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New Records and Notes on the Natural History of Selected Invertebrates from Arkansas

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Running Title: New Records of Invertebrates from Arkansas

Because invertebrate biologists are few and scattered in Arkansas, the invertebrate fauna of much of the state is poorly known. The lack of expertise in identifying invertebrate species, coupled with a lack of seasonal collecting, have limited the publication of information regarding species occurrence and basic biology.

Herein we document new or previously unreported records of distribution and provide notes on the natural history of selected invertebrates from Arkansas. Southwestern Arkansas lies almost entirely within the West Gulf Coastal Plain natural division (Foti 1974), whereas eastern Arkansas is comprised of the Mississippi Alluvial Plain and northern Arkansas is formed largely of 2 major highland areas – the Ouachitas and Ozarks. This diversity of habitats allows for an interesting diversity of invertebrate life.

Field observations and collections were made by the authors and students at Henderson State University (HSU) and Southern Arkansas University (SAU). Invertebrate specimens were preserved in 70%v/v or 90%v/v isopropanol and housed at HSU, SAU, Brigham Young University (BYU), or the United States National Museum (USNM). Digital photography also was used to document species within their habitats (images available from RT).

CLASS TURBELLARIA

Bipalium kewense Moseley 1878 – land planarian. This land planarian is easily identified by its diagnostic spade-like head and bi-colored body. In Arkansas, this planarian species was reported previously by Daly and Darlington (1981) from Pulaski (Little Rock), Faulkner (Conway), and Ouachita (Camden) counties. Tumilson and Robison (2010) provided additional records of *B. kewense* from Clark and Columbia counties in southern Arkansas.

Although native to tropical Asia, land planarians

have been dispersed via the trade in tropical plants, thus they commonly are observed in greenhouses in the soil of potted plants and have become established across the southern United States (Ducey et al. 2007). Daly and Darlington (1981) noted that *B. kewense* was found after heavy rains on driveways in Little Rock; otherwise their specimens were discovered under wet boards, logs, rotting trees, railroad ties, and concrete patio slabs.

On 14 May 2011, one 10 cm specimen of *B. kewense* was collected from a sidewalk in Russellville, Pope Co., AR by D. N. Miller. This represents a new county record for Pope County.

In addition, a single 8 cm long specimen of *B. kewense* was collected by HWR on 7 April 2014 from the fish research labs area of UAPB in Pine Bluff, Jefferson Co., AR, which also is a new county record.

CLASS CRUSTACEA

Crayfishes in North America are properly identified best by evaluation of secondary sexual characteristics, and especially the morphology of the first pleopods (= gonopods) of the form I male (Hobbs 1972). Form I is capable of breeding but form II is sexually nonfunctional. Oviparous females are those bearing eggs. In the following accounts of crayfishes, the forms examined are noted. Distances given with locality data are shown as originally recorded with metric conversions in parentheses.

Cambarellus (Pandicambarus) puer Hobbs 1945 - Swamp Dwarf Crayfish. This tiny crayfish can be distinguished from its congener, *C. shufeldtii*, by the male gonopod. In *C. puer* the processes of the gonopod are curved whereas they are straight in *C. shufeldtii*. Specimens were collected by use of an aquatic dip net in vegetated backwater regions of a stream. Oviparous females listed below are the first

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reports of ovigerous *Cambarellus puer* from Arkansas and were collected from April to July (26 Apr 1976, 23 May 1975, 26 July 1976, 28 July 1941).

Collections: *Calhoun Co.*: Champagnolle Creek, 1 mi. (1.6 km) E of Hampton Oil Field; 25 May 1975; S. Pelt; USNM 147715 (1 ovigerous female). *Cleveland Co.*: stream under U.S. Hwy 79, 3 mi. (4.8 km) NE of junction with AR St. Hwy 15; Aug 1960; J. Bohlke; USNM 116031 (1 male I, 3 male II, 7 females). *Columbia Co.*: Bayou Dorcheat at U.S. Hwy 82, W of Magnolia, AR; 11 October 2015; HWR (2 females). *Greene Co.*: small stream 4.9 mi. (7.9 km) NE of Paragould on AR St. Hwy 1; 28 July 1941; H. H. Hobbs, Jr.; USNM 117744 (6 male I, 1 female ovigerous). *Howard Co.*: ditch 12.3 mi. (19.8 km) S of Lockesburg, AR on U.S. Hwy 71; 31 July 1941; H. H. Hobbs, Jr.; USNM 117743 (3 male juveniles, 5 female juveniles). *Jackson Co.*: Village Creek at AR St. Hwy 37, E of Tuckerman, AR; 26 July 1976; R. W. Bouchard (1 male II, 3 females, 1 ovigerous female). This marks the first documentation of an ovigerous female in Arkansas.

