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Coleoptera (Histeridae, Leiodidae and Scarabaeidae) inhabiting the burrows of Baird's pocket gopher (Rodentia: Geomyidae: *Geomys breviceps*) in Arkansas

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(Rodentia: Geomyidae: *Geomys breviceps*) in Arkansas

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Abstract. Pocket gopher burrows were sampled from 22 counties within Arkansas to determine the associated faunal composition of three major families of Coleoptera (Histeridae, Leiodidae and Scarabaeidae) commonly associated with pocket gopher burrows. We collected eight species of Histeridae, four species of Leiodidae and eight species of Scarabaeidae from the burrows of *Geomys breviceps* Baird. Three of the Histeridae were new state records, *Geomysaprinus goffi* Ross, *G. rugosifrons* (Fall) and *Margarinotus felipae* (Lewis). All of the Leiodidae were new state records and one Scarabaeidae was a new state record, *Dellacasiellus concavus* (Say). The most commonly collected scarab beetles were *Cryptoscatomaseter haldemani* (Horn) and *Geomyphilus insolitus* (Brown). The most commonly collected hister beetle was *Onthophilus kirni* Ross. The Leiodidae were infrequently captured.

Keywords: Inquiline; Pitfall; Burrow excavation; State record

Introduction

Interest in the insect fauna associated with pocket gophers in the southern United States has yielded several recent published studies reporting a number of undescribed species of insects, mainly beetles in the families Histeridae, Leiodidae and Scarabaeidae (Peck and Skelley 2001; Skelley and Gordon

2001; Skelley and Kovarik 2001; Kovarik et al. 2008; Tishechkin and Cline 2008; Connior 2011a). Some of these studies have focused on specific taxonomic groups of pocket gophers (e.g. Skelley and Kovarik 2001; Kovarik et al. 2008), while others have focused on geopolitical boundaries (e.g. Tishechkin and Cline 2008). From these studies, regional distributions of insect inquilines are starting to emerge, especially regarding associations with pocket gophers.

Arkansas has two species of pocket gophers, *Geomys breviceps* Baird (Baird's pocket gopher) and *Geomys bursarius ozarkensis* Elrod, Zimmerman, Sudman and Heidt (Ozark pocket gopher) (Connior 2010a). *Geomys breviceps* occurs from southeastern Texas and central Oklahoma eastward into Arkansas and Louisiana (Sulentic et al. 1991). Within Arkansas, it is restricted to the southern two-thirds of the state (Elrod et al. 1996; Connior 2010b). *Geomys bursarius* occurs from southern Manitoba southward through the central plains United States southward towards Arkansas and Texas (Connior 2011b). *Geomys b. ozarkensis* is endemic to the southwestern one-third of Izard County, Arkansas (Connior et al. 2010).

Recently, Kovarik et al. (2008) conducted a survey documenting the insect inquiline fauna associated with *Geomys b. ozarkensis*. However, the inquiline fauna associated with *Geomys breviceps* residing in Arkansas remained unknown, except for limited work reported in Fiene et al. (2011). Several published studies, including monographs, have reported on the beetle inquilines associated with *G. breviceps* in other states (e.g. Gordon and Skelley 2007; Tishechkin and Cline 2008; Connior 2011a). Thus, the purpose of this study was to document the insect fauna associated with *G. breviceps* within Arkansas.

Materials and Methods

Burrow excavation and pitfall trapping was conducted during April 2008 through April 2013 at 30 different sites spanning 22 counties throughout Arkansas, USA (Fig. 1). For the purpose of this manuscript a site is defined as an area encompassing up to 1 km². Two methods were employed to obtain inquilines: 1) direct excavation of a burrow, including nest/latrine chambers and foraging chambers; and 2) "in situ" pitfall traps. Hereafter, we refer to the first method as "burrow excavation" and the second method as "pitfall."

Pocket gopher burrows were excavated opportunistically, either during the trapping of the resident pocket gopher for removal or during excavation of the suspected large nest mounds containing the nest and associated latrine chambers. During burrow excavation insects were collected via removal and/or sifting of the material. Specimens were stored in 70% EtOH.

Pitfall traps (see Fig. 2) were installed after initial removal of the resident pocket gopher via trapping. Pitfall traps consisted of a 1 liter cup filled with antifreeze that were placed flush with the bottom of the foraging tunnel and a small bait cup containing pig (*Sus scrofa* L.) manure and malt sugar was secured above the cup. A board was placed over the pitfall and covered with soil to prevent surface organisms from entering the burrow and to enhance diffusion of the bait odor. After removal of a resident gopher, fresh dung that the insects rely on begins to degrade which induces inquilines to travel through the burrow systems in search of the new "dung" and thus fall in the pitfall trap. Pitfalls were left buried for ca. 14 days. Specimens were stored in 70% EtOH for later identification. Trapping was concentrated from November through April when beetles within the burrow systems are most active (Skelley and Gordon 2001). We provide distributional range maps for the United States for those species that have been collected in numerous states and are primarily associated with pocket gopher burrows as reported in previous literature.

The taxonomy of the Scarabaeidae follows Gordon and Skelley (2007), which synonymized some species and provided new generic names for the scarab species formerly included in the genus *Aphodius* Illiger. Voucher specimens of the insects are deposited in the Florida State Collection of Arthropods (FSCA), Gainesville, FL, and voucher specimens of *Geomys breviceps* are deposited in the Arkansas State University Museum of Zoology (ASUMZ), Jonesboro, AR, and Henderson State University (HSU), Arkadelphia, AR.

Results

We collected eight species of Histeridae, four species of Leiodidae and eight species of Scarabaeidae from the burrows of *Geomys breviceps*. Three Histeridae were new state records, *Geomysaprinus goffi* Ross, *G. rugosifrons* (Fall) and *Margarinotus felipae* (Lewis). One of the hister species collected was an undescribed *Geomysaprinus* that was also reported in Kovarik et al. (2008). A formal description is currently in progress. All of the Leiodidae were new state records. The only Scarabaeidae that was a new state record was *Dellacasiellus concavus* (Say). All other species have been reported from Arkansas associated with either *Geomys bursarius ozarkensis* (Kovarik et. al. 2008) or *G. breviceps* (Fiene et al. 2011). We provide a list of the species collected during this research below. Collection information is presented as location, date, number of specimens collected in parentheses and collection type.

Coleoptera: Histeridae

Atholus minutus Ross

Distribution. Restricted to the southern United States (Fig. 3).

New Arkansas Records. **Calhoun Co.:** 2 km W Harrell; 2.III.2011 (2); burrow excavation. **Cleburne Co.:** Heber Springs, jct. SR-25 & SR-5; 14-27.IV.2008 (5); pitfall. **Franklin:** 3 km N of Altus off AR 186, Wiederkehr vineyard; 3-4.IV.2009 (3); burrow excavation. **Jefferson Co.:** Pine Bluff, Prison; 10-16.IV.2010 (5); pitfall. **Johnson Co.:** vic. Ludwig, Co Rd. 3536; 31.X-1.XI.2008 (2); burrow excavation. **Lafayette Co.:** Bradley, 0.5 km W jct. AR St Hwy 160 and Co. Rd. 9; 15-25.IV.2012 (3); pitfall. **Logan Co.:** 3 km N of Magazine, 5.IV.2009 (2); burrow excavation. **Saline Co.:** vic. East End; Jct. N Sardis Rd. and Wilson St.; 5-IV-4.V.2013 (2); pitfall. **Scott Co.:** ~2 km E of Mansfield, 0.5km S. on Harp Rd.; 5.IV.2009 (1); burrow excavation. **Union Co.:** vic. Smackover; Jct. AR St. Hwy 7/ 7 Spur; 3-5.IV.2010 (1); pitfall trap **White Co.:** ~2 km W of Center Hill; Junc. AR 36/Tater Hill Rd.; 25.IV.2009 (2); burrow excavation. 9-23.IV.2010 (22); pitfall. 9.IV.2010 (4); burrow excavation.

Published Arkansas Records. Izard Co. (Kovarik et. al 2008).

Published Records. (Ross 1940; Godwin 2000; Tishechkin and Cline 2008; Connior 2011a) **FLORIDA:** Lake Co. **LOUISIANA:** DeSoto, Grant, Natchitoches and Webster Pars. **TEXAS:** Wood Co.

Remarks. *Atholus minutus* seems to be associated with pocket gopher burrows and was relatively common within the dung chambers of pocket gophers in Arkansas.

Atholus nubilus (J. L. LeConte)

Distribution. Throughout the central United States.

New Arkansas Records. **Cleburne Co.:** Heber Springs, jct. SR-25 & SR-5; 14-27.IV.2008 (1); pitfall. **Saline Co.:** vic. East End; Jct. N Sardis Rd. and Wilson St.; 5-IV-4.V.2013 (1); pitfall traps. **Johnson Co.:** vic. Ludwig; Co Rd. 3536; 31.X-1.XI.2008 (1); burrow excavation.

Published Arkansas Records. Izard Co. (Kovarik et al. 2008).

Published Records. No other records associated with pocket gopher burrows.

Remarks. *Atholus nubilus* is generally not collected in association with pocket gophers. However, Kovarik et al. (2008) reported six specimens from the Ozark pocket gopher (*Geomys bursarius ozarkensis*) in Izard County, Arkansas. The current study found an association between *A. nubilus* and *G. breviceps*,

however only three specimens were collected and each during a separate collection event. Therefore, the association between *A. nubilus* and pocket gophers remains unclear.

***Geomysaprinus goffi* Ross**

Distribution. Restricted to the southern United States (Fig. 4).

New Arkansas Records. Lafayette Co.: Bradley, 0.5 km W jct. AR St Hwy 160 and Co. Rd. 9; 15-25.IV.2012 (2); pitfall. **Ouachita Co.:** Poison Springs Battlefield; 10-17.IV.2010 (6); pitfall. **Union Co.:** vicinity of El Dorado; 0.5 km S jct. AR St Hwy 63 and Grady Bell Road; 7-10.V.2012 (1); pitfall.

Published Arkansas Records. None.

Published Records. (Ross 1940, Ross 1944a, 1944b; Tishechkin and Cline 2008; Connior 2011a). **FLORIDA:** Alachua, Brevard, Hillsborough, Lake and Putnam Cos. **LOUISIANA:** Claiborne and Natchitoches Pars. **TEXAS:** Bexar Co.

Remarks. *Geomysaprinus goffi* is an infrequently collected hister beetle that is associated with sandy soil habitats.

***Geomysaprinus rugosifrons* (Fall)**

Distribution. Found throughout the central United States and Canada (Fig. 5).

New Arkansas Records. Calhoun Co.: 2 km W Harrell, 7-8.III.2009 (2); pitfall. **Columbia Co.:** Magnolia; 28.X.2010 (1); burrow excavation. **Hot Spring Co.:** Malvern, 1 km S jct. US-67 and SR-171; 13-16.IV.2012 (7); pitfall. **Jefferson Co.:** Pine Bluff, Prison; 10-16.IV.2010 (2); pitfall. **Lafayette Co.:** Bradley, 0.5 km W jct. AR St Hwy 160 and Co. Rd. 9; 15-25.IV.2012 (23); pitfall. **Miller Co.:** Fouke; Jct. AR St Hwy 71 and Co. Rd. 24. 15-25.IV.2012 (5); pitfall. **Saline Co.:** vic. East End, Jct N Sardis Rd. and Wilson St.; 5-IV-4.V.2013 (1); pitfall.

Published Arkansas Records. None.

Published Records. (Fall 1919). **CANADA:** Manitoba. **UNITED STATES:** Illinois: Cook Co.

Remarks. The species was described from pocket gopher burrows in Aweme, Manitoba, Canada (Fall 1919). Wenzel (1944) reported the collection of *G. rugosifrons* "at large" from Cook Co., IL, where pocket gophers do not occur. Blume and Summerlin (1988) collected six specimens of *Geomysaprinus* resembling *rugosifrons* from Brazos Co., Texas, the only reported collection of this apparently undescribed species.

***Margarinotus felipae* (Lewis)**

Distribution. Throughout the central United States.

New Arkansas Records. Cleburne Co.: Heber Springs, jct. SR-25 & SR-5; 14-27.IV.2008 (8); pitfall. **Scott Co.:** ~2 km E of Mansfield, 0.5km S. on Harp Rd.; 5.IV.2009 (4); burrow excavation.

