

2014

## Distribution, Habitat Preference, and Status of the Ditch Fencing Crayfish, *Faxonella clypeata* (Hay) (Decapoda: Cambaridae), in Arkansas

H. W. Robison

C. T. McAllister

*Eastern Oklahoma State College*, [cmcallister@se.edu](mailto:cmcallister@se.edu)

Follow this and additional works at: <http://scholarworks.uark.edu/jaas>

 Part of the [Animal Studies Commons](#), [Fresh Water Studies Commons](#), and the [Terrestrial and Aquatic Ecology Commons](#)

---

### Recommended Citation

Robison, H. W. and McAllister, C. T. (2014) "Distribution, Habitat Preference, and Status of the Ditch Fencing Crayfish, *Faxonella clypeata* (Hay) (Decapoda: Cambaridae), in Arkansas," *Journal of the Arkansas Academy of Science*: Vol. 68 , Article 17.  
Available at: <http://scholarworks.uark.edu/jaas/vol68/iss1/17>

This article is available for use under the Creative Commons license: Attribution-NoDerivatives 4.0 International (CC BY-ND 4.0). Users are able to read, download, copy, print, distribute, search, link to the full texts of these articles, or use them for any other lawful purpose, without asking prior permission from the publisher or the author.

This Article is brought to you for free and open access by ScholarWorks@UARK. It has been accepted for inclusion in Journal of the Arkansas Academy of Science by an authorized editor of ScholarWorks@UARK. For more information, please contact [scholar@uark.edu](mailto:scholar@uark.edu), [ccmiddle@uark.edu](mailto:ccmiddle@uark.edu).

## Distribution, Habitat Preference, and Status of the Ditch Fencing Crayfish, *Faxonella clypeata* (Hay) (Decapoda: Cambaridae), in Arkansas

H.W. Robison<sup>1</sup> and C.T. McAllister<sup>2\*</sup>

<sup>1</sup>9717 Wild Mountain Drive, Sherwood, AR 72120

<sup>2</sup>Science and Mathematics Division, Eastern Oklahoma State College, Idabel, OK 74745

\*Correspondence: cmcallister@se.edu

Running Title: *Faxonella clypeata* in Arkansas

### Abstract

The ditch fencing crayfish, *Faxonella clypeata* (Hay), is a common and widespread crayfish that inhabits roadside ditches, intermittent first-order streams, shallow sloughs with heavy vegetation, and edges of swamps in Arkansas. Between 1997-2012, we made 55 collections of *F. clypeata* in 34 counties throughout eastern Arkansas, including 23 counties where *F. clypeata* had not been previously documented. At most of these locations within the West Gulf Coastal and Mississippi Alluvial Plain provinces, *F. clypeata* was found to be a locally abundant crayfish. With regard to conservation status, *F. clypeata* should be considered as “Currently Stable” due to its widespread distribution and general abundance throughout its range in the state.

### Introduction

Arkansas is home to approximately 53 currently described species of crayfishes (Bouchard and Robison 1980, HWR *unpubl.*). Among these many crayfishes is the ditch fencing crayfish, *Faxonella clypeata* (Hay). Hay (1899) originally described *F. clypeata* as *Cambarus clypeatus* from near Bay St. Louis, Hancock Co., Mississippi. This crayfish occurs from southeastern Texas across the southern states to northern Florida and to South Carolina, ranging north to southeastern Missouri (Walls 2009). Recent studies of Arkansas crayfishes have improved our knowledge of several species (Robison and McAllister 2006, 2008, 2010, Robison et al. 2009, 2014, McAllister and Robison 2010, 2012, Wagner et al. 2010a, b, McAllister et al. 2011) but no investigation has involved *F. clypeata* in the state. *Faxonella clypeata* is a commonly encountered state crayfish species; however, we know little of its precise distribution and habitat in Arkansas. In an unpublished thesis, Reimer (1963) provided a cursory look of the distribution of

this species in Arkansas. Fitzpatrick (1963) studied geographic variation in this species and elevated it to the genus *Faxonella* from a subgenus of *Orconectes*. Smith (1953) investigated the life history of this crayfish in Louisiana. Oklahoma crayfishes were surveyed by Reimer (1969) who provided locations of *F. clypeata* and some habitat information. Pflieger (1996) included this crayfish as a member of the Missouri crayfish fauna, and Walls (2009) surveyed the Louisiana crayfish fauna and included *F. clypeata* as a state member. More recently, Morehouse and Tobler (2013) reported that *F. clypeata* was found in three counties of southeastern Oklahoma.