Lafayette Co.: tributary to Bodcaw Creek about 3.5 mi. (5.6 km) from jct. of AR St. Hwy 29 and Sunray Road, on latter; 26 April 1976; R. W. Bouchard; USNM 176846 (3 male I, 1 female ovigerous). *Monroe Co.*: stream under AR St. Hwy 17, 9 mi. (14.5 km) S of jct. with U.S. Hwy 70; 17 August 1960; J. Bohlke; USNM 116035 (1). *Union Co.*: tributary to Bodcaw Bayou ca. 3.5 mi. (5.6 km) from jct. of AR St. Hwy 29 and Sunray Road on latter; 11 Jun 1981; D. Cummings; USNM 177606 (2 male II, 1 female). *White Co.*: Ditch near Bayou Des Arc, 6 mi. (9.7 km) NE of McRae, AR on U.S. Hwy 67; 14 August 1960; J. Bohlke; USNM 116030 (4 male II, 1 female).

Cambarellus (Dirigicambarus) shufeldtii (Faxon) 1884 - Cajun Dwarf Crayfish. *Cambarellus* species are the only crayfishes in Arkansas to have well-developed lateral rostral spines. Species may be distinguished using the processes of the male gonopod. Ovigerous females listed below represent the first reports of ovigerous *Cambarellus shufeldtii* from Arkansas and were collected from April to October (14 April 1973, 7 May 1982, and 11 October 2015).

Collections: *Columbia Co.*: Bayou Dorcheat at U.S. Hwy 82, W of Magnolia, AR; 11 October 2015; HWR; (2 male II; 1 ovigerous female). The ovigerous female had 29 eggs and was 1.8 cm in length.

Jackson Co.: Village Creek at AR St. Hwy 37 E of Tuckerman, AR; 19 February 1977; R. W. Bouchard (1 female). *Lafayette Co.*: unnamed oxbow lake of the

Red River, 0.6 mi. (1.0 km) SW of Boyd, AR; 7 May 1982; HWR; USNM 208635 (3 male I, 2 male II, 3 females ovigerous, 3 other females). *Lawrence Co.*: Village Creek at Minturn, AR; 19 February 1977; R. W. Bouchard (1 female). *White Co.*: slough 14.4 mi. (23.2 km) W of Augusta, AR; 8 September 1948; L. Williams; USNM 132713 (1). *Woodruff Co.*: roadside ditch and culvert on U.S. Hwy 64, 2 mi. (3.2 km) W of jct. of U.S. Hwy 64 and AR St. Hwy 39, Fair Oaks, AR; 14 April 1973; H. H. Hobbs, Jr.; USNM 144583 (18 male I, 1 male II, 1 female adult, 4 female ovigerous, 4 female juvenile).

Cambarus (Lacunicambarus) diogenes Girard 1852 - Devil Crawfish. This crayfish is a primary burrower and burrows are known as deep as 6 feet (1.8 m) (Walls 2009). Specimens were dug from deep burrows along the creek.

Collections: *Lawrence Co.*: Village Creek at Minturn, AR; 19 February 1977; R. W. Bouchard (1 male I, 1 female, 3 female juveniles). This is the first record from Lawrence Co. of this crayfish species.

Cambarus (Lacunicambarus) ludovicianus Faxon 1885 - Painted Devil Crayfish. Although a primary burrower, this species occasionally leaves the protection of the burrow and seeks open water. Burrowers are always difficult to document, therefore collection and identification of a first form male is noteworthy. The male form II specimen taken was collected by use of an aquatic dip net.

Collections: *Lafayette-Columbia Co.*: Bayou Dorcheat at U.S. Hwy 82 W of Magnolia, AR; 11 October 2015; HWR; (1 male II). *Columbia Co.*: burrow in roadside ditch 3.6 mi. (5.8 km) W of Magnolia, AR on U.S. Hwy 82; 26 January 1993; HWR (1 female ovigerous). This is the first report of an ovigerous female of *C. ludovicianus* from Arkansas.

