

2010

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Recommended Citation

McAllister, Chris T. and Robison, Henry W. (2010) "Distribution of the Endemic Redspotted Stream Crayfish, *Orconectes acares* (Decapoda: Cambaridae), in Arkansas," *Journal of the Arkansas Academy of Science*: Vol. 64, Article 28.

Available at: <https://scholarworks.uark.edu/jaas/vol64/iss1/28>

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Distribution of the Endemic Redspotted Stream Crayfish, *Orconectes acares* (Decapoda: Cambaridae), in Arkansas

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There has been a recent increase in interest in the study of the crayfishes of Arkansas (Robison and McAllister 2008, 2009, 2010; Crandall et al. 2009). Crayfishes are an important component of aquatic habitats, serving as a food source for numerous vertebrates. One of these species, the redspotted stream crayfish *Orconectes* (*Procericambarus*) *acares* Fitzpatrick, is a relatively small decapod that is endemic to tributaries of the Ouachita River in 7 counties of the state (Hobbs 1989). Originally described as a subspecies of *Orconectes leptogonopodus* by Fitzpatrick (1965), *O. acares* was elevated to full species by Hobbs (1972). The type locality is an unnamed tributary to the Ouachita River, 9.7 km NW of Mount Ida, Montgomery County (Fitzpatrick 1965). According to the Nature Conservancy (NatureServe 2009), *O. acares* is ranked G4 (apparently secure) in the state.

Between April 1996 and October 1997, March and May 2000, and again between October 2009 and April 2010, we collected *O. acares* in small streams in the Ouachita National Forest (ONF) of Arkansas and Oklahoma using a variety of methods, including: minnow seines, one-man seines, backpack electroshockers, aquatic dipnets, baited and unbaited crayfish traps, or overturning rocks by hand. Select voucher specimens were preserved in 60% isopropanol and deposited in the Southern Arkansas University (SAU) Invertebrate Collection and the Smithsonian National Museum of Natural History (USNM) Invertebrate Zoology Collection in Washington, D.C.

In addition, to document previously unpublished records of *O. acares*, we searched 3 of the larger online museum databases, including the Illinois Natural History Crustacean Collection, University of Illinois at Urbana-Champaign (INHS), the North Carolina State Museum of Natural Sciences Crustacean Collection, Raleigh (NCSM), and the USNM. All previous literature dealing with *O. acares* was reviewed and distributional information was utilized when deemed accurate.

Diagnosis.—Rostrum with marginal tubercles or spines, median carina present, margins subparallel or slightly converging cephalad, not thickened. Length of areola 29.1 to 33.7% of total length (TL) of carapace, 5.5-7.0x longer than broad, 3 to 5 punctations in narrowest part. Postorbital ridges strong, divergent, corneous spines or tubercles; sides of carapace lacking lateral spines. First pleopod of first form male reaching caudal margin of coxopodite of first pereopod with abdomen flexed; central projection with strong cephalic shoulder near base; central projection straight, longer than mesial process, setiform and straight almost to tip; mesial process, slender, with tip curving caudodistally; mesial process straight, setiform, slender, delicate; tips of first pleopod divergent and bent mesiad near tip. Chela depressed but palm somewhat inflated; all surfaces bearing setiferous punctuations.

Coloration in life.—Body color slate-gray with telson and uropods brown. Chela slate gray with undersides off-white. Distinctive dorsolateral paired bright red spots on tergal segments 3, 4, and 5. A red bar runs across tergal segment 6. Cheeks and lower edge of the gill covered with pinkish streaks.

Size.—Adults range in size from 25 to 76 mm in TL. The measurements of the carapace, areola, rostrum, and chela of the type specimens were provided by Fitzpatrick (1965).

Habitat.—*Orconectes acares* inhabits rapidly flowing water associated with shoals. Spring outflows are also utilized by this species.

General range.—Hobbs (1989) presented the range of *O. acares* as tributaries of the Ouachita River in Garland, Hot Spring, Montgomery, Perry, Pike, Polk, and Saline counties, Arkansas. It is a true Arkansas endemic (Robison et al. 2008).