Published Arkansas Records. None.

Published Records. Iowa City, Johnson County, Iowa is the type locality (Lewis 1901).

Remarks. *Margarinotus felipae* was described from Iowa City, Iowa with no other habitat associations noted (Lewis 1901). There is not enough habitat data known about *M. felipae* to determine its affinity with pocket gopher burrows.

Onthophilus kirni Ross

Distribution. Restricted to the south-central United States (Fig. 6).

New Arkansas Records. **Calhoun Co.:** 2 km W Harrell; 15.XI.2009 (16); burrow excavation. 2.III.2011 (20); burrow excavation. **Cleburne Co.:** Heber Springs, jct. SR-25 & SR-5; 14-27.IV.2008 (1); pitfall. **Columbia Co.:** Magnolia; 3.XII.2010 (4); burrow excavation. **Drew Co.:** Baxter, 3 km N Jct. SR-35 & CR-76; 8-9.IV.2011 (1); pitfall. **Faulkner Co.:** Lollie; 2.IV.2009 (10); burrow excavation. **Franklin:** 3 km N of Altus off AR 186, Wiederkehr vineyard; 3-24.IV.2009 (1); pitfalls. 3 km N of Altus off AR 186, Wiederkehr vineyard; 3-24.IV.2009 (28); burrow excavation. **Hot Spring Co.:** Malvern, 1 km S jct. US-67 and SR-171; 13-16.IV.2012 (7); pitfall. **Jefferson Co.:** Pine Bluff, Prison; 10-16.IV.2010 (14); pitfall. **Johnson Co.:** vic. Ludwig, Co Rd. 3536; 31.X-1.XI.2008 (133); pitfall. **Lafayette Co.:** Bradley, 1 km W of jct. SR-160 & CR-9 on SR-160; 15-25.IV.2012 (38); pitfall. **Little River Co.:** 16 km W St. Hwy. 32/ US Hwy 71 Jct.; 6.IV-23.V.2013 (18); pitfall. **Logan Co.:** 3 km N of Magazine; 4.IV.2009 (5); burrow excavation. 24.IV.2009 (20); burrow excavation. **Miller Co.:** vic. Fouke, 0.25 km N of jct. SR-71 & CR-24; 15-25.IV.2012 (4); pitfall. **Ouachita Co.:** Poison Springs Battlefield; 10-17.IV.2010 (62); pitfall. **Pulaski Co.:** vic. Wrightsville, Jct E Bingham Rd and I-530; 17.IV.2010 (1); pitfall. **Saline Co.:** vic. East End; Jct N Sardis Rd. and Wilson St.; 5.IV-4.V.2013 (21); pitfall. **Scott Co.:** ~2 km E of Mansfield, 0.5 km S on Harp Rd.; 5.IV.2009 (1); burrow excavation. **Sebastian Co.:** E. of Excelsior, ~1 km E of jct. AR71 & AR10; 25.IV.2009 (8); burrow excavation. **Union Co.:** vic. Smackover; Jct. AR St. Hwy 7/ 7 Spur; 11.XII.2009 (4); burrow excavation. 3.IV.2010 (2); burrow excavation. 3-5.IV.2010 (1); pitfall. **White Co.:** ~2 km W of Center Hill; Junc. AR 36/Tater Hill Rd.; 25.IV.2009 (36); burrow excavation. 9-23.IV.2010 (81); pitfall. 9.IV.2010 (60); burrow excavation.

Published Arkansas Records. Iazard Co. (Kovarik et. al 2008).

Published Records. (Ross 1944b; Helava 1978; Blume and Summerlin 1988; Tishechkin and Cline 2008; Connior 2011a; Connior and McAllister 2013). **LOUISIANA:** Claiborne, DeSoto, Grant, Natchitoches, Morehouse, Ouachita, Union, Webster and Winn Pars. **OKLAHOMA:** Atoka, Choctaw, McCurtain and Pushmataha Cos. **TEXAS:** Brazos and Bexar Cos.

Remarks. *Onthophilus kirni* is a common hisster beetle collected from pocket gopher burrows in the south-central United States.

Spilodiscus gloveri (Horn)

Distribution. Throughout the central United States (Fig. 7).

New Arkansas Records. **Cleburne Co.:** Heber Springs, jct. SR-25 & SR-5; 14-27.IV.2008 (5); pitfall. **Franklin:** 3 km N of Altus off AR 186, Wiederkehr vineyard; 3-4.IV.2009 (6); burrow excavation. **Hot Spring Co.:** Malvern, 1 km S Jct US-67 and SR-171, 13-16.IV.2012 (1); pitfall. **Lafayette Co.:** Bradley, 0.5 km W Jct AR St Hwy 160 and Co. Rd. 9; 15-25.IV.2012 (13); pitfall. **Little River Co.:** 16 km W Jct St. Hwy. 32/ US Hwy 71; 6.IV-23.V.2013 (1); pitfall. **Logan Co.:** 3 km N of Magazine; 4-24.IV.2009 (1); pitfall. 24.IV.2009 (2); burrow excavation. **Sebastian Co.:** E. of Excelsior, ~1 km E of Jct AR71 & AR10; 25.IV.2009 (2); burrow excavation.

Published Arkansas Records. Iazard Co. (Kovarik et. al 2008).

Published Records. (Caterino 1998; Tishechkin and Cline 2008; Connor 2011a; Connor and McAllister 2013). **COLORADO: Denver Co. ILLINOIS: Mason Co. LOUISIANA: Grant, Natchitoches, Union and Webster Pars. OKLAHOMA: Atoka, Latimer, McCurtain and Pushmataha Cos. TEXAS: Bexar and Wood Cos.** Also reported from Kansas and Oklahoma, although no further data was given (Casey 1916).

Remarks. *Spilodiscus gloveri* seems to be directly associated with pocket gopher burrows (Caterino 1998).

Coleoptera: Leiodidae

***Sciodrepoides watsoni* (Blanchard)**

Distribution. Distributed throughout the United States.

New Arkansas Records. Scott Co.: ~2km E of Mansfield, 0.5 km S on Harp Rd.; 25.IV-9.V.2009 (2); pitfall.

Published Arkansas Records. None.

Published Pocket Gopher Records: (Peck and Skelley 2001). **ILLINOIS: Kankakee and McLean Cos. NEBRASKA: Lancaster Co.**

Remarks. *Sciodrepoides watsoni* is most commonly found on small animal carrion or collected from carrion traps (Peck 2001). The species is not a primary pocket gopher burrow associate and seems to be opportunistic in the burrows.

***Catops geomysi* Peck and Skelley**

Distribution. Restricted to the southern United States (Fig. 8).

New Arkansas Records. Scott Co.: ~2 km E of Mansfield, 0.5km S. on Harp Rd.; 5.IV.2009 (1); burrow excavation. **Sevier Co.:** Gilham, 1 km W jct. US-71 and Mineral Rd.; 7.IV-23.V.2012 (7); pitfall. **White Co.:** ~2 km W of Center Hill; Junc. AR 36/Tater Hill Rd.; 25.IV.2009 (1); burrow excavation.

Published Arkansas Records. None.

Published Records. (Peck and Skelley 2001). **ALABAMA: Coffee Co. FLORIDA: Alachua, Flagler, Gilchrist, Highlands and Leon Cos. GEORGIA: Dodge, Richmond, Schreven and Thomas Cos. MISSISSIPPI: Oktibbeha Co. OKLAHOMA: Latimer Co. TEXAS. Brazos and Tyler Cos.**

Remarks. This species has been collected either in flight traps, carrion baits or burrows of pocket gophers (Peck 2001). The species was named based on its association with pocket gophers.

***Ptomaphagus geomysi* Peck and Skelley**

Distribution. Restricted to the southern United States (Fig. 9).

New Arkansas Records. Hot Spring Co.: Malvern, 1 km S Jct US-67 and SR-171, 13-16.IV.2012 (5); pitfall. **Ouachita Co.:** Poison Springs Battlefied; 10-17.IV.2010 (46); pitfall. **Nevada Co.:** 3 km W Bluff City; 10-17.IV.2010 (23); pitfall. 1 km W Bluff City; 10-17.IV.2010 (4); pitfall. 2 km S Bluff City; 10-17.IV.2010 (4); pitfall.

Published Arkansas Records. None.

Published Records. (Peck and Skelley 2001; Tisheckin and Cline 2008). **ALABAMA.** Baldwin, Coffee, Covington, Escambia, Russell Cos. **FLORIDA.** Calhoun, Jackson, Leon, Okaloosa, Santa Rosa, Suwannee, Taylor Cos. **GEORGIA.** Baker, Jenkins Cos. **LOUISIANA.** Natchitoches Parish. **TEXAS.** Hardin and Milam Cos.

Remarks. *Ptomaphagus* spp. are primarily scavengers occupying a wide range of litter and soil habitats (Peck 2001). *Ptomaphagus geomysi* are only known from collections made from *Geomys* burrows (Peck and Skelley 2001).

***Ptomaphagus nevadicus* Horn**

Distribution. Distributed throughout North America from southern Canada to Mexico.

New Arkansas Records. Faulkner Co.: Conway, Tinker Creek; 10-23.IV.2010 (2); pitfall.

Published Arkansas Records. None.

Published Records. (Peck 1973; Peck and Skelley 2001). **ARIZONA:** Cochise and Maricopa Cos. **CALIFORNIA:** Alameda, Contra Costa, Marin and San Francisco, **KANSAS:** Saline Co. **NORTH DAKOTA:** Ransom Co. **NEW MEXICO:** Otero Co. **TEXAS:** Bexar, Jeff Davis and Kent Cos.

Remarks. *Ptomaphagus nevadicus* is a generalist beetle inhabiting small mammal nests (Peck 1973).

Coleoptera: Scarabaeidae

***Cryptoscatomaseter acuminatus* (Cartwright) [=Aphodius acuminatus]**

Distribution: Known from the Midwest ranging from Nebraska and Kansas southwest towards Texas and Arizona (Fig. 10).

New Arkansas Records. Nevada Co.: 2 km S Bluff City; 10-17.IV.2011 (8); pitfall. **Ouachita Co.:** S of Camden, Jct AR-7 & 376; 6-15.II.2010 (22); pitfall. Poison Springs Battlefield; 10-17.IV.2011 (8); pitfall.

Published Arkansas Records. Ouachita Co. (Fiene et al. 2011).

Published Records. (Gordon and Skelley 2007; Ratcliffe and Paulsen 2008; Tisheckin and Cline 2008; Connior 2011a; Connior and McAllister 2013). **ARIZONA:** Pima Co. **KANSAS:** Comanche and Kiowa Cos. **LOUISIANA:** Natchitoches, Ouachita, Union and Webster Pars. **NEBRASKA:** Dundy, Garden, Greeley, Keith, Sheridan, Sioux and Wheeler Cos. **OKLAHOMA:** Pushmataha Co. **TEXAS:** Bexar, Gillespie, Karnes, Liberty, Llano and Mason Cos.

Remarks. The species was first collected in Arkansas during the fall from a burrow excavation in Ouachita Co. (Fiene et al. 2011). It has now been collected from Nevada Co. (adjacent to Ouachita).

***Cryptoscatomaseter haldemani* (Horn) [=Aphodius haldemani]**

Distribution. Known from the Midwest, Kansas south to Louisiana and Texas (Fig. 11).