The purpose of this present study was to attempt to accurately describe the habitat and distribution of *F. clypeata* in Arkansas. Specific objectives of the study were: (1) to determine the distribution of *F. clypeata*; (2) to document the habitat of *F. clypeata*; and (3) examine the current conservation status of this crayfish in the state.

### Materials and Methods

Fieldwork was conducted from March 1997 through April 2012. The majority of collections was made during the months of March, April, and May. *Faxonella clypeata* was collected by hand, aquatic dipnets, baited and unbaited crayfish traps, and by digging burrows with shovels. Notes on habitat type were made at each of the 55 collection sites and later summarized for presentation in the text. Collection efforts were centered in southern and eastern Arkansas within the Mississippi Alluvial Plain (Delta) and West Gulf Coastal Plain (Fig. 1). Fifty-five collections of *F. clypeata* were made in 34 counties throughout eastern Arkansas (Appendix). Select voucher specimens were preserved in 60% v/v isopropanol and deposited in the Southern Arkansas University (SAU) Invertebrate Collection, and the Smithsonian National Museum of Natural History (USNM) Invertebrate Zoology

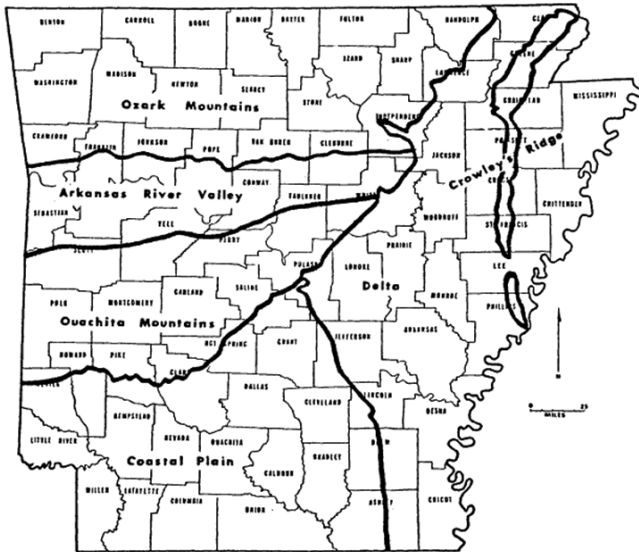
*Faxonella clypeata* in Arkansas

Figure 1. Physiographic regions of Arkansas. Coastal Plain (=West Gulf Coastal Plain), Delta (=Mississippi Alluvial Plain).

Collection in Washington, D.C. In addition to our field collections, crayfish collections housed at SAU were examined for specimens of *F. clypeata*, and a search of the online computerized database of crayfishes at the National Museum of Natural History, Smithsonian Institution (USNM 2014) and Illinois Natural History Survey Crustacean Collection (INHS 2014) was also performed.

#### Diagnosis of *Faxonella clypeata*:

*Faxonella clypeata* is a small crayfish ( $\leq 5$  cm in total length) with a short, broad, turned down rostrum lacking marginal spines. The areola is short and wide and the cervical spine is absent with chelae sexually dimorphic. Male gonopods of Form I specimens possess only a central projection and a mesial process. The central projection of the gonopod is three times longer than the mesial projection. The mesial process is short, stout, and extending at most a quarter length of the central projection, never overlapping the other mesial process. Tips of the central projection overlap in normal position like crossed sabers when viewed from below. Copulatory hooks are found only on leg 3. See Pflieger (1996, plate 9) and Walls (2009, p. 141) for morphological characters.

