a stereomicroscope even at magnifications of around 100X. The setae are easily seen on other ocellate blaniulids, for example *P. fuscus*, whose ocelli are arranged in 2 unequal rows, and *N. kochii*. As noted by Enghoff and Shelley (1979), males are less numerous than females in most blaniulid species, but they are particularly rare in *V. minutus*, which is surely parthenogenetic. To our knowledge only 2 males have ever been reported, one of which was illustrated by Enghoff and Shelley (1979, figs. 5–10).

Occasionally, *V. minutus* is found in deciduous leaf litter, but the great majority of specimens are encountered in association with decaying logs and stumps, principally pines and primarily beneath loose bark. Its preference for subcortical pine habitats was first recognized by Say (1821:106), who stated that it was "found commonly under pine bark on the eastern shore of Virginia." Chamberlin (1921) noted that it was often found under bark of decaying trees but did not mention pines specifically, and Shelley (1978a) reported that the

milliped is particularly abundant in southeastern pine forests that have been ravaged by the southern pine beetle (*Dendroctonus frontalis* Zimmerman, 1868), in which dead pine logs are plentiful. This association with pines makes *V. minutus* one of the few North American millipeds that collectors can search for deliberately with a high probability of success, by visiting predominantly pine forests and peeling bark off decaying logs. The individuals from Oklahoma and Bowie and Cass Counties, Texas, were discovered in this manner; those from Oklahoma were under bark of a pine stump on the edge of a wooded area; those from Bowie County were under bark of decaying pine logs in a predominantly loblolly pine forest (*Pinus taeda* L.) with scattered southern red oaks (*Quercus falcata* Michaux) and other hardwoods; and the specimen from Cass County was in litter associated with these trees. However, the individuals from Newton and Rusk Counties, Texas, were encountered under bark of decaying oak logs.

Though plentiful, published records of *V. minutus* are somewhat difficult to trace because of its contorted nomenclatural history. The first account was by Say (1821), who described it as "*Julus pusillus*," but this binomial is preoccupied by *J. pusillus* Leach, 1815; Brandt's (1841) name, *minutus*, is thus the oldest available specific name. The main reason for the uncertainties, however, is confusion between *V. minutus* and *N. kochii*, which has an even more complicated nomenclatural history (see Enghoff and Shelley 1979, Enghoff 1984a). The name *minutus* was neglected by European diplopodologists until Chamberlin (1921, 1922) brought it into the synonymy of *N. kochii*, and Enghoff and Shelley (1979) showed that *minutus* and *kochii* are 2 different species. Enghoff (1984a) referred *minutus* to the new, monotypic genus, *Virgoiulus*, which occupies a basal position in the phylogeny of the blaniulid subfamily Nopoiulinae and is an endemic North American genus.

We present below distributional data for *V. minutus* beginning with deletions that were probably based on misidentifications of other blaniulids or narrow-bodied representatives of other julidan families like the Nemasomatidae. Subsequently, we compile published records beginning with generalized range statements and then provide detailed locality records. Missing data were not provided on vial labels,

and the number of specimens, all being females or juveniles, is provided after the institutional acronym except for samples with too many individuals to count, indicated by "several." Based on occurrences in adjacent states, we predict that *V. minutus* will be discovered in southeastern Wisconsin (at least Kenosha County) and perhaps more broadly across the southern border of the state; occurrences in southeastern Iowa and throughout the eastern periphery of Oklahoma are also plausible. The overall distribution (Fig. 1) encompasses around 850 miles (1360 km) north-south and 1060 miles (1696 km) east-west, and can be characterized as follows: the United States east of the Central Plains from, north-south, central Missouri, southern Michigan, northern Illinois and Ohio, and Long Island, New York, to the latitude of Gainesville, Alachua County, Florida (actually known from Putnam County, the adjacent county to the east), the Gulf Coast, and southern Louisiana; east-west, from the area of New York City, the Outer Banks of North Carolina, and northeastern Florida to central Missouri and the eastern peripheries of Texas and Oklahoma. There are no new or published records from Maryland and the District of Columbia, but *V. minutus* is expected there, so its area encompasses parts of 24 states plus DC and all of 14 states: Maryland, Delaware, Virginia, North and South Carolina, Georgia, Alabama, Mississippi, Tennessee, Kentucky, West Virginia, Indiana, Arkansas, and Louisiana. The northernmost record is from Berrien County, Michigan; the easternmost localities are in New York and Dare County, North Carolina; the southernmost is in Putnam County, Florida; and the westernmost are in Angelina and Rusk Counties, Texas. Acronyms of sample repositories are as follows: AMNH—American Museum of Natural History, New York; FMNH—Field Museum of Natural History, Chicago, Illinois; FSCA—Florida State Collection of Arthropods, Gainesville; INHS—Illinois Natural History Survey, Champaign; JAB—private collection of J.A. Beatty, Carbondale, Illinois; MCZ—Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts; MEM—Mississippi Entomological Museum, Mississippi State University, Starkville; MPM—Milwaukee Public Museum, Milwaukee, Wisconsin; NCSM—North Carolina State Museum of Natural Sciences, Raleigh; NMNH—National Museum of Natural