New Arkansas Records. **Calhoun Co.:** 2 km W Harrell; 7-8.III.2009 (32); pitfall. 15.XI.2009 (155); burrow excavation. **Cleburne Co.:** Heber Springs, jct. SR-25 & SR-5; 14-27.IV.2008 (7); pitfall. **Faulkner Co.:** Lollie; 14.III-2.IV.2009 (2); pitfall. 22.III.2009 (9); burrow excavation. 2.IV.2009 (1); burrow excavation. Lollie; 14.III.2009 (7); burrow excavation. **Franklin:** 3 km N of Altus off AR 186, Wiederkehr vineyard; 3-24.IV.2009 (13); pitfall. 3 km N of Altus off AR 186, Wiederkehr vineyard; 24.IV.2009 (1); burrow excavation. **Jefferson Co.:** Pine Bluff, Prison; 10-16.IV.2010 (4); pitfall. **Johnson Co.:** vic. Ludwig, Co Rd. 3536; 31.X-1.XI.2008 (163); pitfall. 24.III.2009 (17); burrow excavation. 3.IV.2009 (3); burrow excavation. **Lafayette Co.:** Bradley, 1 km W of jct. SR-160 & CR-9 on SR-160; 15-25.IV.2012 (1); pitfall. **Little River Co.:** 16 km W Jct St Hwy 32/ US Hwy 71; 6.IV-23.V.2013 (3); pitfall. **Logan Co.:** 3 km N of Magazine; 4-24.IV.2009 (1); pitfall. 6.IV.2009 (5); burrow excavation. **Miller Co.:** vic. Fouke, 0.25 km N of jct. SR-71 & CR-24; 15-25.IV.2012; (1); pitfall. **Nevada Co.:** 3 km. W. Bluff City; 10-17.IV.2011 (2); pitfall. **Ouachita Co.:** S of Camden, jct. AR-7 & 376; 6-15.II.2010 (49); pitfall. **Saline Co.:** vic. East End, Jct N Sardis Rd. and Wilson St.; 5-IV-4.V.2013 (16); pitfall. **Sebastian Co.:** E of Excelsior, ~1 km E of jct. AR71 & AR10; 25.IV.2009 (1); burrow excavation. **Union Co.:** vic. Smackover, Jct AR St. Hwy 7/ 7 Spur; 11.XII.2009 (26); burrow excavation. **White Co.:** ~2 km W of Center Hill; Jct AR 36/Tater Hill Rd.; 25.IV.2009 (2); burrow excavation. 9-23.IV.2010 (6); pitfall.

Published Arkansas Records. Iizard Co. (Kovarik et al. 2008).

Published Records. (Gordon and Skelley 2007; Tishechkin and Cline 2008; Connior 2011a; Connior and McAllister 2013). **KANSAS:** Kiowa Co. **LOUISIANA:** Claiborne, Lincoln, Natchitoches, Ouachita, Union and Webster Pars. **OKLAHOMA:** Atoka, Choctaw, Latimer, McCurtain and Pushmataha Cos. **TEXAS:** Brazos and Llano Cos.

Remarks. This species was commonly collected from *Geomys* burrows in Arkansas.

***Cryptoscatomaseter oklahomensis* (Brown)**

[=*Aphodius atwateri* Cartwright, = *Aphodius oklahomensis*]

Distribution. Known from the south central United States (Fig. 12).

New Arkansas Records. **Faulkner Co.:** Lollie; 14.III-2.IV.2009 (10); pitfall. 22.III.2009 (10); burrow excavation. 14.III.2009 (1); burrow excavation. 2.IV.2009 (1); burrow excavation. Conway, Tinker Creek; 10-23.IV.2010 (1); pitfall. **Franklin:** 3 km N of Altus off AR 186, Wiederkehr vineyard; 3-24.IV.2009 (11); pitfall. 24.IV.2009 (1); burrow excavation. **Johnson Co.:** vic. Ludwig, Co Rd. 3536; 24.III.2009 (29); burrow excavation. 3.IV.2009 (7); burrow excavation. **Little River Co.:** 16 km W Jct St Hwy 32/ US Hwy 71; 6.IV-23.V.2013 (1); pitfall. **Logan Co.:** 3 km N of Magazine; 4-24.IV.2009 (2); pitfall. 6.IV.2009 (2); burrow excavation. 24.III.2009 (1); burrow excavation. **Miller Co.:** vic. Fouke, 0.25 km N of Jct SR-71 & CR-24; 15-25.IV.2012 (1); pitfall. **Saline Co.:** vic. East End, Jct N Sardis Rd. and Wilson St.; 5-IV-4.V.2013 (1); pitfall. **Scott Co.:** ~2km E of Mansfield, 0.5 km S on Harp Rd.; 25.IV-9.V.2009 (4); pitfall. 27.III.2009 (6); burrow excavation.

Published Arkansas Records. Iizard Co. (Kovarik et al. 2008).

Published Records. (Gordon and Skelley 2007; Tishechkin and Cline 2008; Connior 2011a; Connior and McAllister 2013). **LOUISIANA:** Desoto and Union Pars. **OKLAHOMA:** Atoka, Choctaw, Latimer, McCurtain and Pushmataha Cos. **TEXAS:** Bexar, Brazos, Karnes, Llano and Wood Cos.

Remarks. The species was commonly collected from *Geomys* burrows in Arkansas.

***Dellacasiellus concavus* (Say) [=Aphodius concavus]**

Distribution. Widespread prairie species ranging from Wyoming southward to Texas (Fig. 13).

New Arkansas Records. Faulkner Co.: Conway, Tinker Creek; 10-23.IV.2010 (1); pitfall.

Published Arkansas Records. None.

Published Records. (Gordon and Skelley 2007; Ratcliffe and Paulsen 2008; Worthington and Larsen 2010). **INDIANA:** La Porte Co. **IOWA:** Winneshiek Co. **TEXAS:** San Patricio Co. **NEW MEXICO:** Grant Co. **NEBASKA:** Chase, Dawes, Dixon, Dodge, Dundy, Frontier, Jefferson, Keith, Lancaster, Lincoln, Red Willow, Sarpy, Scotts Bluff and Sioux Cos. **NORTH DAKOTA:** Cass Co. **WYOMING:** Crook Co.

Remarks. This species is only known from Arkansas from a single specimen that was collected along with *Cryptoscatomaseter oklahomensis* and *Geomyphilus insolitus*.

***Dellacassiellus kirni* (Cartwright) [=Aphodius kirni]**

Distribution. Widespread prairie species (Fig. 14).

New Arkansas Records. Lafayette Co.: Bradley, 1 km W of Jct SR-160 & CR-9 on SR-160; 15-25.IV.2012 (298); pitfall. **Little River Co.:** 16 km W Jct St Hwy 32/ US Hwy 71; 6.IV-23.V.2013 (3); pitfall. 14.5 km W Jct St Hwy. 32/ US Hwy 71; 6.IV-23.V.2013 (3); pitfall. **Miller Co.:** vic. Fouke, 0.25 km N of Jct SR-71 & CR-24; 15-25.IV.2012 (182); pitfall. **Saline Co.:** vic. East End, Jct N Sardis Rd. and Wilson St.; 5.IV-4.V.2013 (6); pitfall. **Sebastian Co.:** E of Excelsior, ~1 km E of Jct AR 71 & AR 10; 25.IV.2009 (11); burrow excavation. **Scott Co.:** ~2 km E of Mansfield, 0.5 km S on Harp Rd.; 25.IV-9.V.2009 (4); pitfall. 27.III.2009 (21); burrow excavation.

Published Arkansas Records. Izard Co. (Kovarik et al. 2008).

Published Records. (Kriska and Katovich 2005; Gordon and Skelley 2007; Ratcliffe and Paulsen 2008; Tishechkin and Cline 2008; Connior 2011a). **CANADA:** MANITOBA: Aweme. **USA:** **INDIANA:** LaPorte Co. **IOWA:** Winneshiek. **KANSAS:** Comanche and Kiowa Cos. **LOUISIANA:** Bossier, Natchitoches, Union and Webster Pars. **NEBRASKA:** Arthur, Blaine, Brown, Cherry, Custer, Dawes, Dawson, Dixon, Dundy, Franklin, Greeley, Hall, Hitchcock, Holt, Kearney, Keith, Lincoln, Logan, Loup, McPherson, Morrill, Perkins, Red Willow, Richardson, Rock, Sarpy, Scotts Bluff, Sioux and Thomas Cos. **TEXAS:** Brooks and Kenedy Cos. **WISCONSIN:** Burnett, Douglas, Jackson, Monroe, Polk, Richland and Sauk Cos.

Remarks. *Dellacasiellus kirni* may represent several cryptic species due to wide distribution and variability (Gordon and Skelley 2007).

***Euphoria discicollis* (Thomson)**

Distribution. Known from the central United States, Kansas and Oklahoma, southward towards Texas, Louisiana, Georgia and Florida (Fig. 15).

New Arkansas Records. Cleburne Co.: Heber Springs, Jct SR-25 & SR-5; 14-27.IV.2008 (10); pitfall. **Logan Co.:** 3 km N of Magazine, 4-24.IV.2009 (1); pitfall. **Saline Co.:** vic. East End; Jct N Sardis Rd. and Wilson St.; 5.IV-4.V.2013 (2); pitfall. **Sebastian Co.:** E of Excelsior, ~1 km E of jct. AR 71 & AR 10;

25.IV.2009 (1); burrow excavation. **Scott Co.:** ~2 km E of Mansfield, 0.5 km S on Harp Rd.; 24.IV.2009 (1); burrow excavation. 25.IV-9.V.2009 (1); pitfall.

Published Arkansas Records. Cleburne Co. (Orozco 2012).

Published Records. (Godwin 2000; Skelley and Gordon 2001; Tischeckin and Cline 2008; Connior 2011a; Orozco 2012; Connior and McAllister 2013). **FLORIDA:** Bay, Calhoun, Okaloosa and Santa Rosa Cos. **GEORGIA:** Baker and Dodge Cos. **KANSAS:** Gove and Kiowa Cos. **LOUISIANA:** Grant, Natchitoches and Webster Pars. **OKLAHOMA:** Cleveland, Payne and Pushmataha Cos. **TEXAS:** Angelina, Nacogdoches and Wood Cos.

Remarks. Only yellowish brown and black specimens were collected in Arkansas; however, Godwin (2000) found reddish specimens in Texas. Species of *Euphoria* are generally opportunistic and have been found breeding in ant and rodent nests (Orozco 2012). Thus far, *E. discicollis* has only been collected in association with pocket gophers.

***Geomyphilus insolitus* (Brown) [=Aphodius insolitus]**

Distribution. Widespread prairie species (Fig. 16).

New Arkansas Records. **Calhoun Co.:** 2 km W Harrell; 7-8.III.2009 (1); pitfall. 15.XI.2009 (2); burrow excavation. **Cleburne Co.:** Heber Springs, Jct SR-25 & SR-5; 14-27.IV.2008 (2); pitfall. **Columbia Co.:** Magnolia, Jct US 79/ CR-47; 29.X-3.XI.2010 (1); pitfall. **Drew Co.:** Baxter, 3.4 km N. jct. SR-35/CR-76; 9-25.IV.2011 (3); pitfall. **Faulkner Co.:** Lollie; 14.III-2.IV.2009 (1); pitfall. Conway, Tinker Creek; 10-23.IV.2010 (91); pitfall. **Franklin:** 3 km N of Altus off AR 186, Wiederkehr vineyard; 3-24.IV.2009 (4); pitfall. 24.IV.2009 (1); burrow excavation. **Johnson Co.:** vic. Ludwig, Co Rd. 3536; 31.X-1.XI 2008 (8); pitfall. 24.III.2009 (4); burrow excavation. 3.IV.2009 (1); burrow excavation. **Little River Co.:** 16 km W Jct St Hwy 32/ US Hwy 71; 6.IV-23.V.2013 (10); pitfall. 14.5 km W Jct St. Hwy. 32/ US Hwy 71; 6.IV-23.V.2013 (1); pitfall. **Logan Co.:** 3 km N of Magazine, 4-24.IV.2009 (1); pitfall. 6.IV.2009 (6); burrow excavation. 24.III.2009 (4); burrow excavation. **Miller Co.:** vic. Fouke, 0.25 km N of Jct SR-71 & CR-24; 15-25.IV.2012 (4); pitfall. **Saline Co.:** vic. East End, Jct N Sardis Rd. and Wilson St.; 5.IV-4.V.2013 (10); pitfall. **Sebastian Co.:** E of Excelsior, ~1 km. E. of Jct AR 71 & AR 10; 25.IV.2009 (1); burrow excavation. **Scott Co.:** ~2 km E of Mansfield, 0.5 km S on Harp Rd.; 25.IV-9.V.2009 (8); pitfall. 27.III.2009 (1); burrow excavation. **Union Co.:** vic. Smackover, Jct AR St. Hwy 7/ 7 Spur; 11.XII.2009 (6); burrow excavation. **White Co.:** ~2 km W of Center Hill, Jct AR 36/Tater Hill Rd.; 25.IV.2009 (15); burrow excavation. 9-23.IV.2010 (54); pitfall. 1 km E Center Hill; 10-23.IV.2010 (13); pitfall.