#### Other *Faxonella* spp. in the state:

In Arkansas, two *Faxonella* species (*F. clypeata* and *F. blairi*) have been documented to occur (Robison et al. 2014) with a third, the Ouachita fencing crayfish (*F. creaseri*), possibly occurring in the state. Differences between the three species are as follows

(see also Walls 2009): In male *F. clypeata* the mesial process of the gonopod is much shorter than in *F. creaseri* and the central projection is a bit thicker and less attenuated at the tip. Male *F. blairi* can be distinguished from all other *Faxonella* species by the much straighter central projection of *F. blairi*, which reaches to the coxae of the first pereopod. In *F. creaseri*, the central projection reaches basically to the same level, but the distal half of the ramus is bent more mesially. In *F. clypeata*, the mesial process is much shorter. Hayes and Reimer (1977) described the distinguishing characters of *F. blairi*, including the annulus ventralis of the *F. blairi* female, which is much more firmly embedded in the sternum, much more than in other species of *Faxonella* and the sinus is simpler in sculpture.

#### Genetics:

Robison et al. (2014) recently provided information on the genetics of *F. blairi* and *F. clypeata*. Phylogenetic analyses (see their Fig. 2) clearly showed that these two crayfish species form reciprocally monophyletic groups and are genetically differentiated from one another and from species in other genera.

#### Results and Discussion

Our 15 years of collecting this species in 34 counties in Arkansas has established *F. clypeata* as an inhabitant of roadside ditches, intermittent first-order streams, shallow sloughs with heavy vegetation, and edges of swamps. Because this species is a secondary burrower, individuals construct simple burrows 10-30 cm deep topped by small turrets of tiny round pellets when water levels recede. Like Pflieger (1996), we found *F. clypeata* sequestered in these burrows for most of the year. We rarely found *F. clypeata* in permanent lentic situations. Generally, we found that this crayfish inhabited waters that dried up during the summer when they then took refuge in burrows dug into the ditch bottom or sides.

Reimer (1963) documented *F. clypeata* from 11 counties in Arkansas (Ashley, Calhoun, Cleveland, Columbia, Grant, Greene, Hempstead, Lincoln, Little River, Phillips, and St. Francis). Our studies amassed a total of 55 specific localities for *F. clypeata* ( $n=1,198$  specimens), which are listed in the Appendix and plotted as counties in Fig. 2. *Faxonella clypeata* was documented from 34 counties throughout the Coastal Plain of Arkansas, 23 (68%) of them new county records. This crayfish was collected most frequently in southern Arkansas and was less abundant in the

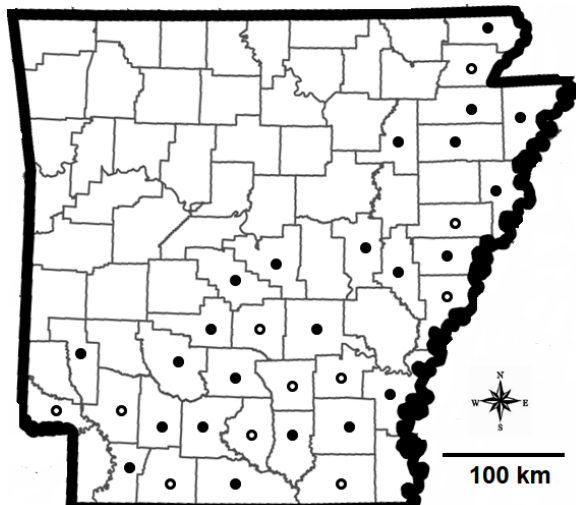


Figure 2. County distribution of *F. clypeata* in Arkansas. Open dots = previous records (Reimer 1963); dots (new records).

northeast Arkansas counties. Our sites in southwestern and southcentral Arkansas are well within the limits of the range of *F. clypeata* shown on the ecological niche model map of Morehouse and Tobler (2013, Fig. 44).

The highest number of specimens collected at one time was 208 individuals (USNM 208547) collected on 16 April 1983 by one of us (HWR) and D. Koym from a roadside ditch in Dallas County. Even though the crayfish was collected throughout the Coastal Plain physiographic province (Fig. 2), most often *F. clypeata* was found associated with pine woodlands or areas where trees were located rather than open alluvial farming areas. This finding mirrors what Walls (2009) found in Louisiana where he collected *F. clypeata* mostly in the pinelands, and not in the alluvial soils of the Mississippi and Atchafalaya basins.