Specific localities for 1,030 *O. acares* are listed in Table 1 and plotted in Fig. 1. Several new localities are documented as well as a new county record (Clark). *Orconectes acares* was found at 126 of 252 (50%) sites in Arkansas, including 81 sites in Montgomery, 18 sites in Garland, and 14 sites in Polk

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counties. *Orconectes acares* was collected less frequently in Clark (6 sites), Pike (3 sites), Perry (2 sites), Hot Spring (1 site) and Saline (1 site) counties (Fig. 2). Interestingly, no *O. acares* were found at any of the 204 collecting sites on the Oklahoma side (LeFlore and McCurtain counties) of the ONF. It was not found at sites on the Cossatot, Mountain Fork, Petit Jean, or Poteau rivers. This Ouachita River endemic has its distribution centered within the ONF in Garland

and Montgomery counties (Fig. 1) and thus a high abundance should be expected. *Orconectes acares* was collected in all major tributaries of the Ouachita River drainage, including the Caddo, Little Missouri, Ouachita, and Saline rivers. In addition, *O. acares* was collected at several seeps and springs. Together with the western painted crayfish (*Orconectes palmeri longimanus*), *O. acares* is 1 of the 2 most abundant crayfishes in the Arkansas portion of the ONF.

Table 1. Collection sites of *O. acares* from 8 counties of Arkansas.

County	Specific Locality	Date(s)	No. collected	Museum	Collector
Clark ¹	Wingfield Creek, 0.8 km E of St. Hwy. 53	8 Apr. 1974	10	USNM 145690	H.W. Robison
	Caddo River at St. Hwy. 182 bridge, 2.7 km N of Amity	31 May 1975	3	USNM 146683	H.W. Robison
	Antoine River at Graysonia (ghost town)	2 Aug. 1981	22	USNM 219082	D.D. Koym
	Caddo River at Caddo Valley, off St. Hwy. 7 and I-30	27 May 1991	1	INHS 5237	Mayer
	Caddo River, 4.0 km NW of Amity	17 May 1997	38	SAU	H.W. Robison
Garland	Caddo River at St. Hwy. 182, N of Amity	10 Oct. 1997	9	SAU	H.W. Robison
	Small stream, 4.0 km E of Royal on US 270	23 June 1960	2	USNM 217146	Holt
	S. Fork of Saline River, 6.4 km S of Mt. Valley	18 Apr. 1970	2	USNM 130412	A.P. Blair
	Brook at Mt. Valley	18 Apr. 1970	1	USNM 130413	A.P. Blair
	Ten Mile Creek at St. Hwy. 70 bridge	8 Apr. 1974	4	USNM 145680	H.W. Robison
	S. Fork of Saline River on co. rd., 0.8 km N Jct. St. Hwy. 70	8 Apr. 1974	15	USNM 145702	H.W. Robison
	Middle branch of Gulpha Creek, E of Hot Springs	29 May 1992	2	USNM 260044	H.W. Robison
	Mazarn Creek at FSR	2 Aug. 1996	6	SAU	H.W. Robison