History, Smithsonian Institution, Washington, D.C.; UAAM—University of Arkansas Arthropod Museum, Fayetteville; UMO—Enns Entomological Museum, University of Missouri, Columbia; VMNH—Virginia Museum of Natural History, Martinsville; ZMUC—Natural History Museum of Denmark, Copenhagen.

DELETIONS

New England, Utah, and Wyoming; Canada; Mexico. Chamberlin (1921) cited *N. minutus* from New England, but there are no preserved specimens in any American repository. Chamberlin and Hoffman (1958) stated that the species occurs sporadically as far west as Utah, and Chamberlin (1943a, 1951) reported *N. minutus* from Casper, Natrona County, Wyoming, and Salt Lake City and Salem, Salt Lake and Utah Counties, Utah, all of which are well west of the coherent distribution shown in Figure 1. The Utah records probably refer to *Orinisobates utus* (Chamberlin, 1912) (Nemasomatidae), which is common in canyons and along watercourses in Salt Lake and Utah Counties and northern Utah in general (Enghoff 1985, plus unreported specimens examined by the 2nd author). We have not seen any blaniulids from Casper, Wyoming, but surmise that this record refers to an introduced species like *N. kochii*, as it is well removed from the known range of *O. utus*, whose only Wyoming records are from the Teton Mountains adjacent to Idaho (Enghoff 1985).

Chamberlin and Hoffman (1958) included eastern Canada in the range of *N. minutus*, and Loomis (1968) gave the range as the "United States and Canada." However, Shelley (1988, 2002) stated that it is not probable for any region of Canada, even the most proximate part of southern Ontario (Essex County), because at that time the species was not known from north of southern Ohio. We report sites from Lorain County, Ohio, near metropolitan Cleveland, and Berrien and Hillsdale Counties, Michigan, and Snider (1991) recorded questionable occurrences from Lenawee and Saginaw Counties, Michigan. These samples are not available and the latter is still doubtful, but Lenawee County is adjacent to Hillsdale and hence is plausible, so we denote it with a dot in Figure 1. Thus, while we still exclude Canada from the distribution, *V. minutus* is now known from only 75 miles (120 km) southwest

of Essex County, and discovery in southern Ontario is plausible.

Chamberlin (1943b) and Loomis (1968) reported *N. minutus* from Chapultepec Park in Mexico City and Salazar, Distrito Federal, Mexico. The 2nd author recently discovered the samples from Chapultepec Park at the NMNH, and the 3rd author identified them as *N. kochii*. This is the 2nd Mexican record of *N. kochii*, the 1st being that of Jawlowski (1930), who recorded the synonym *N. armatus* (Němec, 1895) (see Enghoff 1984b), from Patzcuaro, Michoacan, which was reiterated by Loomis (1968). Sample data follow: **Distrito Federal**, Mexico City, Chapultepec Forest Park, in leaf litter, ♂, 2 ♀, 3 juvs., 7 October 1939, F. Bonet (NMNH).

PUBLISHED RECORDS

"MIDDLE STATES" in general (Say 1821, Brandt 1841, Golovatch and Hoffman 2000).

UNITED STATES EAST OF THE MISSISSIPPI RIVER (Chamberlin 1921).

WIDESPREAD OVER EASTERN UNITED STATES AS FAR SOUTH AS DELAWARE AND VIRGINIA AND WEST TO TENNESSEE (Chamberlin and Hoffman 1958).

EASTERN NORTH AMERICA (ALABAMA, ARKANSAS, FLORIDA, GEORGIA, ILLINOIS, INDIANA, KENTUCKY, LOUISIANA, MISSOURI, NORTH CAROLINA, OHIO, PENNSYLVANIA, SOUTH CAROLINA, TENNESSEE, VIRGINIA, AND WEST VIRGINIA) (Enghoff and Shelley 1979).