Published Arkansas Records. Izard Co. (Kovarik et al. 2008).

Published Records. (Kriska and Katovich 2005; Gordon and Skelley 2007; Tischeckin and Cline 2008; Connior 2011a; Connior and McAllister 2013). **ILLINOIS:** Iroquois, Kankakee, Mason, Morgan and Scott Cos. **INDIANA:** Newton Co. **KANSAS:** Comanche and Kiowa Cos. **LOUISIANA:** Lincoln, Morehouse, Natchitoches, Ouachita, Union and Webster Pars. **OKLAHOMA:** Atoka, Choctaw, Latimer, Payne and Pushmataha Cos. **TEXAS:** Brazos Co. **WISCONSIN.** Burnett, Douglas, Jackson, LaCrosse, Monroe, Polk, Richland and Sauk Cos.

Remarks. The species was commonly collected in Arkansas and seems to be restricted to pocket gopher burrows throughout its range.

***Scabrostomus sepultus* (Cartwright) [=Aphodius sepultus]**

Distribution. Known from the south central United States (Fig. 17).

New Arkansas Records. Lafayette Co.: Bradley, 1 km W of Jct SR-160 & CR-9 on SR-160; 15-25.IV.2012 (1); pitfall. **Ouachita Co.:** Poison Springs Battlefield, 10-17.IV.2011 (1); pitfall. S of Camden, jct. AR-7 & 376; 6-15.II.2010 (1); pitfall.

Published Arkansas Records. Izard Co. (Kovarik et al. 2008).

Published Records. (Gordon and Skelley 2007; Tishechkin and Cline 2008; Connior 2011a). **KANSAS: Kiowa Co. LOUISIANA: Bossier, Natchitoches and Webster Pars. NEW MEXICO: Chaves and Eddy Cos. TEXAS: Bexar, Brazos and Karnes Cos.**

Remarks. The species seems to be restricted to pocket gopher burrows throughout its range.

Discussion

Both Kovarik et. al. (2008) and Fiene et. al. (2011) collected pocket gopher inquilines through the burrow excavation sampling technique, whereas in this study we employed a combination of approaches that resulted in numerous new state records. We suspect that the species collected in this study from *Geomys breviceps* burrows in Arkansas represents the majority of the Histeridae, Leiodidae and Scarabaeidae that are inquilines in pocket gopher burrows. However, further sampling in Arkansas may elucidate additional county distributional records and additional rare inquiline beetle species, particularly in extreme northwestern Arkansas (Ozark Plateau) and southwestern Arkansas (southern Ouachita Mountains) where sampling has been limited so far.

The inquiline beetle fauna documented in this study was similar to that of Oklahoma, Texas and Louisiana which is not surprising since *Geomys breviceps* occurs within these states. However, many of these beetles have been found with different pocket gopher hosts as well. Thus, these results suggest that many of these beetles are generalist inquilines with pocket gophers, as opposed to specialists associated with specific pocket gopher species.

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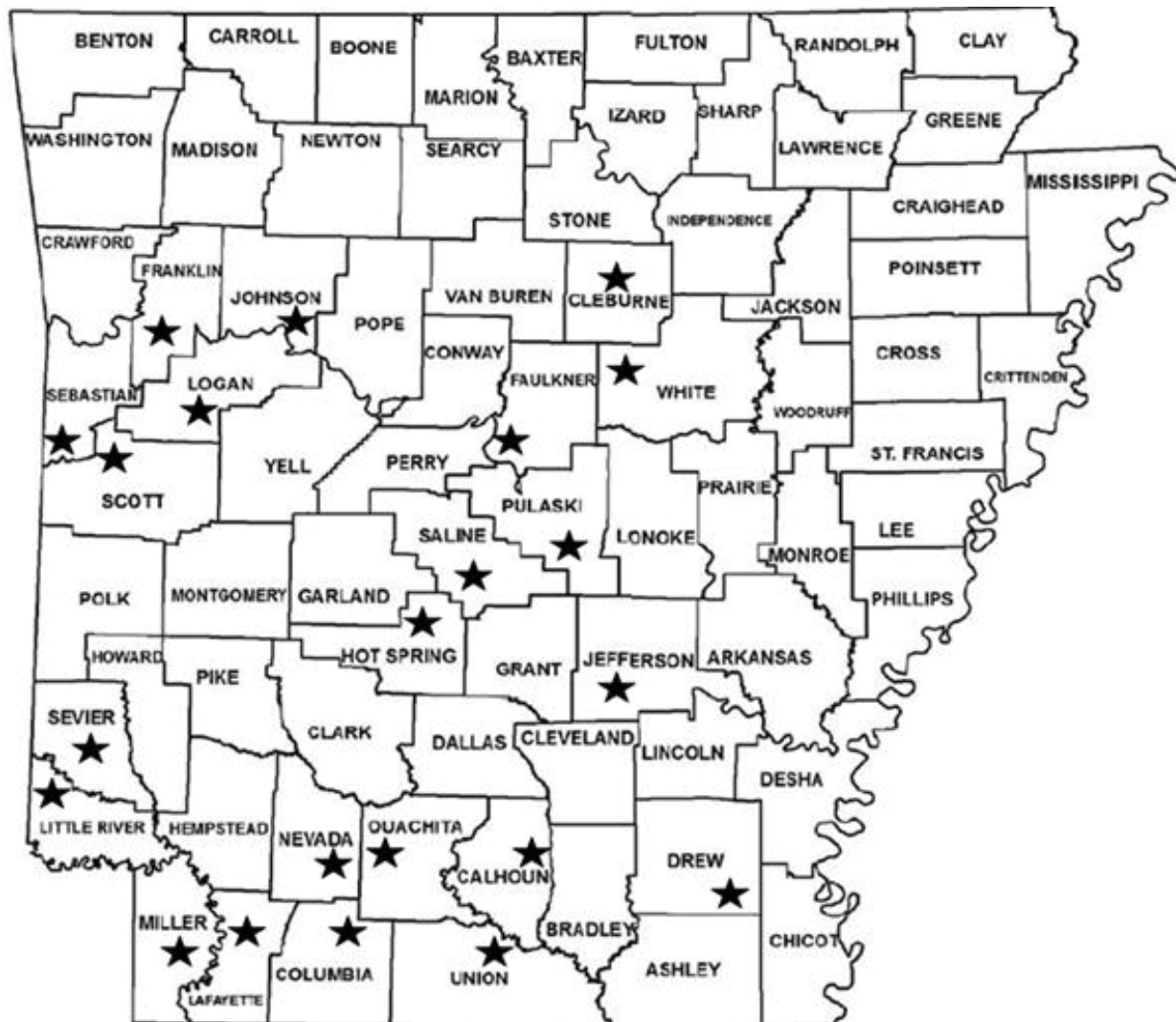


Figure 1. Arkansas county map denoting counties where pocket gopher beetle inquilines were collected. Note: Stars indicate counties where collections were made and do not necessarily denote the exact locale. Counties either containing single or multiple collection sites are only referenced with a single star per county.

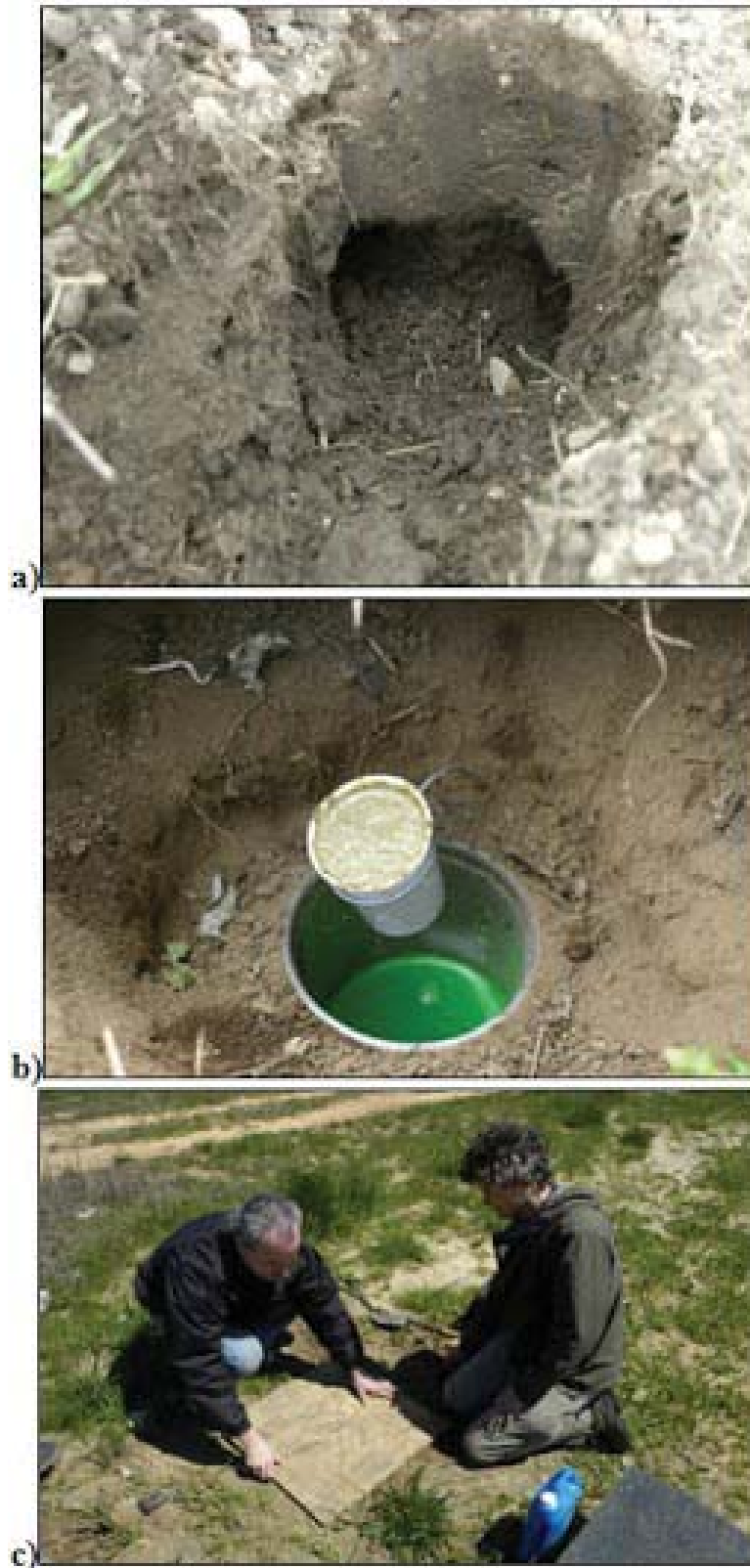


Figure 2. Installation of a burrow pitfall trap: **a)** burrow is excavated revealing foraging chamber; **b)** small cup is inserted in bottom of foraging chamber and filled with antifreeze and then a cup containing malt sugar and pig manure is placed above the cup; **c)** a board is placed over the pitfall and covered with dirt to seal the trap from the surface.