Reimer (1969) collected *F. clypeata* in Oklahoma in roadside ditches, creeks, ponds, and burrows, while Morehouse and Tobler (2013) reported *F. clypeata* inhabited swamps and standing pools of water in roadside ditches in the state. In Louisiana, Walls (2009) found that *F. clypeata* was seldom in permanent waters deep enough for predatory fish, but preferred shallow ditches, sloughs and ponds with permanent vegetation. When this habitat dried, Walls (2009) reported the crayfish burrowed into the sides and bottom in individual mud cells. Interestingly, in Missouri, Pflieger (1969) collected this crayfish from small intermittent creeks and the shallows of seasonally flooded sloughs and swamps.

Collections of crayfishes have been made in all 75 Arkansas counties by HWR during the past 25 yrs. These collection records showed an absence of *F. clypeata* from the Ozark and Ouachita Mountains

physiographic regions as well as the Arkansas River Valley and Crowley's Ridge. Rather, *F. clypeata* occupies the West Gulf Coastal Plain Province becoming less abundant in northeastern and extreme southwestern Arkansas. Intensive searches throughout all 75 counties of Arkansas revealed the presence of *F. clypeata* in only 34 (45%) counties (Fig. 2, Appendix). At most of these locations ( $n = 55$ ) *F. clypeata* was found to be a locally abundant crayfish.

During the study period, six additional species of crayfish associates found sympatrically were collected while searching for *F. clypeata*. These included the digger crayfish (*Fallicambarus fodiens*), painted devil crayfish (*Cambarus ludovicianus*), Cajun dwarf crayfish (*Cambarellus puer*), twin crayfish (*Procambarus geminus*), White River crayfish (*Procambarus acutus*), and giant bearded crayfish (*Procambarus tulaneii*).

Taylor et al. (2007) provided the most current conservation estimate of status of all native crayfishes in the United States and Canada. They reported 1.2% of the crayfish fauna of the two countries was endangered, while 14.3% was threatened, and 14.9% was considered vulnerable. In addition, 52% or 189 of the 363 native crayfishes were considered stable while 48% or 173 species were in need of some conservation status. Under American Fisheries Society status guidelines, *F. clypeata* was listed by Taylor et al. (2007) as CS (currently stable) with a Nature Conservancy/NatureServe heritage rank of G5 (demonstrably widespread, abundant and secure). In addition, the species is listed as Least Concern on the IUCN Red List (Crandall 2010). After extensive collecting in Arkansas, we agree with Taylor et al. (2007) and Crandall (2010) and feel *F. clypeata* should be considered as currently stable due to its widespread abundance throughout its range in Arkansas.

In summary, *F. clypeata* inhabits the West Gulf Coastal Plain and Mississippi Alluvial Plain physiographic provinces of Arkansas. Our research indicates this species is widespread and common in the state. Within Arkansas, the distributional range includes 34 counties located primarily in these physiographic provinces where *F. clypeata* was locally abundant.

### Acknowledgments

For assistance in collecting we thank former SAU students K. Ball, C. Brummett, N. Covington, J. Rader, and M. Connior (South Arkansas Community College). We also thank Dr. C. A. Taylor and C. Mayer (INHS)

***Faxonella clypeata* in Arkansas**

and B. Wagner (Arkansas Game & Fish Commission) for providing information on *F. clypeata*. The Arkansas Game & Fish Commission provided scientific collecting permits to HWR and CTM.