	Mazarn Creek at co. rd. 104, N of Pearcy	2 Aug. 1996	4	SAU	H.W. Robison
	Mazarn Creek at co. rd. 107, S of Sunshine	2 Aug. 1996	1	SAU	H.W. Robison
	Cearly Creek at St. Hwy. 227	2 Aug. 1996	2	SAU	H.W. Robison
	Meyers Creek at co. rd. 103	2 Aug. 1996	3	SAU	H.W. Robison
	Glazypeau Creek, 8.0 km SE of Mt. Valley	19 May 1997	5	SAU	H.W. Robison
	Glazypeau Creek at St. Hwy. 227 at Mt. Pine	19 May 1997	1	SAU	H.W. Robison
	North Fork of Ouachita River at St. Hwy. 298	4 June 1997	15	SAU	H.W. Robison
	North Fork of Ouachita River at FSR	4 June 1997	20	SAU	H.W. Robison
	4.8 km NE of Hot Springs off St. Hwy 7, S. Fork Saline River	15 Aug. 2009	1	SAU	C.T. McAllister
	Trib. of Bear Creek, 3.2 km N of Bear, off co. rd. 119	27 Nov. 2009	2	SAU	C.T. McAllister
	Stokes Creek off US 70/270 in Hot Springs	19 Mar. 2010	2	SAU	C.T. McAllister
		15 Apr. 2010	2	SAU	C.T. McAllister
Hot Spring	4.8 km SW of Bismarck off St. Hwy. 84 at Big Hill Creek	10 Sept. 2009	3	SAU	C.T. McAllister
Montgomery		16 Mar. 2010	3	SAU	C.T. McAllister
		21 Apr. 2010	5	SAU	C.T. McAllister
	Camp Albert Pike	1918	5	USNM 207619, 217152	unknown
	18.0 km NW of Mt. Ida	7 Aug. 1954	1	USNM 115519 ²	G.W. Penn
	9.7 km NW of Mt. Ida	19 Nov. 1955	2	USNM 217147	R. Suttkus
		19 Nov. 1964	2	USNM 115517-115518 ³	R. Suttkus
	37.0 km NW of Mt. Ida on US 270	23 June 1960	5	USNM 217143	Holt
	Little Missouri River, ONF, Albert Pike Gap Camp	11 May 1963	9	USNM 114821	A.P. Blair
	Jones Creek at Caddo Gap	11 May 1963	26	USNM 114822	A.P. Blair
	Little Missouri River at Camp Albert Pike	22 June 1974	27	USNM 145754	H.W. Robison
	Trib. to Jones Creek on St. Hwy. 8	13 Sept. 1974	57	USNM 146070	H.W. Robison
	Spring Run, 9.0 km SE Polk Co. line on St. Hwy 8	27 May 1977	8	USNM 149036	U. Tennessee
	Caddo River at St. Hwy. 240 bridge, S of St. Hwy 8	11 June 1981	7	USNM 177605	Cummings
	Creek on US 270, 9.7 km NW of Mt. Ida	25 Sept. 1981	10	NCSM 3480, 24923	R. Franz
		25 Sept. 1981	2	USNM 178375	R. Franz
	Caddo River at Caddo Gap	27 May 1991	2	INHS 5239	Mayer et al.
		26 Apr. 1996	17	SAU	H.W. Robison
		2 Mar. 1997	12	SAU	H.W. Robison
	Collier Creek at St. Hwy. 8, N of Caddo Gap	14 Apr. 1996	5	SAU	H.W. Robison
		2 Mar. 1997	6	SAU	H.W. Robison
	Caddo River at St. Hwy. 240, SE of Caddo Gap	14 Apr. 1996	11	SAU	H.W. Robison
	Little Missouri River at Camp Albert Pike Rec. Area	26 Apr. 1996	7	SAU	H.W. Robison
		23 June 1996	2	SAU	H.W. Robison
		17 May 1997	9	SAU	H.W. Robison
	Caddo River at Norman	26 Apr. 1996	1	SAU	H.W. Robison