SOUTHEASTERN NORTH AMERICA, WEST TO ARKANSAS, NORTH TO ILLINOIS AND PENNSYLVANIA (Enghoff 1984a).

EASTERN UNITED STATES, FROM PENNSYLVANIA AND MISSOURI SOUTH TO FLORIDA AND LOUISIANA (Hoffman 1999).

NEW YORK: New York in general (Chamberlin 1921, Bailey 1928).

NEW JERSEY: New Jersey in general (Chamberlin 1921).

PENNSYLVANIA: Pennsylvania in general (Chamberlin 1921, Enghoff and Shelley 1979, Enghoff 1984a, Hoffman 1999).

DELAWARE: Delaware in general (Chamberlin 1921, Chamberlin and Hoffman 1958). To the best of our knowledge, this is the only published record of an indigenous milliped from the state of Delaware.

VIRGINIA: Virginia in general (Bollman 1887, Chamberlin and Hoffman 1958, Enghoff and

Shelley 1979). Eastern shore in general. **Accomack and Northampton Cos.** (Say 1821, Newport 1844, Wood 1865, Loomis 1968, Hoffman 1999).

NORTH CAROLINA: North Carolina in general (Enghoff and Shelley 1979). **Durham Co.**, Duke Forest (Chamberlin 1940, Causey 1940, Wray 1967, Shelley 1978a, 2000). **Cleveland Co.**, Kings Mountain area (Filka and Shelley 1980, Shelley 2000). Sites in **Alexander, Bertie, Bladen, Brunswick, Carteret, Chatham, Dare, Edgecombe, Gates, Granville, Halifax, Harnett, Jones, Lee, Macon, Madison, Moore, Orange, Pitt, Richmond, Vance, Wake, and Wilkes Cos.** (Shelley 1978a, 2000).

SOUTH CAROLINA: South Carolina in general (Enghoff and Shelley 1979). Coastal zone in general (Shelley 1978b).

GEORGIA: Georgia in general (Enghoff and Shelley 1979).

FLORIDA: Florida in general (Enghoff and Shelley 1979, Hoffman 1999). **Escambia Co.**, Pensacola (Bollman 1887, 1893, McNeill 1887, Hoffman 1999, Shelley 2001). Sites in **Gadsden, Jefferson, Leon, Liberty, Putnam, and Santa Rosa Cos.** (Shelley 2001).

ALABAMA: Alabama in general (Enghoff and Shelley 1979).

TENNESSEE: Tennessee in general (Chamberlin 1921, Chamberlin and Hoffman 1958, Enghoff and Shelley 1979). **Jefferson Co.**, Mossy Creek (Bollman 1888a). **Overton Co.**, Standing Stone St. Pk. (Loomis 1944). **Sevier Co.**, Gatlinburg and Great Smoky Mountains National Park (Chamberlin 1952).

KENTUCKY: Kentucky in general (Enghoff and Shelley 1979). **Powell Co.**, below Raven Rock (stated by Enghoff [1979] as probably in Kentucky, which is correct).

WEST VIRGINIA: West Virginia in general (Enghoff and Shelley 1979).

OHIO: Ohio in general (Chamberlin 1921, Williams and Hefner 1928, Enghoff and Shelley 1979).

INDIANA: Indiana in general (Chamberlin 1921, Enghoff and Shelley 1979). **Clark Co.**, New Providence (Bollman 1888b). **Marion Co.**, Indianapolis (Bollman 1888b). **Monroe Co.**, Bloomington (Bollman 1887, 1888b). **Washington Co.**, Salem (Bollman 1888b).

ILLINOIS: Illinois in general (Chamberlin 1921, Enghoff and Shelley 1979, Enghoff 1984a).

MICHIGAN: Michigan in general (Johnson 1954). **Lenawee and Saginaw Cos.**, reported with a question mark (Snider 1991).

MISSOURI: Missouri in general (Enghoff and Shelley 1979, Hoffman 1999).

ARKANSAS: Arkansas in general (Enghoff and Shelley 1979, Enghoff 1984a). **Pulaski Co.**, Little Rock (Bollman 1888c, McAllister et al. 2002) and North Little Rock (=“Argenta”) (Bollman 1888c, McAllister et al. 2002), sites in **Baxter, Bradley, Calhoun, Clarke, Craighead, Drew, Hempstead, Lincoln, Logan, Lafayette, Nevada, Polk, Pope, Scott, and Sevier Cos.** (McAllister et al. 2002, 2003).