Orconectes palmeri (Faxon) 1884 - Gray Speckled Crayfish. Three poorly defined subspecies of *Orconectes palmeri* are known (Penn 1957). Only 2 occur in Arkansas. The northeastern subspecies, named the Gray-speckled Painted Crayfish (*O. p. palmeri*), is found from roughly central Arkansas and SE Missouri to W Tennessee, then S through central and W Mississippi into the extreme NW Florida parishes of Louisiana (Walls 2009). The western subspecies, named Western Painted Crayfish (*O. palmeri longimanus*), is found W of the Mississippi River; however, there is a broad area of intergradation (or a cline) with *O. p. palmeri* occurring through much

of NE Arkansas. Dr. Raymond W. Bouchard, a crayfish specialist formerly with the Smithsonian Institution, collected the specimens listed below and identified them as clear intergrades between the 2 subspecies, i.e. *Orconectes palmeri* X *longimanus*. Because the taxonomic problem involving intergradation of the 2 subspecies occurs in central Arkansas, the following 7 correctly identified intergrade collections are valuable in resolving the status of the 2 forms, and thus are reported herein.

Collections: *Lawrence Co.*: Village Creek 1.5 mi. (2.4 km) SE of Alicia, AR; 26 July 1976; R. W. Bouchard; (2 female juveniles). Village Creek at Minturn; 26 July 1976; R. W. Bouchard; (3 male juvenile, 3 female juveniles). Village Creek at Minturn; 19 February 1977; R. W. Bouchard; (4 male I, 3 female, 2 female juveniles).

Jackson Co.: Village Creek at AR St. Hwy 14, S of Newport, AR; 27 July 1976; R. W. Bouchard; (2 male juveniles, 2 female juveniles). Village Creek at AR St. Hwy 37, E of Tuckerman, AR; 26 July 1976; R. W. Bouchard; (2 female juveniles). Village Creek at mouth; 27 July 1977; R. W. Bouchard; (1 female juvenile). Village Creek at AR St. Hwy 37; 19 February 1977; R. W. Bouchard; (2 male I).

Procamburus (Ortmannicus) geminus Hobbs 1975 - Twin Crawfish. *Procamburus geminus* was described from specimens collected from near Taylor, Columbia County, AR by Hobbs (1975). Nothing is known about its natural history (Walls 2009). One ovigerous female of *P. geminus* was collected on 26 April 1965.

New locality records for *P. geminus* in southwestern Arkansas are provided here. *Columbia Co.*: Bayou Dorcheat at AR St. Hwy 160, W of Taylor, AR; 20 April 1984; HWR (3 male II, 2 female). Bayou Dorcheat at co. rd. 12, W of Philadelphia, AR; 20 April 1984; HWR (1 male II). Big Creek at AR St. Hwy 371, W of Magnolia, AR; 9 June 1986; HWR (1 male II). Otter Creek at AR St. Hwy 98, W of Emerson, AR; 12 June 1988; HWR (3 male juveniles).

Lafayette Co.: Walker Creek at AR St. Hwy 160, W of Walker Creek, AR; 26 April 1985; HWR; (2 male II, 1 ovigerous female).

CLASS ARACHNIDA

Nephila clavipes (Linnaeus 1767) – the golden orbweaver, golden-silk orbweaver, or banana spider. Being a primarily neotropical genus, *Nephila clavipes* (Figure 1) is the only species that occurs in North

America. Historically, it ranged from Central America and through the Gulf Coastal states of the United States, primarily in the warmer portions of the subtropical regions (Comstock 1948, Levi 1980, Evans 2007). More recently, northward expansion of the range away from the coast has been attributed to climate change (Bakkegard and Davenport 2012). Preferred habitat tends to be damp areas with open forest and humidity above 80% (Moore 1977).

Nephila clavipes was first documented in Arkansas in the Ouachita River bottoms, Felsenthal National Wildlife Refuge (FNWR), in Ashley and Union counties of southeastern Arkansas (Tumlison and Robison 2010). They reported 4 individuals at that time. On 5 September 2015, the site was revisited between 1630 – 1830 hrs to determine the status of the population. We searched 3 contiguous areas (GPS 33.156N, 92.112W): a triangular wooded patch, a rectangle into the woods, and a section of forest edge.



Figure 1. An adult female *Nephila clavipes* near the Ouachita River, Union County, AR, September 2015.