C.T. McAllister and H.W. RobisonTable 1. Collection sites of *Orconectes acares* from 8 counties of Arkansas.

County	Specific Locality	Date(s)	No. collected	Museum	Collector
	Crystal Springs Campground, 6.4 km NE of Norman	26 Apr. 1996	4	SAU	H.W. Robison
		10 July 1996	2	SAU	H.W. Robison
	Collier Creek Spring (T3S, R24W, Sec. 21)	26 Apr. 1986	5	SAU	H.W. Robison
		21 May 1996	1	SAU	H.W. Robison
		22 June 1996	5	SAU	H.W. Robison
		20 July 1996	2	SAU	H.W. Robison
		17 Oct. 1996	3	SAU	H.W. Robison
	Twin Creek at US 270, 9.7 km E of Mt. Ida	27 Apr. 1996	1	SAU	H.W. Robison
	Williams Creek at US 270, 1.6 km E of Mt. Ida	27 Apr. 1996	2	SAU	H.W. Robison
	Rodgers Creek at US 270, 3.2 km E of Mt. Ida	27 Apr. 1996	5	SAU	H.W. Robison
	Ouachita River, 9.7 km NW of Mt. Ida off US 270, Rocky Shoals	27 Apr. 1996	18	SAU	H.W. Robison
	Ouachita River at Oden off St. Hwy. 379	27 Apr. 1996	10	SAU	H.W. Robison
		4 Oct. 1996	11	SAU	H.W. Robison
	Ouachita River S of Pine Ridge	27 Apr. 1996	4	SAU	H.W. Robison
		20 July 1996	9	SAU	H.W. Robison
	Singing Springs (T3S, R24W, Secs. 16, 21, 22)	21 May 1996	3	SAU	H.W. Robison
		19 July 1996	1	SAU	H.W. Robison
		17 Oct. 1996	4	SAU	H.W. Robison
	Rattlesnake Springs (T3S, R24W, Secs. 33-34)	21 May 1996	1	SAU	H.W. Robison
		21 June 1996	3	SAU	H.W. Robison
		22 June 1996	1	SAU	H.W. Robison
		19 July 1996	2	SAU	H.W. Robison
		17 Oct. 1996	5	SAU	H.W. Robison
	Box Springs (T3S, R26W, Sec. 33)	22 May 1996	3	SAU	H.W. Robison
		21 June 1996	2	SAU	H.W. Robison
		19 July 1996	3	SAU	H.W. Robison
		17 Oct. 1996	4	SAU	H.W. Robison
	Slatington Spring (T3S, R27W, Sec. 33)	22 May 1996	1	SAU	H.W. Robison
		21 June 1996	1	SAU	H.W. Robison
		20 July 1996	2	SAU	H.W. Robison
	Crooked Creek Spring (T3S, R27W, Secs. 34-35)	22 May 1996	2	SAU	H.W. Robison
		21 June 1996	1	SAU	H.W. Robison
		20 July 1996	1	SAU	H.W. Robison
	Rough Creek Seeps	21 June 1996	2	SAU	H.W. Robison
	Blue Creek (Seeps) Springs (T3S, R23W, Secs. 15, 22)	21 June 1996	1	SAU	H.W. Robison
		19 July 1996	1	SAU	H.W. Robison
	Wehunt Creek (Seeps) Springs (T3S, R27W, Sec. 28)	21 June 1996	5	SAU	H.W. Robison
	Crystal (Seeps) Springs (T3S, R25W, Secs. 13-14)	22 June 1996	6	SAU	H.W. Robison
	Polk Creek Springs (T4S, R26W, Secs. 5-8)	23 June 1996	2	SAU	H.W. Robison
	Albert Pike seeps at Albert Pike Campground	23 June 1996	4	SAU	H.W. Robison
	Caddo River at St. Hwy. 8, 16.1 km W of Black Springs	23 June 1996	1	SAU	H.W. Robison
	Caddo River at Mr. Willie's farm, 12.9 km W of Black Springs	23 June 1996	1	SAU	H.W. Robison
	Caddo River at St. Hwy. 8, 9.7 km W of Black Springs	23 June 1996	1	SAU	H.W. Robison
	Caddo River S of Black Springs	23 June 1996	6	SAU	H.W. Robison
	Lick Creek, 1.6 km N of Black Springs	23 June 1996	10	SAU	H.W. Robison
	Caddo River at St. Hwy. 240	10 July 1996	11	SAU	H.W. Robison
	South Fork of Caddo River at co. rd. 4	10 July 1996	5	SAU	H.W. Robison
	South Fork of Caddo River at Fancy Hill	10 July 1996	3	SAU	H.W. Robison
	South Fork of Caddo River, S of Hopper	10 July 1996	1	SAU	H.W. Robison
	Smith Creek at St. Hwy. 8, 0.6 km NW of Caddo Gap	10 July 1996	1	SAU	H.W. Robison
		2 Mar. 1997	2	SAU	H.W. Robison
	Gap Creek N of Jones Creek off St. Hwy. 8	10 July 1996	6	SAU	H.W. Robison
		2 Mar. 1997	3	SAU	H.W. Robison
	Mill Creek at co. rd. 9	10 July 1996	2	SAU	H.W. Robison
	Mill Creek at St. Hwy. 27, S of Story	4 June 1997	6	SAU	H.W. Robison
	Collier Creek at St. Hwy. 8 at Caddo Hills High School	10 July 1996	1	SAU	H.W. Robison
	Huddleston Creek at St. Hwy. 8 at Norman	10 July 1996	1	SAU	H.W. Robison
	Collier Creek at Collier Springs Rec. Area	10 July 1996	1	SAU	H.W. Robison
	South Fork of Ouachita River at US 270 at Mt. Ida	11 July 1996	7	SAU	H.W. Robison
		17 May 1997	2	SAU	H.W. Robison
	Ouachita River at US 270 bridge at Rocky Shoals	11 July 1996	10	SAU	H.W. Robison
		17 May 1997	7	SAU	H.W. Robison
	South Fork of Ouachita River at St. Hwy. 379	11 July 1996	3	SAU	H.W. Robison
		2 Mar. 1997	1	SAU	H.W. Robison
	South Fork of Ouachita River, FSR W of Mt. Ida	11 July 1996	6	SAU	H.W. Robison
	Muddy Creek at St. Hwy. 27, S of Story	11 July 1996	2	SAU	H.W. Robison