LOUISIANA: Louisiana in general (Enghoff and Shelley 1979, Hoffman 1999). **Caddo Par.**, (Causey 1963, as undetermined females of the Nemasomidae [=Nemasomatidae]).

NEW RECORDS

PENNSYLVANIA: **Franklin Co.**, Penn. Mar. (exact location unknown), 27 July 1955, W. Suter (FSCA 1). **Washington Co.**, Monongahela, W.L. Gregg (NMNH 2). **Westmoreland Co.**, Seward, 24 July 1959, W. Suter (FSCA 8); and Youngstown, 22 June 1962 (FSCA 10). *First definite state records.*

VIRGINIA: **Cumberland Co.**, 1.2 miles (2 km) SSW Columbia, 15 February & 17 March 1990, J.C. Mitchell (VMNH 4). **Franklin Co.**, 2 miles (3.2 km) N Algoma, 2 April 1958, R.L. Hoffman, R.E. Crabill, Jr. (VMNH 1). **City of Norfolk**, Talbot Hall, 31 December 1959, L.J. Taylor (FSCA 1). *First definite state records.*

NORTH CAROLINA: **Macon Co.**, Cullasaja River Gorge nr. Van Hook Cpgd., Nantahala Nat. For., 9 June 1962, R.C. Graves (FSCA 3); and Coweeta Hydrologic Station nr. Otto, 23 May 1965, S.B. Peck (FSCA 1).

SOUTH CAROLINA: **Colleton Co.**, between Walterboro & Adams Run, December 1929, O.F. Cook (NMNH several). **Oconee Co.**, along SC Hwy. 28 at unknown site, 29 July 1960 (AMNH 1). *First definite state records.*

GEORGIA: **Atkinson Co.**, Pearson, 14 September 1959, W. Suter (FSCA 8). **Early Co.**, Kolomoki Mounds St. Pk., 19 November 1977, R.M. Shelley (ZMUC 1). **Fannin Co.**, along GA Hwy. 60, 2 miles (3.2 km) N Union Co. line, 3 July 1963, R.L. Hoffman (VMNH 1). **Gwinnett Co.**, 0.5 miles (0.8 km) NW Snellville, 24 December 1985, D.L. Stephan (NCSM 1). **Lincoln Co.**, Elijah Clark Memor-

ial St. Pk., Dooly Spring, 1958, N.B. Causey (FSCA 1). **Rabun Co.**, north slope of Rabun Bald nr. rd. to tower, 30 May 1964, H.R. Steeves (FSCA 3). **Union Co.**, east slope of Brasstown Bald, S. & J. Peck (FSCA 1). *First definite state records.*

FLORIDA: **Duval Co.**, Jacksonville, Tree Hill Nature Center, 13 April 2002, R.M. Shelley (NCSM 1). **Escambia Co.**, 11.6 miles (18.6 km) NW downtown Pensacola, jct. FL Hwys. C97 & C297A, 18 November 1977, R.M. Shelley (ZMUC 55). **Walton Co.**, Basin Bayou St. Pk., 18 November 1977, R.M. Shelley (ZMUC 18). **Washington Co.**, Falling Waters St. Pk., 18 November 1977, R.M. Shelley (ZMUC 8).

ALABAMA: **Baldwin Co.**, Jct. US Hwys. 90 & 98 W of Loxley, 22 January 1965, N.B. Causey (FSCA 1). **Cullman Co.**, nr. Cullman, Hurricane Creek Park, 6 July 1963, H.R. Steeves (FSCA 5). **Franklin Co.**, The Dismals, 18 July 1959, H.R. Steeves (FSCA 3); Dismal Gardens, 4 September 1961, J. Wagner, W. Suter (FSCA 13); and Rock Bridge Canyon, 21 May 1961, H.R. Steeves (FSCA 47). **Jackson Co.**, 7.5 miles (12 km) N Princeton, 29 October 1960, H.R. Steeves (FSCA 1); and National Mtn., 15 March 1966, S.B. Peck (MCZ 83). **Jefferson Co.**, Alabama Caverns, 4 February 1961, H.R. Steeves (FSCA 109). **Madison Co.**, Shelta Cave (Cv.), 12 April 1965, J.E. Cooper, Sr. & Jr., M.L. Riser (FSCA 1) and 25 September 1966, L. Hubricht (VMNH 16). **Marion Co.**, Bear Creek, 22 June 1960, H.R. Steeves (FSCA 162); and Hackleburg, Davis Water Mill, 25 May 1964, S. & J.W. King (FSCA 22). **Marshall Co.**, nr. Guffey Cv., 22 March 1959 & 27 November 1960, H.R. Steeves (FSCA 14). **Shelby Co.**, Oak Mtn. St. Pk., 26 March 1961, 22 April 1961 & 24 April 1965, H.R. Steeves, Jr. (FSCA 14, NMNH 4). **Talladega Co.**, Talladega Nat. For., 16 April 1960, H.R. Steeves (FSCA 4); and Sylacauga, 18 September 1959, W. Suter (FSCA 19). **Walker Co.**, nr. Jasper, Devil’s Ladder, 28 May 1960, H.R. Steeves (FSCA 4). *First definite state records.*