**Literature Cited**

- Bouchard RW** and **HW Robison**. 1980. An inventory of the decapod crustaceans (crayfishes and shrimps) of Arkansas with a discussion of their habitats. Proceedings of the Arkansas Academy of Science 34:22-30.
- Crandall KA**. 2010. *Faxonella clypeata*. The IUCN Red List of Threatened Species. Version 2014.2. [www.iucnredlist.org/details/153949/0](http://www.iucnredlist.org/details/153949/0). (Accessed 26 August 2014).
- Fitzpatrick JF Jr**. 1963. Geographic variation in the crayfish *Faxonella clypeata* (Hay) with the definition and defense of the genus *Faxonella creaser* (Decapoda, Astacidae). Tulane Studies in Zoology 10: 57-79.
- Hay WP**. 1899. Descriptions of two new species of crayfish. Proceedings of the United States National Museum 22: 121-123.
- Hayes WA** and **RD Reimer**. 1977. *Faxonella blairi*, a new crayfish from the Red River drainage of Oklahoma and Arkansas. Proceedings of the Biological Society of Washington 90:1-5
- Hobbs HH Jr**. 1989. An illustrated checklist of the American crayfishes (Decapoda: Astacidae, Cambaridae, and Parastacidae). Smithsonian Contributions to Zoology Number 480, Washington, D.C. 236 p.
- INHS (Illinois Natural History Survey Database)**. 2014. INHS Crustacean Collection Database [online]. Available from: <http://ellipse.inhs.uiuc.edu:591/INHSCollections/crustsearch.html>. (Accessed: 15 January 2014).
- McAllister CT** and **HW Robison**. 2010. Distribution of the endemic redspotted stream crayfish, *Orconectes acares* (Decapoda: Cambaridae), in Arkansas. Journal of the Arkansas Academy of Science 64:136-140.
- McAllister CT** and **HW Robison**. 2012. Distribution, life history aspects, and conservation status of the spothanded crayfish, *Orconectes (Procericambarus) punctimanus* (Creaser) (Decapoda: Cambaridae), in Arkansas. Journal of the Arkansas Academy of Science 66:117-124.
- McAllister CT, CA Taylor** and **HW Robison**. 2011. New distributional records of the Red River burrowing crayfish, *Procambarus curdi* and Osage burrowing crayfish, *Procambarus liberorum* (Decapoda: Cambaridae), in Arkansas and Oklahoma. Proceedings of the Oklahoma Academy of Science 91:19-27.
- Morehouse RL** and **M Tobler**. 2013. Crayfishes (Decapoda: Cambaridae) of Oklahoma: Identification, distributions, and natural history. Zootaxa 3717:101-157.
- Pfliieger WL**. 1996. The crayfishes of Missouri. Jefferson City (MO): Missouri Department of Conservation. 152 p.
- Reimer RD**. 1963. The crawfish of Arkansas. [MS thesis]. Fayetteville (AR): University of Arkansas. 170 p.
- Reimer RD**. 1969. A report on the crawfishes (Decapoda, Astacida) of Oklahoma. Proceedings of the Oklahoma Academy of Science 48:49-65.
- Robison HW, BG Crump, CT McAllister, C Brummett** and **EA Bergery**. 2009. Distribution, life history aspects, and conservation status of the Mena crayfish, *Orconectes (Procericambarus) menae* (Decapoda: Cambaridae). Proceedings of the Oklahoma Academy of Science 89:47-55.
- Robison HW** and **CT McAllister**. 2006. First record of the Osage burrowing crayfish, *Procambarus liberorum* Fitzpatrick (Decapoda: Cambaridae), in Oklahoma. Proceedings of the Oklahoma Academy of Science 86:87-88.
- Robison HW** and **CT McAllister**. 2008. Additional distributional records of the Ouachita Mountain crayfish, *Procambarus tenuis* (Decapoda: Cambaridae), in Arkansas and Oklahoma, with notes on ecology and natural history. Proceedings of the Oklahoma Academy of Science 88:27-33.
- Robison HW** and **CT McAllister**. 2010. Status and geographic distribution of the endemic Bayou Bodcau crayfish (*Bouchardina robisoni*) in Arkansas. Southwestern Naturalist 55:449-452.
- Robison HW, CT McAllister, JW Breinholt** and **KA Crandall**. 2014. Status, distribution and genetics of Blair's fencing crayfish, *Faxonella blairi* (Decapoda: Cambaridae). Southwestern Naturalist 59:(in press).
- Smith EW**. 1953. The life history of the crayfish *Orconectes (Faxonella clypeata)* (Hay) (Decapoda, Astacidae). Tulane Studies in Zoology 1:79-96.