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County	Specific Locality	Date(s)	No. collected	Museum	Collector
Perry	Little Missouri River at Little Missouri Falls Rec. Area	3 Aug. 1996	5	SAU	H.W. Robison
	Little Missouri River at FSR 22	3 Aug. 1996	3	SAU	H.W. Robison
	Ouachita River at Pine Ridge	4 Oct. 1996	9	SAU	H.W. Robison
	Ouachita River at McGuire Access Area	4 Oct. 1996	13	SAU	H.W. Robison
	Tea Creek (Seep) Spring (T3S, R23W, Secs. 22-23)	17 Oct. 1996	2	SAU	H.W. Robison
	Unnamed trib. of Sweetwater Creek at US 270	2 Mar. 1997	1	SAU	H.W. Robison
	Sweetwater Creek at US 270	2 Mar. 1997	1	SAU	H.W. Robison
	Brushy Creek at US 270	2 Mar. 1997	2	SAU	H.W. Robison
	Big Brushy Creek at US 270	2 Mar. 1997	1	SAU	H.W. Robison
	Fiddlers Creek at US 270	2 Mar. 1997	1	SAU	H.W. Robison
	Polk Creek at US 270, 3.2 km NW of Pencil Bluff	2 Mar. 1997	3	SAU	H.W. Robison
	Ouachita River at US 270	2 Mar. 1997	8	SAU	H.W. Robison
		18 May 1997	7	SAU	H.W. Robison
	South Fork of Ouachita River at co. rd. 17	2 Mar. 1997	2	SAU	H.W. Robison
	Unnamed trib. to Fivemile Creek at St. Hwy. 8	2 Mar. 1997	1	SAU	H.W. Robison
	Shady Creek, 8.0 km E of Mt. Ida	17 May 1997	1	SAU	H.W. Robison
	Polk Creek, 1.6 km E of Oden	17 May 1997	1	SAU	H.W. Robison
	Kate's Creek at co. rd. 23, 6.4 km NE of Big Fork	17 June 1996	1	SAU	H.W. Robison
	Kate's Creek, SW of Pine Ridge	17 May 1997	2	SAU	H.W. Robison
	Caddo River, 0.3 km W Caddo Gap, Mill Creek Rd.	27 Oct. 1997	16	INHS 6258	C. Taylor et al.
	Ouachita River, 1.6 km E of Pine Ridge, SE of St. Hwy. 88	28 Oct. 1997	4	INHS 6262	C. Taylor et al.
	Ouachita River, 3.9 km SE Pencil Bluff, off US 270	28 Oct. 1997	11	INHS 6265	C. Taylor et al.
	Gap Creek and tributary, 1.5 km SE Caddo Gap, off St. Hwy. 8	27 Oct. 1997	66	INHS 6294	Sabaj et al.
	Ouachita River at River Bluff Rec. Area	4 June 1997	22	SAU	H.W. Robison
	Ouachita River at St. Hwy. 298	4 June 1997	15	SAU	H.W. Robison
	Irons Fork of Ouachita River at St. Hwy. 298, E of Fannie	4 June 1997	14	SAU	H.W. Robison
	Small trib., 8.9 km S of Hollis on St. Hwy. 7	23 June 1960	3	USNM 217145	Holt
	Bear Creek, 8.0 km S of Hollis off St. Hwy. 7 on FSR 780	22 Apr. 2010	11	SAU	C.T. McAllister
	Caddo River at Glenwood	31 May 1975	3	USNM 146703	H.W. Robison
	Little Missouri River, 6.4 km W of Langley off St. Hwy. 84	26 April 1996	1	SAU	H.W. Robison
	Little Missouri River at St. Hwy. 84, W of Langley	17 May 1997	1	SAU	H.W. Robison
	Irons Fork Creek, near Mena	30 July 1941	4	USNM 117200	H.H. Hobbs, Jr.
	Shady Lake Rec. area, off St. Hwy. 84, 9.7 km N of Umpire	23 Sept. 1980	8	NCSM 3585	R. Franz
	Ouachita River, 9.7 km NE of Mena off St. Hwy. 71	9 Apr. 1982	1	INHS 55	L.M. Page et al.
	Ouachita River, McGuire Access, between Ink and Cherry Hill	28 May 1977	2	USNM 149024	U. Tennessee
		27 Apr. 1996	16	SAU	H.W. Robison
	Ouachita River, 0.6 km S of Cherry Hill	27 Apr. 1996	5	SAU	H.W. Robison
	Irons Fork of Ouachita River at St. Hwy. 88, 9.2 km E of Mena	28 Apr. 1996	11	SAU	H.W. Robison
		18 May 1997	7	SAU	H.W. Robison
	Roadside seepage, 15.3 km NW of Mena	18 May 1997	3	SAU	H.W. Robison
	Ouachita River off US 71 at Acorn	28 Apr. 1996	28	SAU	H.W. Robison
	Big Fork Creek at Big Fork off St. Hwy. 8	17 June 1996	1	SAU	H.W. Robison
		23 June 1996	1	SAU	H.W. Robison
	Abernathy Springs at St. Hwy. 8	23 June 1996	3	SAU	H.W. Robison
	Big Fork Creek, 0.6 km S of Opal on co. rd. 67	17 June 1996	7	SAU	H.W. Robison
	Big Fork Creek at St. Hwy. 8, Abernathy Springs	23 June 1996	1	SAU	H.W. Robison
		2 Mar. 1997	2	SAU	H.W. Robison
Saline	Little Missouri River off co. rd. 25	2 Aug. 1996	5	SAU	H.W. Robison
	Unnamed trib., 3.2 km SE of Cherry Hill	18 May 1997	9	SAU	H.W. Robison
	Ten Mile Creek at US 70	18 May 1982	29	USNM 178683	R.A. Etnier