The 50 m stretch of forest edge was oriented N-S and was formed by the ecotone of bottomland forest and an open area maintained for boating access to the Ouachita River, with the open edge facing E. The 15 m long base of the triangle was continuous with the line of this edge and consisted of sides of ca. 30 m, generally facing N and S. The rectangle was a

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relatively open patch of woods with the E border being the forest edge, and extending ca. 45 m into the woods. These 3 areas allowed us to examine whether webs were more common in the woods or edge, and whether they tended to have a particular orientation. Tumilson and Robison (2010) had found all of their spiders on webs facing E-W.

We found 14 *N. clavipes* in the triangle, 8 in the rectangle, and 16 along the edge. Webs were oriented to face openings: N-S in the triangle, E-W in the edge, and variable but generally E-W in the rectangle. Our observations somewhat support the argument of Robinson and Robinson (1974) that compass orientation of webs is determined by position of available web supports, but orientation to an opening that serves as a flight corridor for insect prey seems also to be an important aspect of orientation at our site. In thermally extreme environments, web orientation may be used to reduce absorption of solar heat (Higgins and Ezcurra 1996), but shading at our site likely makes this adaptation unnecessary.

Webs were attached to available anchors, including sticks on the ground, and trees and bushes such as oak, maple, hickory, huckleberry, sweetgum, persimmon, greenbriar, and other vines. Webs also were attached to each other in some cases. Four contiguous webs spanned the E side of the rectangle. Farr (1977) argued that such clumped distribution of webs seems to be influenced by population density of the spiders coupled with limited availability of sites for attachment of webs.

Foods detected in the webs were 5 horseflies (Tabanidae) and 1 praying mantis (Mantidae). Female *N. clavipes* were positioned on the open side of the web, centered about 1.75 m above the substrate (range 0.75 – 3.5 m), and typically hung upside-down in the web.

CLASS INSECTA

Tetraloniella albata (Cresson 1872) – white long-horned bee. This species of small bee is identifiable visually by its white, fuzzy appearance (males have long antennae – Figure 2), and it can be located by audition due to high-pitched sounds of its wing beat (Tumilson and Benjamin 2011). The bee was first documented in Arkansas (MD Warriner *in litt.*) and further studied (Tumilson and Benjamin 2011) at Terre Noire Natural Area (owned by the Arkansas Natural Heritage Commission, ANHC) in Clark County. Conservation of *T. albata*, a species of special concern in Arkansas, requires efforts to maintain or restore

prairie clover to suitable sites in blackland prairie environments in southwestern Arkansas (see Foti 1974). In Arkansas, this bee was known previously only from Terre Noire Natural Area in Clark County and Saratoga Natural Area (owned by the ANHC) in Howard County (MD Warriner, *in litt.*).

Tetraloniella albata is oligolectic, meaning it uses only one kind of plant – purple prairie clover (*Dalea purpurea*). This affinity allows researchers to focus survey attempts by first finding the host plant. We visited some remnant blackland prairies where *D. purpurea* is known to occur to search for additional populations of this rare bee.

Columbus Prairie (Sec. 20, T11S, R26W; GPS 33.789N, 93.812W; Hempstead County, owned by The Nature Conservancy) was visited on 6 June 2012 between 1120 – 1300 hrs. Purple prairie clover was present near the entrance to the prairie, and further into the prairie it became quite common and widespread. Flowers on some plants had not begun to bloom, but on average, bloom was about half complete on most prairie clover plants, and *Liatris* was just coming into bloom. We found 29 *Tetraloniella albata* which were most common in areas of very thick growth of *Dalea purpurea* (common enough that 2-3 could be seen simultaneously, which is not common in our experience (Tumilson and Benjamin 2011)).



Figure 2. *Tetraloniella albata* (male) on *Dalea purpurea* at Terre Noire Natural Area, Clark Co., AR, 27 May 2010.

Rick Evans Grandview Prairie (Sec. 16, 17, T11S, R26W; GPS 33.803N, 93.809W; Hempstead County, owned by the Arkansas Game and Fish Commission)

was visited on 6 June 2012 between 1330 – 1430 hrs. This locality is across the highway, but otherwise is adjacent to the Columbus Prairie site, but we report results of our search here due to different ownership and land use fragmentation surrounding these habitat islands. Both sites contain populations of purple prairie clover. Although prairie clover was not as dense at Grandview Prairie as it was at Columbus Prairie, and more scattered, we were able to document 6 *T. albata* at 3 sites in Grandview Prairie.

This bee is now documented at 4 sites in 3 counties (Clark, Hempstead, and Howard) in Arkansas, and is expected to occur wherever good historic patches of *Dalea purpurea* remain well established.

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