**Taylor CA, GA Schuster, JE Cooper, RJ DiStefano, AG Eversole, P Hamr, HH Hobbs Jr, et al.** 2007. A reassessment of the conservation status of crayfishes of the United States and Canada after 10+ years of increased awareness. *Fisheries* 32: 272-389.

**USNM (Smithsonian National Museum of Natural History).** 2011. Invertebrate Zoology Collections search site [online]. Available from: <http://collections.nmnh.si.edu/emuwebizweb/pages/nmnh/iz/Query.php>. (Accessed 15 January 2014).

**Wagner BK, CA Taylor, and MD Kottmyer.** 2010a. Status and distribution of gapped ringed crayfish, *Orconectes neglectus chaenodactylus*. *Journal of the Arkansas Academy of Science* 64:115-123.

**Wagner BK, CA Taylor, and MD Kottmyer.** 2010b. Status and distribution of *Orconectes williamsi* (William's crayfish) in Arkansas, with new records from the Arkansas River drainage. *Southeastern Naturalist* 9 (special issue 3):175-184.

**Walls JG.** 2009. *Crawfishes of Louisiana*. Baton Rouge (LA): LSU Press. 240 p.

**Appendix.** County locations of 1,198 specimens of *F. clypeata* from Arkansas (locality, latitude/longitude in decimal degrees or township, section, and range [if known], date of collection, collector, museum collection, and number of specimens). HWR = Henry W. Robison.

#### Arkansas (*n* = 1,198)

##### Ashley County (*n* = 201)

(1) Ditch, 1.3 km S of Crossett Experimental Forest on St. Hwy. 133. 16 March 1967. J. Cooper & M. Cooper. USNM 118469. (40)

(2) Ditch, 8.0 km SW of Hamburg on US 82. 16 March 1967. J. Cooper & M. Cooper. USNM 118470. (115)

(3) South Fork of Fountain Creek at St. Hwy. 81. 16 March 1967. J. Cooper & M. Cooper. USNM 118472. (37)

(4) South Fork of Fountain Creek at St. Hwy. 81 in ditch from woodland stream. 16 March 1967. J. Cooper & M. Cooper. USNM 118473. (5)

(5) North Fork of Fountain Creek at St. Hwy. 81 S of Fountain Hill. 16 March 1967. J. Cooper & M. Cooper. USNM 118474. (2)

(6) Roadside ditch ca. 1.6 km S of Fountain Hill on St. Hwy. 81. 18 April 1986. HWR. USNM 218913. (2)

##### Bradley County (*n* = 31)

(1) Roadside ditch, 4.5 km E of Banks on St. Hwy. 275/4. 18 April 1986. HWR. USNM 218922. (31)

##### Calhoun County (*n* = 15)

(1) Roadside ditch, 4.7 km N of jct. of US 167 and St.

Hwy. 272 on US 167. 18 April 1986. HWR. USNM 218908. (15)

##### Clark County (*n* = 14)

(1) Roadside ditch, 3.7 km S of Gurdon on St. Hwy. 53 (Sec. 10, R20W, T10S). 2 May 2002. HWR. SAU. (14)

##### Clay County (*n* = 1)

(1) Burrow, 4.3 km E of Corning on US 62 (Sec. 3, R5E, T20E). 15 March 1997. HWR. SAU. (1)

##### Cleveland County (*n* = 20)

(1) Backwater area ca. 3 mi. S of Rison on US 79 (Sec. 27, R11W, T9S). 4 May 2002. HWR. SAU. (20)

##### Columbia County (*n* = 168)

(1) Roadside ditch and burrows at jct. of co. rd. and US 82 (Sec. 23, R20W, T17S). 6 March 1982. HWR. USNM 177931. (17)

(2) Ditch and burrows 3.2 km E of jct. of St. Hwy. 98 and St. Hwy. 82 (Sec. 23, R19W, T17S). 6 March 1981. HWR. USNM 177939. (12)

(3) Roadside ditch, 18.3 km E of Magnolia on US 82. 30 April 2007. HWR. SAU. (133)

(4) Trib. to Little Cornie Creek, off US 82, vic. Calhoun jct. 13 April 2012. C. T. McAllister & M. B. Connior. Uncatalogued. (3)