¹New county record.²Morphotypes.³Holotype and allotype.

Four specimens of supposed *O. acares* deposited in the USNM (145694, 145697, 146652) from Howard County (Little River drainage) are the Little River Creek crayfish, *O. leptogonopodus*. In addition, a female crayfish reported as *O. acares* (USNM 207459) collected on an unknown date by "Lyle" from Camp Pike (=Camp J. T. Robinson Armed Forces Complex), North Little Rock, Pulaski County is also most likely

another species. However, 1 of the most interesting historic collections of *O. acares* contained 3 specimens (1 form II male, 2 females) taken on 23 June 1960 from Perry County (USNM 217145), part of the Fourche LaFave River basin (Arkansas River drainage). In addition, we attempted collections of *O. acares* northward in nearby Yell County without success. We concur with Taylor et al. (2007) that

populations of *O. acares* are currently stable in the state and, at this point, require no protection. Additional attempts at collecting *O. acares* are certainly warranted, which could reveal a more extensive northerly range within the Arkansas River drainage.

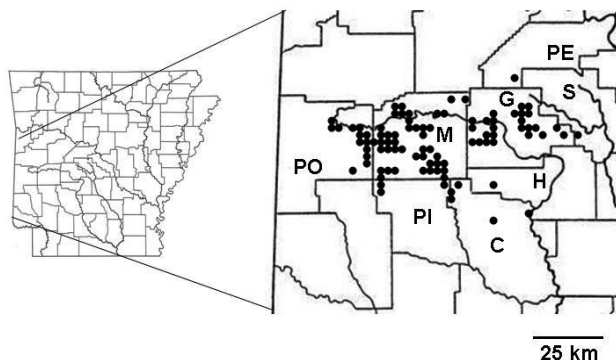


Figure 1. Distribution of *O. acares* in the ONF of Arkansas. Dots may represent more than 1 locality since the scale of the dots cover up more than 1 collection location. Abbreviations: Clark Co. (C); Garland Co. (G); Hot Spring Co. (H); Montgomery Co. (M); Perry Co. (PE); Pike Co. (PI); Polk Co. (PO); Saline Co. (S).



Figure 2. Collection site (Big Hill Creek) of *O. acares* in Hot Spring County (see Table 1). Photograph by CTM on 10 September 2009.

Acknowledgments

We thank S. Cooper (NCSM), K. Reed (USNM), and C. Taylor (INHS) for curatorial assistance. For field assistance, we thank K. Ball, C. Carlton, N. Covington, S. Jacobs, J. T. McAllister, III, and J. Rader. The Arkansas Game and Fish Commission provided scientific collecting permits to HWR.

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