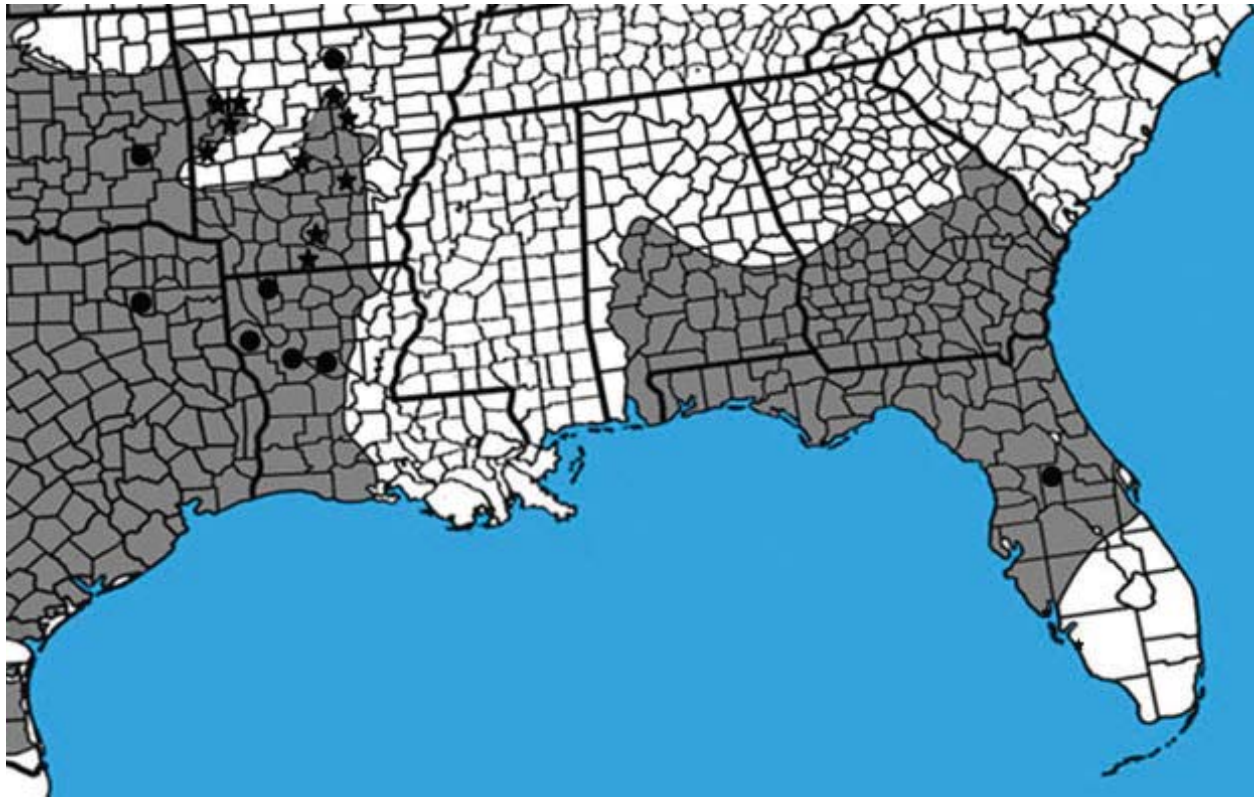


Figure 3. Collection locations for *Atholus minutus*. Note: Gray shading represents *Geomys* spp. distribution. Circles represent published pocket gopher records. Stars represent new Arkansas records.

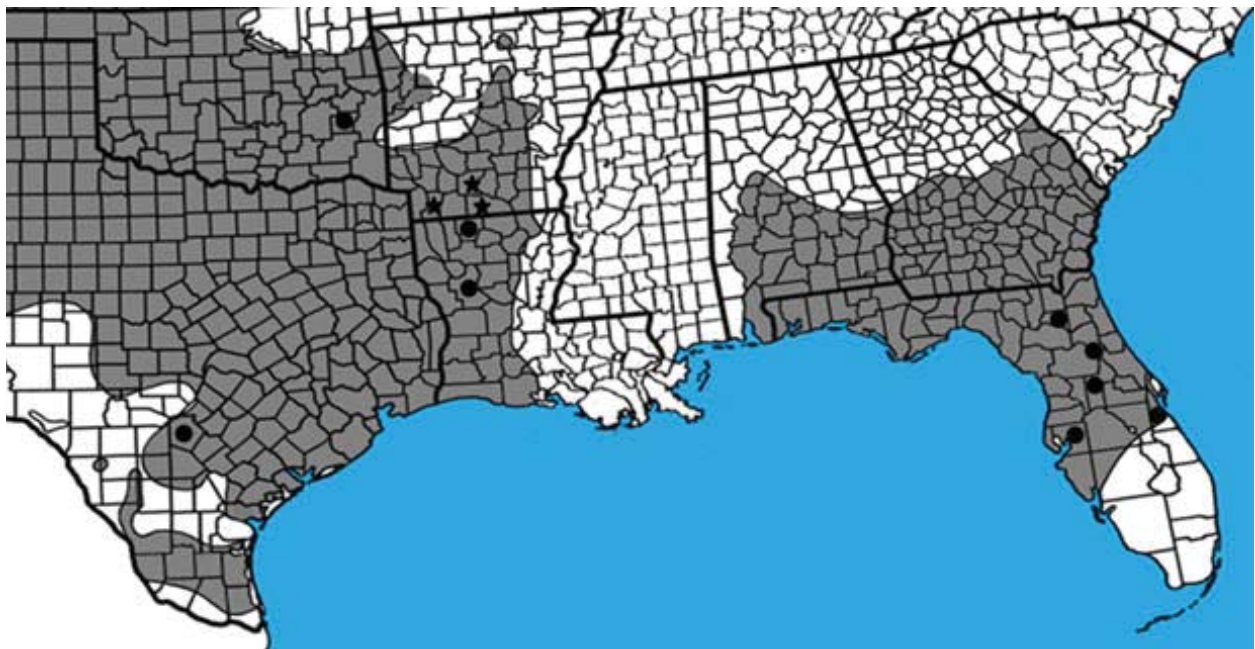


Figure 4. Collection locations for *Geomysaprinus goffi*. Note: Gray shading represents *Geomys* spp. distribution. Circles represent published pocket gopher records. Stars represent new Arkansas records.

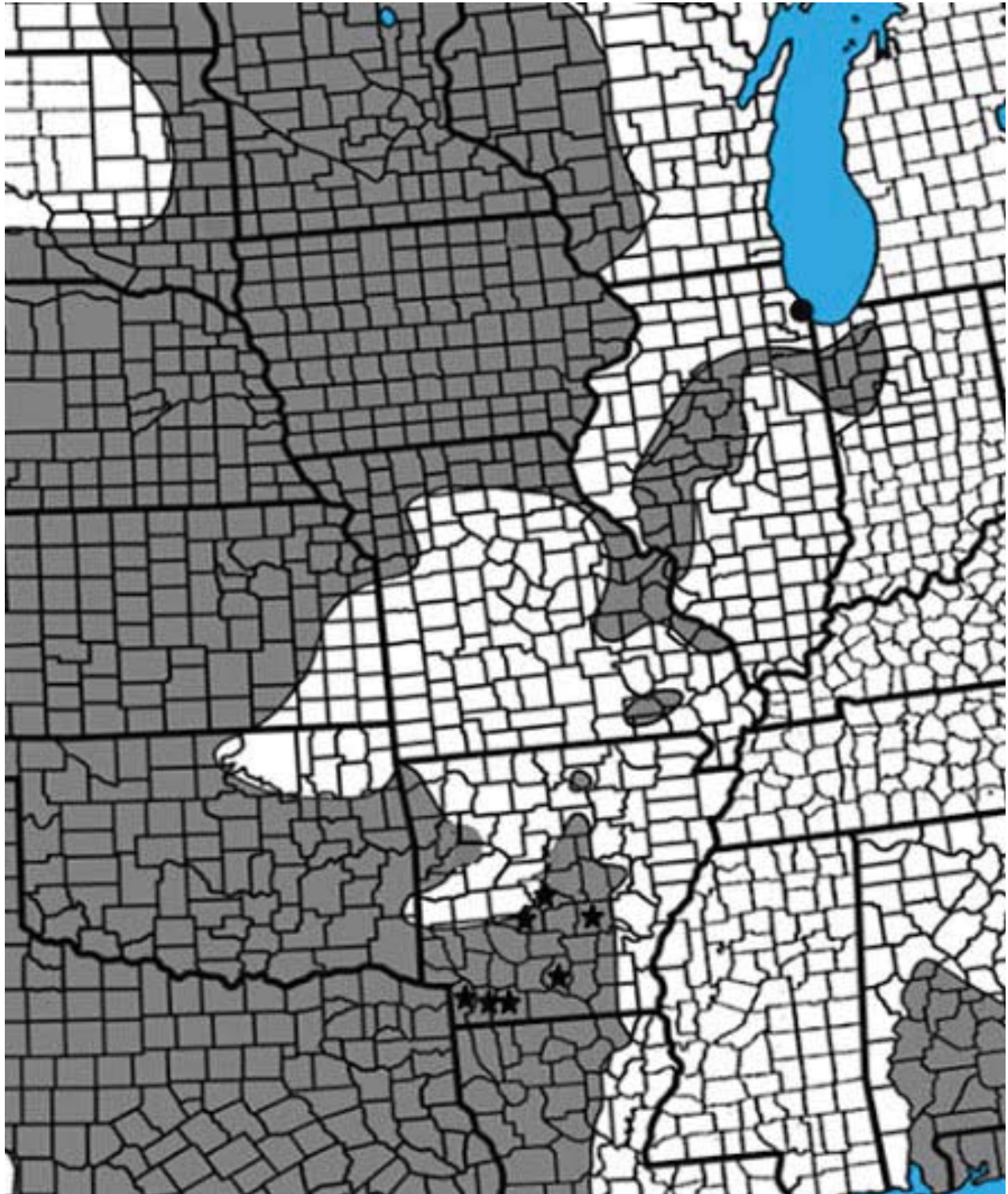


Figure 5. Collection locations for *Geomysaprinus rugosifrons*. Note: Gray shading represents *Geomys* spp. distribution. Circles represent published pocket gopher records. Stars represent new Arkansas records.

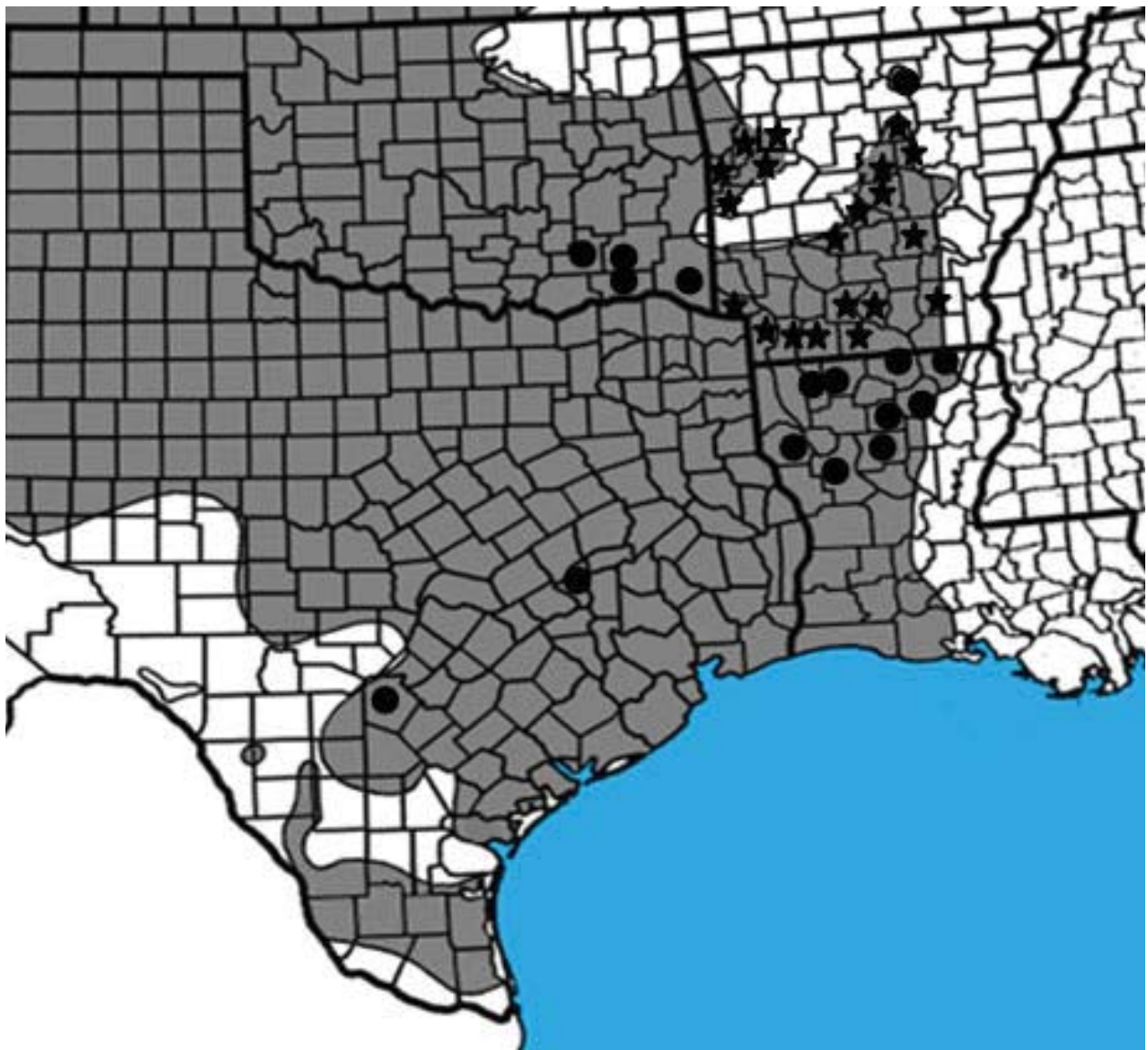


Figure 6. Collection locations for *Onthophilus kirni*. Note: Gray shading represents *Geomys* spp. distribution. Circles represent published pocket gopher records. Stars represent new Arkansas records.