MISSISSIPPI: **Forrest Co.**, 1.5 miles (2.4 km) from Eatonville, 1957, N.B. Causey (FSCA 1). **Kemper Co.** (FMNH 1). **Oktibbeha Co.**, 10 miles (16 km) S Starkville, Craig Springs, cotton field, 31 December 1979, W.H. Cross (NCSM 1). **Pontotoc Co.**, 1 mile (1.6 km) SE Ecu, 20 February 1981, W.H. Cross (MEM several). **Wayne Co.**, 5 miles (8 km) E Eucutta,

near Ben Martin Cv., 10 March 1963, L. Hubricht (VMNH 1). **Winston Co.**, Louisville, 24 March 1981, R.L. Brown (MEM several). *New state record.*

TENNESSEE: **Franklin Co.**, Sewanee, 9 April 1961, H.R. Steeves (FSCA 8). **Morgan Co.** (FMNH 1). **Obion Co.**, Reelfoot Lake St. Pk., 28 April 1956, F.J. Etges (FSCA 1). **Sevier Co.**, Great Smoky Mountains Nat. Pk., Elkmont area, 8 August 1981, R.M. Shelley, H. Enghoff (NCSM 3). **Wilson Co.**, Cedars of Lebanon St. Pk., 14 April 1962, H.R. Steeves (FSCA 2).

KENTUCKY: **Edmonson Co.**, Mammoth Cave Nat. Pk., Mammoth Cave Hollow, 25 September 1960, D.E. Reichle (FSCA 31). **Fayette Co.**, Lexington, 4 February 1944, P.O. Ritcher (INHS 1), and in cave, May 1947, M.W. Sanderson (INHS several). **Grayson Co.**, 7 miles (11.2 km) NW Leitchfield, Rough River Lake, 27 May 1984, D. & M. Hildebrandt (MPM 1). **Jefferson Co.**, Louisville, 27 September 1957, R.E. Woodruff (FSCA 16).

WEST VIRGINIA: **Pocahontas Co.**, McCloud Cv., 20 April 1963, H. Zotter, N.B. Causey (FSCA 22). *First definite state record.*

OHIO: **Champaign Co.**, 26 March 1955, R.E. Woodruff (FSCA 5). **Jackson Co.**, Jackson (FMNH 1). **Lorain Co.**, Oberlin, 29 July 1959, W. Suter (FSCA 26). *First definite state records.*

INDIANA: **Madison Co.**, Anderson, 25 April 1960, J.R. Rees (FSCA 1). **Montgomery Co.**, Crawfordsville (FMNH 1). **Parke Co.**, 12.7 miles (20.3 km) N Rockville, H.S. Dybas (FMNH 5); and 4 miles (6.4 km) W Waveland, along IN Hwy. 47, 27 November 1974, H.S. Dybas (FMNH 2). **Porter Co.**, 16 April 1960, W. Suter (FSCA 1).

ILLINOIS: **Alexander Co.**, Horseshoe Lake Rec. Area, nr. Olive Branch, 2 December 1943, Frish, Ayars (INHS several); and Cache, 19 April 1944, H.H. Ross, M.W. Sanderson (INHS 2). **Champaign Co.**, 2 miles (3.2 km) NE Urbana, Brownfield Woods, 1 March 1933 (INHS 1). **Cook Co.**, Chicago, 24 April 1944 (INHS 1). **De Witt Co.**, Weldon Springs St. Pk., 16 May 1966, S.B. Peck (FSCA 17). **Edgar Co.**, Logan, 7 March 1945, H.H. Ross, M.W. Sanderson (INHS 1). **Jackson Co.**, Carbondale, 10 April 1957, J.C. Downey (JAB 1) and 2 April 1967, J. Benson (JAB 1). **La Salle Co.**, Starved Rock St. Pk., 8 October 1943, H.H. Ross, M.W. Sanderson (INHS several). **Piatt Co.**, White

