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## Distribution of Baird's Pocket Gopher (*Geomys breviceps*) In Arkansas With Additional County Records

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### Abstract

Recently, a population of pocket gophers in the north-central portion of Arkansas was determined to be the plains pocket gopher (*Geomys bursarius*), rather than Baird's pocket gopher (*Geomys breviceps*). This changed the known range of both species extensively. A detailed examination of the known range of Baird's pocket gophers (*G. breviceps*) in Arkansas resulted in 12 new county records. Biogeographically, *G. breviceps* appears to be found in all physiographic regions within the state with the possible exception of Crowley's ridge. It is most common in the Gulf Coastal Plain and rarest in the Mississippi Alluvial Plain. The distribution of *G. breviceps* is consistent with the hypothesis that glaciation events, together with northward invasions from Louisiana and eastern Texas and eastward invasions from Oklahoma (around the Ouachita Mountains) were major creational forces in the establishment of the present *G. breviceps* distribution in Arkansas.

### Introduction

Pocket gophers, genus *Geomys*, are small (173-357 mm) fossorial rodents suitably adapted for a burrowing existence. The genus possesses: strongly clawed front legs, tiny eyes, round small ears, and external fur-lined cheek pouches. *Geomys* sp. range from southern Manitoba, Canada across the central United States to Texas and eastward to the Mississippi river in the south and into Indiana in the north. Also, two disjunct species occur: one, *Geomys pineatus* in the extreme southeastern United States, and the other, *Geomys tropicalis* along the north-eastern coast of Mexico.

Heaney and Timm (1983), using morphology and ectoparasite data, tentatively reported only one species of pocket gopher (*Geomys breviceps*) inhabiting Arkansas and expressed the need for more research to be done in this area. Based on this Sealander and Heidt (1990) reported *G. breviceps* to occur in the state exclusively. They reported the distribution of pocket gophers in Arkansas to include the West Gulf Coastal Plain, the Ouachita Mountains, and the western and southern portions of the Ozark mountains.

Recently, Elrod et al. (in press) reported that pocket gophers in one population in Izard county were actually the plains pocket gopher (*Geomys bursarius*) rather than *G. breviceps* as previously thought. The presence of *G. bursarius* rather than *G. breviceps* in this county greatly altered the geographic distribution of *G. breviceps* in Arkansas as depicted by Sealander and Heidt (1990). The purpose of this study was to investigate the biogeographical distributions and describe new county records for *G. breviceps* in Arkansas.

### Materials and Methods

During vehicle surveys (from March 1995 to April 1996) of 27 counties, pocket gopher mounds (dirt deposited at the surface, excavated during tunneling) were observed and pocket gophers were collected using Victor gopher traps (Woodstream Corp, Lititz, PA). Traps were checked approximately every two hours to insure tissue quality. Voucher specimens were prepared, and tissues (liver and muscle) were removed and stored at -80°C for subsequent allozymic analysis. All specimens were deposited in the Vertebrate Museum at the University of Arkansas at Little Rock.

Taxonomic identification was accomplished following the horizontal starch gel electrophoresis techniques of Bohlin and Zimmerman (1982) and Elrod et al. (in press). Specifically, the fixed alternate alleles malate dehydrogenase (Nadp+)(Mdhp-1, EC 1.1.1.40) and alcohol dehydrogenase (Adh-1, E.C. 1.1.1.1.) which have been shown to be diagnostic in Arkansas for *G. bursarius* and *G. breviceps* were examined (Elrod et al., in press). Also, the species-specific chewing lice (genus *Geomydoecus*) of pocket gophers were evaluated based on morphological criteria established by Timm and Price (1980).

The recent review of the literature and specimen records from 22 museums by Sealander and Heidt (1990) provided the basic data base from which the biogeographic distributions of *Geomys* in Arkansas were investigated.

### Results

Of the 27 counties surveyed, no evidence of pocket gophers were observed (mounds of earth) or collected from the following counties despite extensive survey: Arkansas, Conway, Cross, Garland, Montgomery, Lonoke, Perry, Pope, St. Francis, Stone, Van Buren, White, Woodruff, and Yell. Pocket gophers collected from the remaining 13 counties were subjected to allozyme electrophoresis and it was determined that the *Mdhp-2* and *Adh-1* loci were consistent with the findings of Elrod et al. (in press) for *Geomys breviceps*. The ectoparasite analysis was found to be concordant with the allozyme analysis, and it was concluded that pocket gophers analyzed in this study were *G. breviceps*. Therefore, 13 new county records are established for *G. breviceps* in Arkansas. Localities and samples sizes are as follows:

- Ashley County, 5 miles North of Crossett, n=4
- Calhoun County, 3.5 miles West of Hampton, n=1;
- Cleburne County, Junction of Hwy 25 and Hwy 5, n=5;
- Crawford County, 0.5 miles East of the Junction of Hwy 64 and 71, n=5;
- Faulkner County, Levee of Arkansas River, 10 miles West of Lake Conway, n=2;
- Hot Spring County, 8 miles Northeast Malvern, n=1;
- Lincoln County, 3.1 miles North of Yorktown, n=2
- Logan County, 10 miles South of Paris, n=5;
- Pike County, 1 mile East of Kirby, n=2
- Polk County, Grannis, on Hwy 71, n=2
- Prairie County, 2 miles South of Hickory Plains, n=1
- Scott County, 1 mile East of Mansfield, n=4; 0.5 miles West of Abbott. n=1
- Washington County, Farmington, n=1

### Discussion

In light of these new county records, a conservative range for *G. breviceps* in Arkansas is presented in Fig. 1. To date, *G. breviceps* has been found to occur in four of the five major physiographic regions (Ozark Mountains, Ouachita Mountains, West Gulf Coastal Plain, and the Mississippi Alluvial Plain) within Arkansas. The species has yet to be collected from Crowley's Ridge.