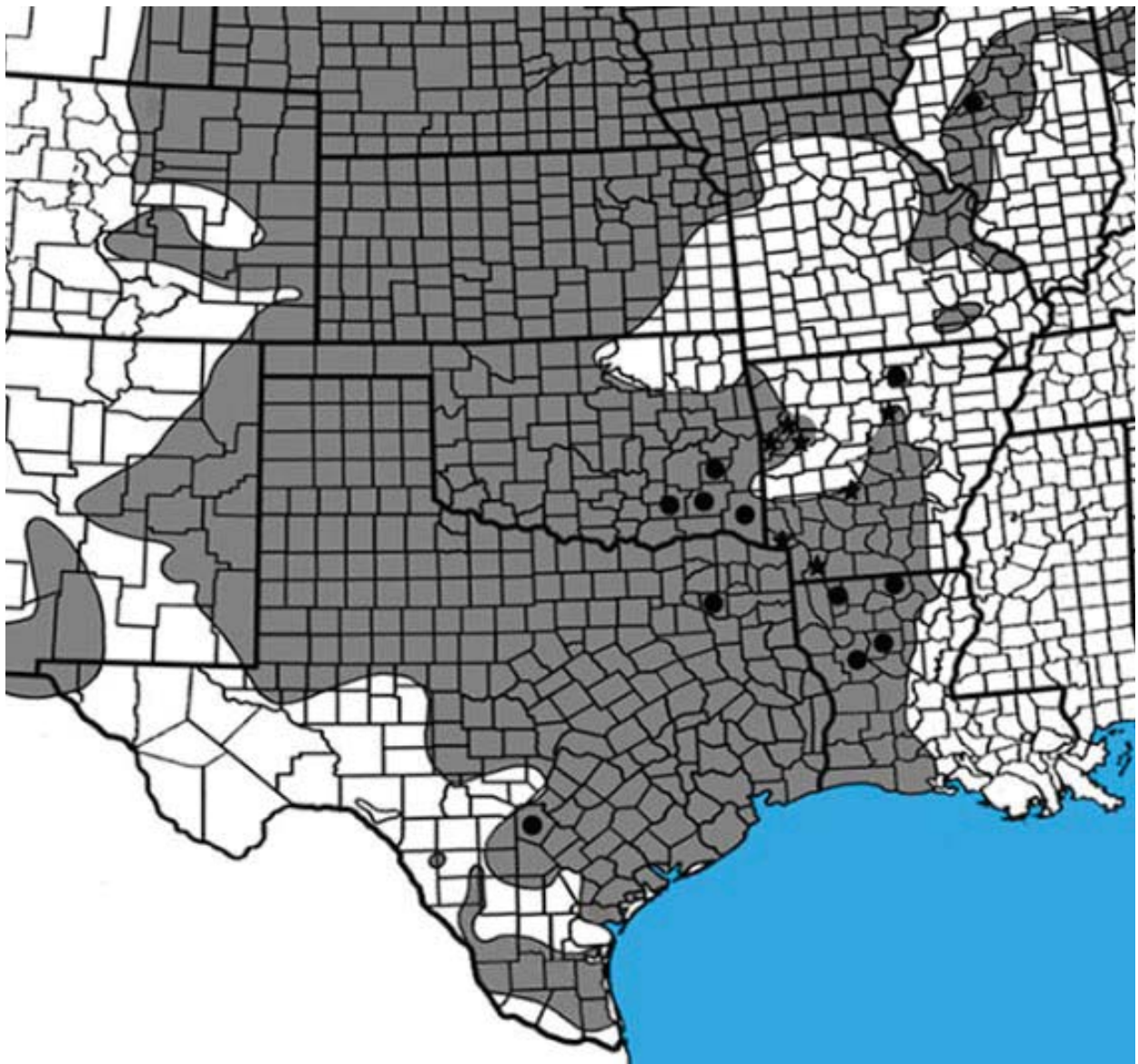


Figure 7. Collection locations for *Spilodiscus gloveri*. Note: Gray shading represents *Geomys* spp. distribution. Circles represent published pocket gopher records. Stars represent new Arkansas records.



Figure 8. Collection locations for *Catops geomysi*. Note: Gray shading represents *Geomys* spp. distribution. Circles represent published pocket gopher records. Stars represent new Arkansas records.



Figure 9. Collection locations for *Ptomaphagus geomysi*. Note: Gray shading represents *Geomys* spp. distribution. Circles represent published pocket gopher records. Stars represent new Arkansas records.

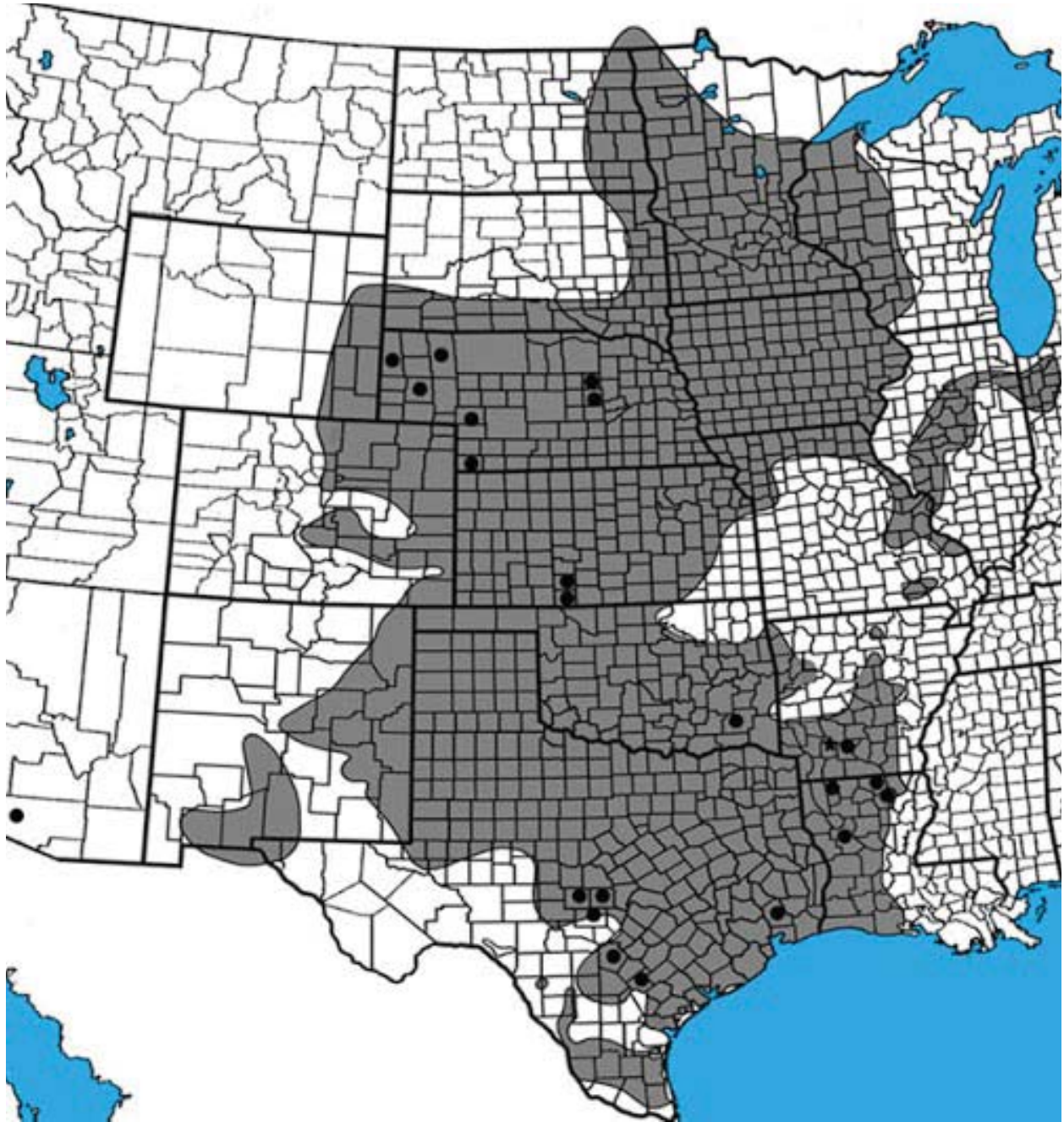


Figure 10. Collection locations for *Cryptoscatomaseter acuminatus*. Note: Gray shading represents *Geomys* spp. distribution. Circles represent published pocket gopher records. Stars represent new Arkansas records.

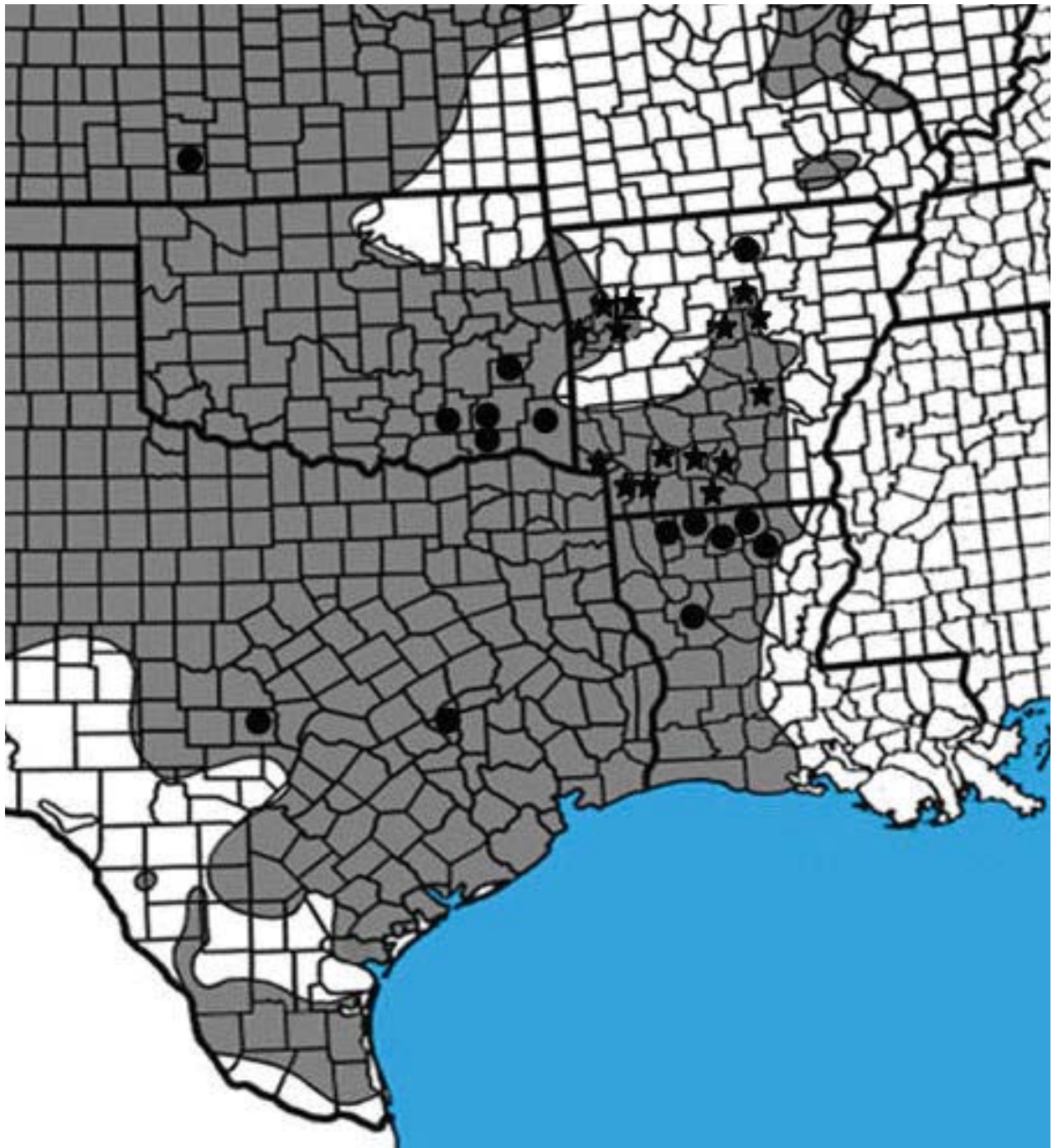


Figure 11. Collection locations for *Cryptoscatomaseter haldemani*. Note: Gray shading represents *Geomys* spp. distribution. Circles represent published pocket gopher records. Stars represent new Arkansas records.