(5) Off US 82 at co. rd. 36, Columbia/Union Co. line. 13 April 2012. C. T. McAllister & M. B. Connior. Uncatalogued. (3)

##### Craighead County (*n* = 5)

(1) Roadside ditch, 4.9 km S of Jonesboro on St. Hwy 1 (Sec. 9, R4E, T13N). 10 April 1992. HWR. SAU. (4)

##### Crittenden County (*n* = 3)

(1) Roadside ditch, 1.9 km S of Norvell on St. Hwy. 149 (Sec. 9, T7N, R6E). 18 April 1994. HWR. SAU. (3)

##### Dallas County (*n* = 204)

(1) No specific locality data. USNM 206946 (1).

(2) Roadside ditch, 0.6 km N of Ouachita-Dallas Co. line on St. Hwy. 7. 16 April 1983. HWR & D. Koym. USNM 208547. (203)

##### Desha County (*n* = 1)

(1) Backwater slough 1.6 km W of Dumas on St. Hwy. 54 (Sec. 29, R4W, T9S). 3 June 1999. HWR. SAU. (1)

##### Drew County (*n* = 77)

(1) N of Hamburg on St. Hwy. 81, creek beyond county line. 16 March 1967. J. Cooper & M. Cooper. USNM 118471. (28)

(2) Roadside ditch, 0.2 km E of Bradley Co. line on St. Hwy. 4. 18 April 1986. HWR. USNM 218910. (48)

(3) Roadside ditch, just E of Cut-Off Creek at St. Hwy. 35. 18 April 1986. HWR. USNM 218921. (1)

##### Grant County (*n* = 45)

(1) Creek, 12.9 km S of Sheridan on US 167. 18 March 1997. HWR. SAU. (29)

(2) Burrows, 4.0 km SW of Sheridan on St. Hwy. 35

***Faxonella clypeata* in Arkansas**

(Sec. 19, R13W, T4S). 18 March 1997. HWR. SAU (16)

**Green County (*n* = 1)**

(1) Roadside ditch, 3.1 km S of Clay Co. line on St. Hwy. 135. 12 April 1985. HWR. USNM 218921. (1)

**Hempstead County (*n* = 16)**

(1) Roadside ditch in Blevins. 20 May 1983. E. Laird. USNM 208517. (8)

(2) Vicinity of Collins Bayou, outside of Blevins. 20 May 1983. S. Hill & B. Hill. USNM 208556. (1)

(3) Roadside ditch 6.4 km S of Blevins on St. Hwy. 24 (Sec. 19, R23W, T10S). 16 April 2001. HWR. SAU. (7)

**Hot Spring County (*n* = 15)**

(1) Roadside ditch, 3.2 km W of Grant Co. line on US 270. 30 April 1976. H. H. Hobbs, Jr. & Kearny. USNM 147220. (5)

(2) Roadside ditch, 5.6 km W of Poyen, ca. 8.0 km E jct. of US 167 and St. Hwy. 27 on US 270. 17 March 1980. HWR. USNM 177213. (10)

**Howard County (*n* = 11)**

(1) Burrows, 3.9 km SE of Mineral Spring on St. Hwy. 355 (Sec. 33, R27W, T10S). 9 May 2006. HWR. SAU. (11)

**Jackson County (*n* = 12)**

(1) Roadside ditch and culvert on St. Hwy. 17, 0.5 km N of Auvergne. 4 April 1973. S. Pelt. USNM 144587. (12)

**Jefferson County (*n* = 12)**

(1) Roadside ditch at Beth Lovorn's residence at Hardin on W. Holland Rd. 25 April 1982. B. Lovorn. USNM 208650. (2)

(2) Roadside ditch, 5.0 km S of St. Hwy. 54 on US 79. 18 March 1987. HWR. USNM 219235. (10)

**Lafayette County (*n* = 3)**

(1) Roadside ditch, 1.9 km N of Lewisville on St. Hwy. 82. 26 April 1976. H.H. Hobbs, Jr. & Kearny. USNM 147182. (1)