Heath, 20 March 1942, H.H. Ross, Riegel (INHS 1). **Putnam Co.**, Magnolia, 23 March 1944, H.H. Ross (INHS 3). **St. Clair Co.**, Marissa, 20 April 1944, H.H. Ross, M.W. Sanderson (INHS several). **Sangamon Co.**, Sherman, 1 February 1944, M.W. Sanderson (INHS 1). *First definite state records.*

MICHIGAN: **Berrien Co.**, Warren Dunes along Lake Michigan, 30 October 1959, W. Suter (FSCA several). **Hillsdale Co.**, Austin, C.H. Bollman (NMNH 2). *First definite state records.*

MISSOURI: **Cole Co.**, Jefferson City, 29 August 1965, W.W. Dowdy (FSCA 2). **Osage Co.**, Westphalia, 15 November 1963, W.R. Enns (UMO 1). **Ripley Co.**, 3.4 miles (5.4 km) E Orange Co. line on US Hwy. 160, 31 August 1977, R. Chenowith (UAAM 2). *First definite state records.*

ARKANSAS: **Baxter Co.**, September 1977 (UAAM 2). **Bradley Co.**, 14 December 1964 (FSCA 1). **Miller Co.**, 1.6 miles (2.6 km) S Genoa off AR Hwy. 196, 10 March 2002, C.S. Harris (NCSM 1). **Nevada Co.**, White Oak Lake St. Pk., 19 December 2001, C.T. McAllister (NCSM 1). **Pulaski Co.**, Little Rock, 16 March 1962, N.B. Causey (FSCA 1). **Washington Co.**, Fayetteville, 13 June 1950, N.B. Causey (FSCA 13); Cave Creek Valley, January 1956 (FSCA 2); and Prairie Cove, along AR Hwy. 1, M. Hite (FSCA 8).

LOUISIANA: **Allen Par.**, 1 mile (1.6 km) N Reeves, along LA Hwy. 113, 20 February 1966, R.E. Tandy (FSCA 2). **Grant Par.**, Williana (FMNH 1). **Washington Par.**, 6 miles (9.6 km) SW Bogalusa, 21 January 1965, N.B. Causey (FSCA 2). **West Feliciana Par.**, Tunica Hills Nature Preserve, 27 February 1971, D.A. Rossman (FSCA 3). **St. Bernard Par.**, Harahan, 15 September 1944, F.G. Werner (MCZ 32).

OKLAHOMA: **McCurtain Co.**, off Hwy. 259A nr. Beaver's Bend St. Pk., 4 November 2004, C.T. McAllister (NCSM 14). *New state record.*

TEXAS: **Angelina Co.**, Lufkin, 22 August 1940, L. Hubricht (NMNH 1). **Bowie Co.**, ca. 7 miles (11.2 km) SW Texarkana and 5 miles (8 km) E Redwater, off US Hwy. 59 near NE corner of Wright Patman Lake, 11 December 2003, Z.D. Ramsey (NCSM 2). **Cass Co.**, ca. 6 miles (9.6 km) NE Atlanta, along FM Rd. 3129, 0.5 miles (0.8 km) N Bloomburg, 24 February 2004, Z.D. Ramsey (NCSM 1). **Newton Co.**, ca. 24 miles (38.4 km) N Newton, Canyon Rim

Trail off TX Hwy. 87, 1.6 miles (2.6 km) N jct. FM Rd. R255 and 10.2 miles (16.3 km) N TX Hwy. 63 [15R 0430457 3442649], 7 October 2004, R.M. Shelley (NCSM 1); and ca. 12 miles (19.2 km) NE Newton, Wild Azalea Trail off FM Rd. 1414, 6.7 miles (10.7 km) N jct. TX Hwy. 87 [15R 0442598 3418623], 7 October 2004, R.M. Shelley (NCSM 1). **Rusk Co.**, 2.2 miles (3.5 km) E Mt. Enterprise, Griff Ross Trail off US Hwy. 84 [15R 034452 3532802], 6 October 2004, R.M. Shelley (NCSM 5). *New state record*.

There is also a sample with 8 females (MCZ) that was collected in September 1904 at "Anechar," New York, which is believed to be a misspelling for "Arrochar," a neighborhood in Staten Island, Richmond County; because it is around the same latitude as the northernmost records in Illinois, Indiana, and Ohio, we place a dot here in Figure 1. The species is not known definitely from central and western New York, or from a latitude north of Berrien County, Michigan.

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