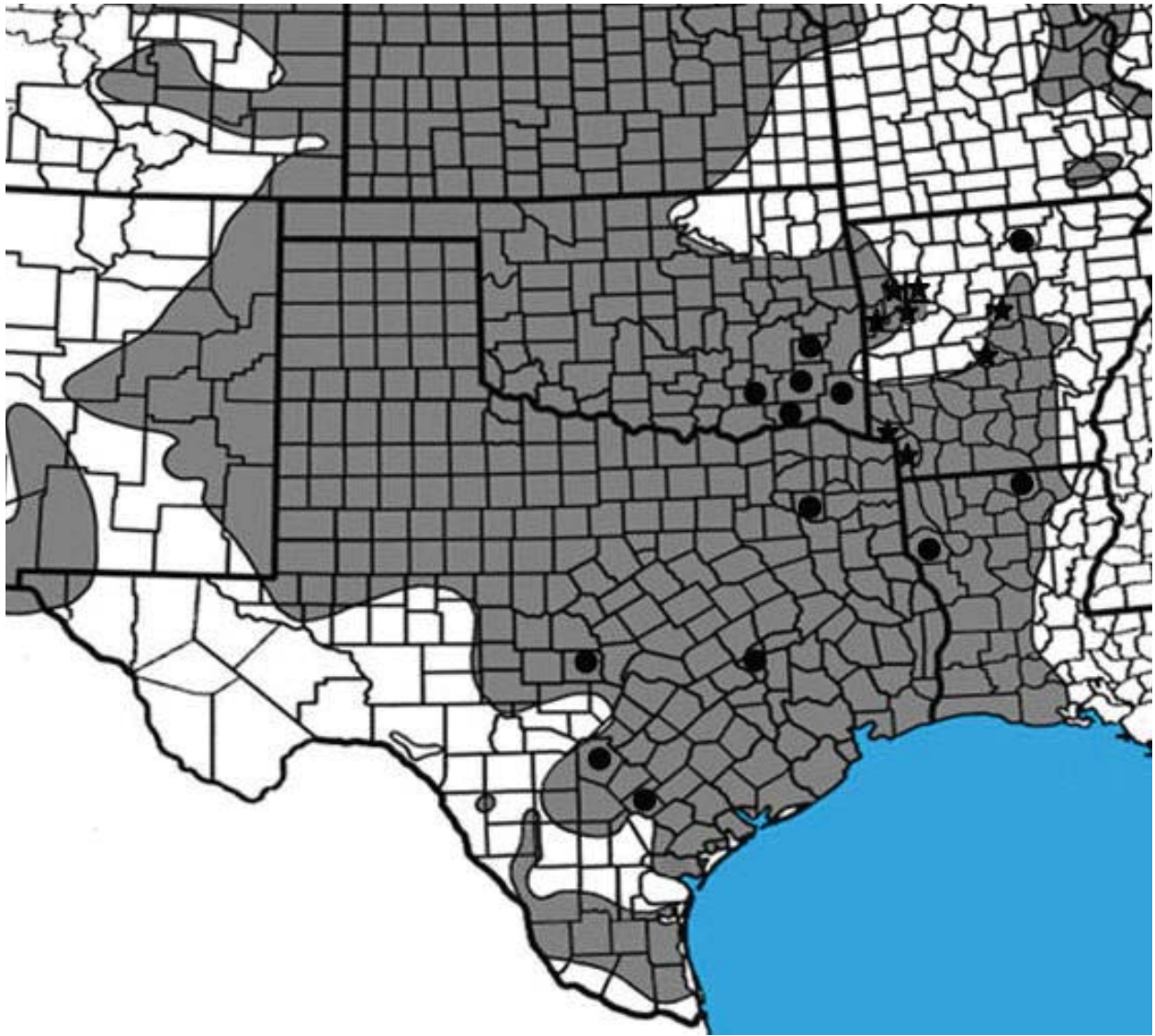


Figure 12. Collection locations for *Cryptoscatomys oklahomensis*. Note: Gray shading represents *Geomys* spp. distribution. Circles represent published pocket gopher records. Stars represent new Arkansas records.

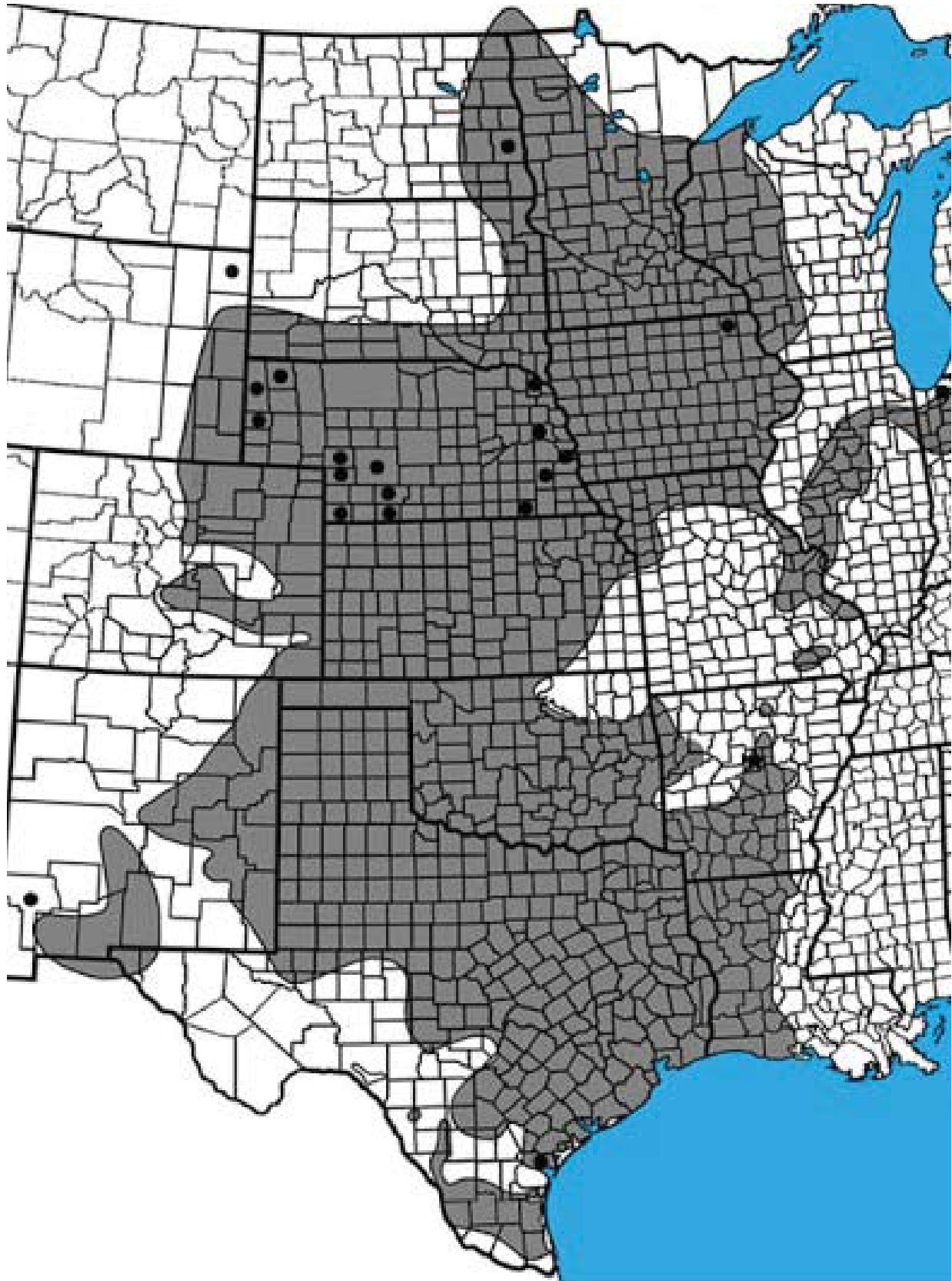


Figure 13. Collection locations for *Dellacasiellus concavus*. Note: Gray shading represents *Geomys* spp. distribution. Circles represent published pocket gopher records. Stars represent new Arkansas records.

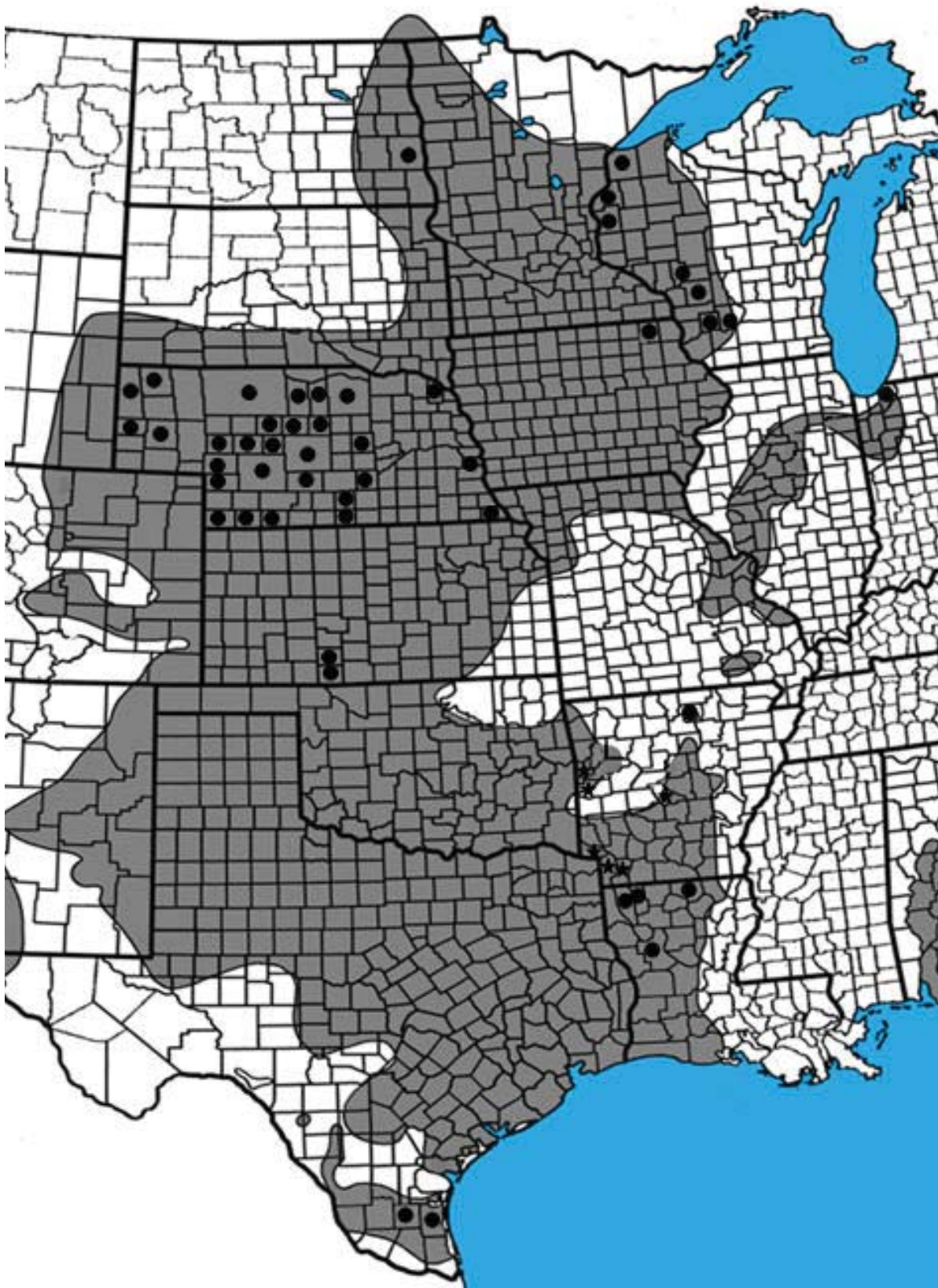


Figure 14. Collection locations for *Dellacasiellus kirni*. Note: Gray shading represents *Geomys* spp. distribution. Circles represent published pocket gopher records. Stars represent new Arkansas records.