Of the four physiographic regions *G. breviceps* occupies, it is most common in the West Gulf Coastal Plain, where it occurs in all counties. It is rare in the Mississippi Alluvial Plain being found only in Prairie County located

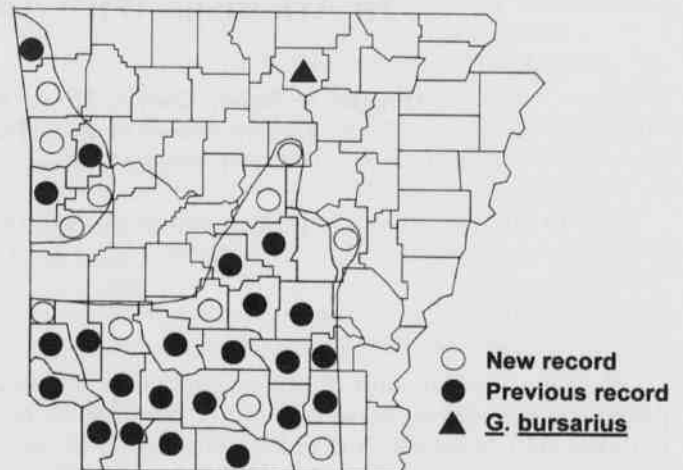


Fig. 1. Current conservative distribution of *Geomys breviceps* in Arkansas.

in the Grand Prairie subdivision. In the Ozark and Ouachita Mountains (with the exception of the Arkansas River Valley), pocket gophers are fairly uncommon. Pocket gopher populations in these areas appear to exist primarily in scattered islands of suitable habitat. These islands are often associated with old creek and river beds where deposits of sand are located. Also, loamy well-drained soils where erosion has been minimal on mountain sides and tops appear utilized. Apparently as long as a corridor for dispersal exists into suitable habitat colonization has occurred.

A hiatus in *G. breviceps*' distribution within Arkansas occurs in the Ouachita Mountains and runs northeastward to the Arkansas River (Fig. 1). This area apparently separates *G. breviceps* into two distinct groupings (western and south-central). The hiatus between the groupings has been extensively surveyed for pocket gophers; however, none has been located to date.

Based on fossil remains, current pocket gopher distributions have been attributed to past glaciation events (Russell, 1968). These glacials and interglacials allowed pocket gopher populations to advance and withdraw periodically. It is thought that *G. bursarius* and *G. breviceps* arose from a common ancestor (Russell, 1968; Davis, 1986). Heaney and Timm (1983) suggest that the split between the *G. bursarius* and *G. breviceps* ancestors occurred during the Kansan glaciation with the speciation of the *G. breviceps* group occurring at some later time. Thus, glacial events would have had an impact on the speciation of *G. breviceps* and would have had a major influence on the present day distributions of *G. breviceps*.

In addition to or as a result of glacial history, the current proposed distribution of *G. breviceps* in Arkansas can best be explained by two colonization events. One inva-

sion must have had a combined source from Louisiana and east Texas populations. These populations moved into the Gulf Coastal Plain via northern expansions from Louisiana and northeastern expansions from East Texas, and moved upward through suitable habitat into the Ouachita Mountains. Another invasion came from Oklahoma eastward into the Ouachita and Ozark Mountains (particularly the Arkansas River Valley) of Arkansas. Based on available information (Russell, 1968), these invasions probably occurred after the Wisconsin glaciation.

Recent colonization events appear to have occurred north of the Arkansas River in the central portion of the state. The route of colonization is uncertain even though it has been surveyed extensively. It should be noted that a contact zone between *G. breviceps* and *G. bursarius* is being approached in the Ozark Mountains. At present, known populations of both species are separated by a distance of approximately 50km and a mountain range. Populations of both species, are found in close proximity to the White River, a potential corridor to dispersal.

If in the future, populations are identified from the area located along the Arkansas River (linking the two groups of *G. breviceps*), genetic investigations will need to be conducted in order to determine relatedness of the populations. In addition, because pocket gophers seem to have colonized suitable habitat which may be isolated, we feel that more localities will be discovered which will likely alter the proposed distribution presented herein.

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#### Literature Cited

- Bohlin, R.G. and E.G. Zimmerman.** 1982. Genic differentiation of two chromosomal races of the *Geomys bursarius* complex. *J. Mamm.*, 63:218-228.
- Elrod, D.A., G.A. Heidt, D.M.A. Elrod, M Birdsong and E.G. Zimmerman.** in press. A second species of pocket gopher in Arkansas. *Southw. Nat.*
- Davis, S.K.** 1986. Population structure and patterns of speciation in *Geomys* (Rodentia: Geomyidae): an analysis using mitochondrial and ribosomal DNA. Unpubl. Ph. D. Dissert. Washington University, St Louis, MO, 188 pp.
- Heaney L.R. and R.M. Timm** 1983. Relationships of pocket gophers of the genus *Geomys* from the central

and northern great plains. *Misc. Publ. Mus. Nat. Hist., Univ. Kansas*, 74:1-59.

**Russell, R.J.** 1968. Evolution and classification of the pocket gophers of the subfamily Geomyinae. *Misc. Publ. Mus. Nat. Hist., Univ. Kansas*, 16:475-579.

**Sealander, J.A. and G.A. Heidt.** 1990. Arkansas mammals: Their natural history, classification, and distribution. Univ. Arkansas Press, Fayetteville, 308 pp.

**Timm, R.M. and R. D. Price.** 1980. The taxonomy of *Geomydoecus* (Mallophaga: Trichodectidae) from the *Geomys bursarius* complex (Rodentia: Geomyidae). *J. Med. Entomol.*, 17:126-145.