(2) Roadside ditch at US 82, 10.0 km E of Red River. 25 April 1975. R. W. Bouchard. USNM 176773. (2)

**Lee County (*n* = 6)**

(1) Backwater ditch 1.6 km SE of Marianna on St. Hwy. 185 (Sec. 35, R3E, T2N). April 28 2003. HWR. SAU. (6)

**Lincoln County (*n* = 74)**

(1) Roadside ditch, 5.0 km NW of Yorktown. 17 April 1983. HWR & D. Koym. USNM 208543. (14)

(2) Roadside ditch, 6.6 km S of jct. of St. Hwy. 11 and 293 on St. Hwy. 293. 17 April 1983. HWR & D. Koym. USNM 208544. (32)

(3) Roadside ditch, W off Holland Rd. at Hardin. 17 April 1983. HWR & D. Koym. USNM 208551. (2)

(4) Roadside ditch, 8.4 km N of Star City. 25 April 1986. HWR. USNM 218938. (28)

**Little River County (*n* = 17)**

(1) Roadside ditch, 3.2 km W of Ashdown on St. Hwy. 32. 27 April 1976. H. H. Hobbs, Jr. & Kearny. USNM 147190. (17)

**Mississippi County (*n* = 9)**

(1) Roadside ditch in Manila on St. Hwy. 18 (Sec. 36, R8E, T14N). 21 March 1999. HWR. SAU. (9)

**Monroe County (*n* = 4)**

(1) Roadside ditch, 2.4 km N of Arkansas Co. line on St. Hwy. 33. 16 April 1985. H. H. Hobbs, Jr. & R. Gilpin. USNM 219019. (3)

(2) Roadside ditch, 6.4 km S of jct. of US. 79 and 49 on US 49. 17 April 1985. H. H. Hobbs, Jr. & R. Gilpin. USNM 219020. (1)

**Nevada County (*n* = 2)**

(1) Roadside ditch on gravel rd. ca. 9.0 km W of jct. with US 67. 28 February 1981. HWR. USNM 177941. (2)

**Ouachita County (*n* = 11)**

(1) Unnamed trib. of Two Bayou Creek between St. Hwy. 4 and St. Hwy. 24. 30 March 1975. S. Pelt. USNM 146675. (8)

(2) N of Stephens off St. Hwy. 57. 13 April 2012. C. T. McAllister & M. B. Connior. Uncatalogued. (3).

**Phillips County (*n* = 3)**

(1) Roadside ditch, 0.8 km SE of Marvell on St. Hwy. 316. D. Jones. 2 April 1982. USNM 208649. (3)

**Poinsett County (*n* = 15)**

(1) 0.8 km N of Fisher (35.5047°N, 90.9651°W). 5 May 2006. B. Wagner. INHS 10825. (15)

**Prairie County (*n* = 3)**

(1) Roadside ditch and burrows ca. 4.0 km NW of DeValls, Bluff (Sec. 7, T2N, R4W). 23 March 1995. HWR. SAU. (3)

**Pulaski County (*n* = 1)**

(1) Camp Pike. 1918. No other data. USNM 218623 (1)

**Saline County (*n* = 9)**

(1) 3.2 km SE of Shannon Hills (34.6113°N, 92.3644°W). 13 April 2006. B. Wagner. INHS 10558. (1)

(2) 1.6 km N of Lakeside, Woodson Lateral Rd. (34.5478°N, 92.2575°W). 13 April 2006. B. Wagner. INHS 10559. (8)

**St. Francis County (*n* = 1)**

(1) Roadside ditch, 3.2 km S of Forrest City on St. Hwy. 1. 13 April 1983. HWR. USNM 218697. (1)

**Union County (*n* = 188)**

(1) No locality data. 30 October 1991. J. Stanley. USNM 260204. (2)

(2) Roadside ditch, ca. 9.7 km W of El Dorado on US 82. 2 April 2000. HWR. SAU. (79)

(3) Roadside ditch at Marysville on US 82. 20 April 2006. HWR. SAU. (106)

(4) Roadside ditch, ca. 3.2 km NW of Mount Holly on St. Hwy. 57. 20 April 2006. HWR. SAU. (1).