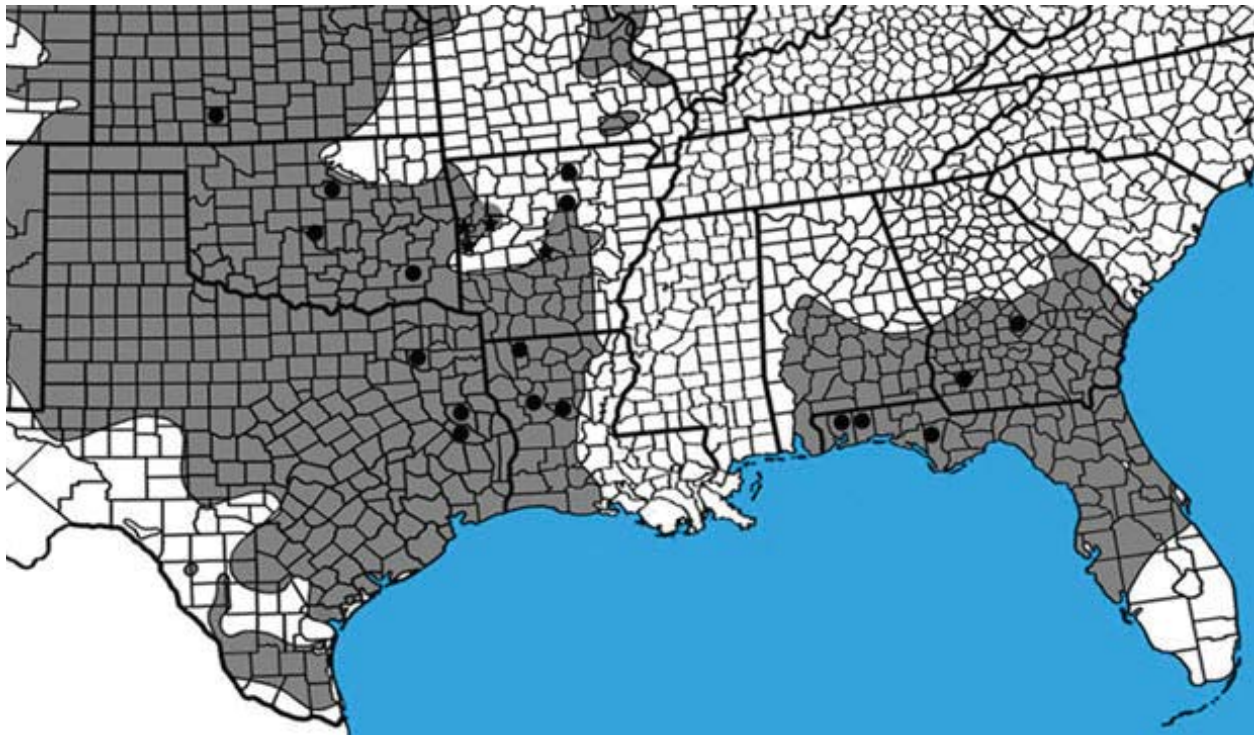


Figure 15. Collection locations for *Euphoria discicollis*. Note: Gray shading represents *Geomys* spp. distribution. Circles represent published pocket gopher records. Stars represent new Arkansas records.

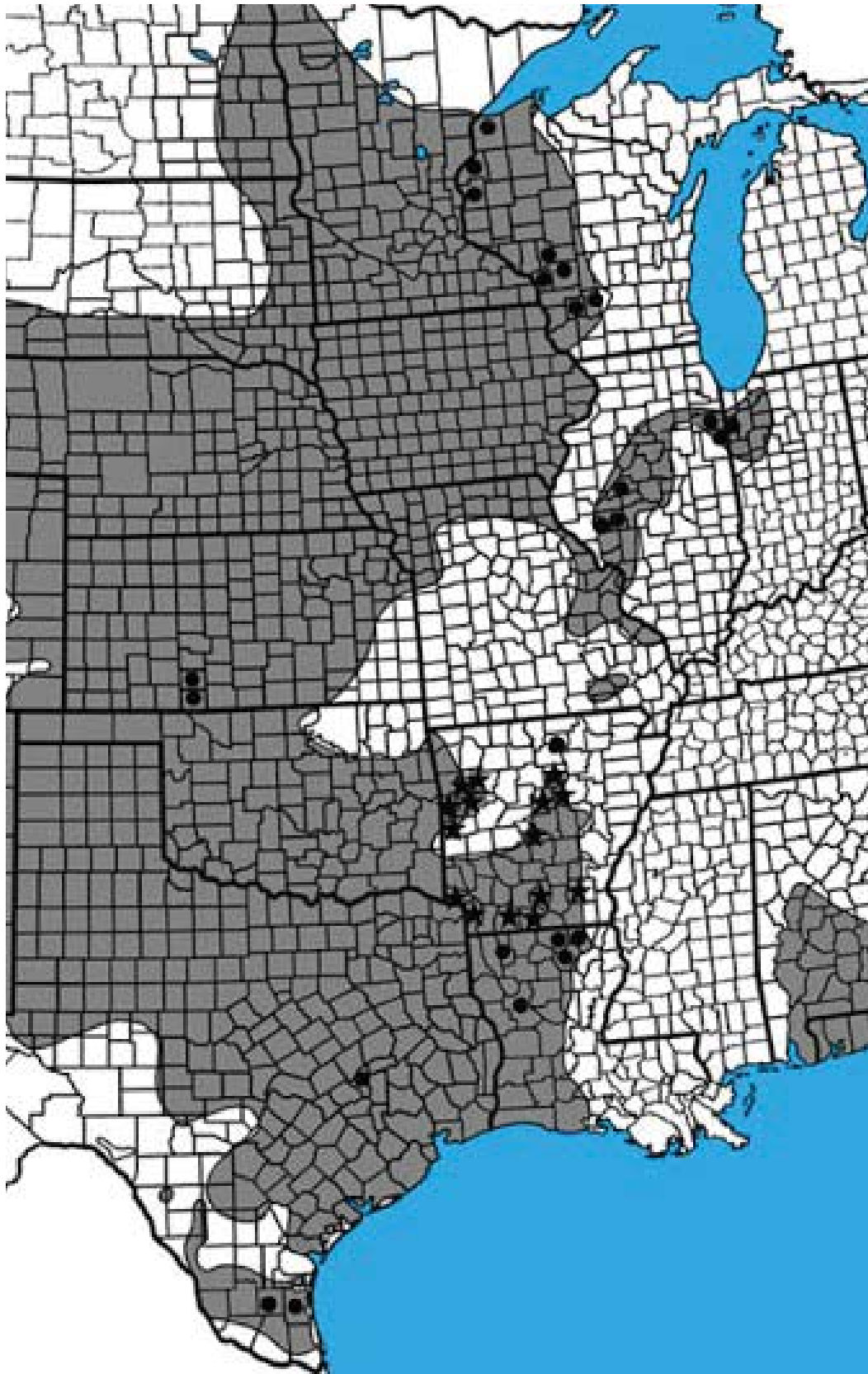


Figure 16. Collection locations for *Geomys insolitus*. Note: Gray shading represents *Geomys* spp. distribution. Circles represent published pocket gopher records. Stars represent new Arkansas records.

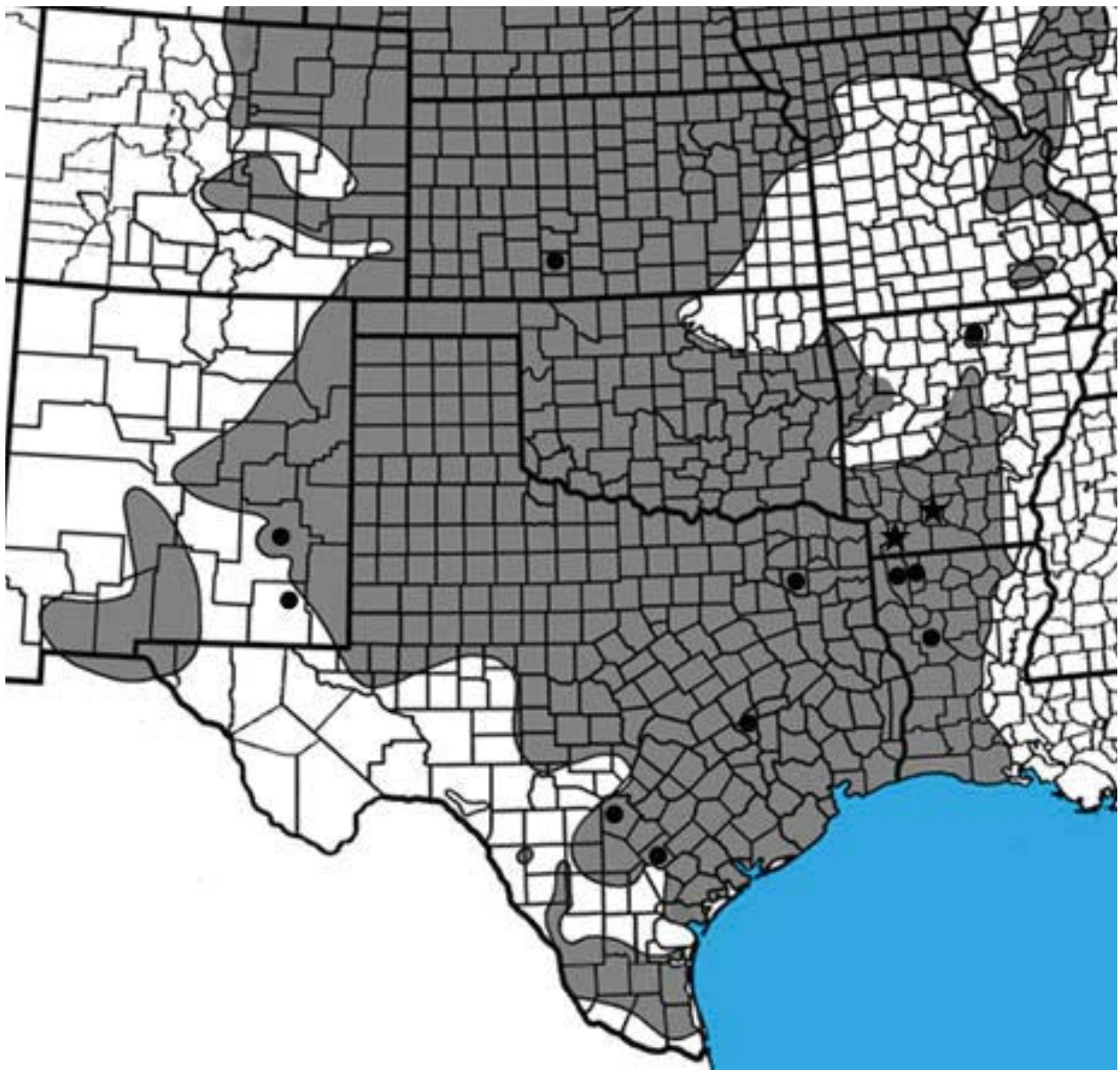


Figure 17. Collection locations for *Scabrostomus sepultus*. Note: Gray shading represents *Geomys* spp. distribution. Circles represent published pocket gopher records. Stars represent new Arkansas records.

