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C. T. McAllister
Eastern Oklahoma State College, cmcallister@se.edu

W. F. Font
Southeastern Louisiana University

H. W. Robison

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Crepidostomum cornutum (Digenea: Allocreadiidae) from Midget Crayfish, *Orconectes* (*Procericambarus*) *nana* (Decapoda: Cambaridae), from Northwestern Arkansas

C.T. McAllister[1]*, W.F. Font[2] and H.W. Robison[3]

[1]*Science and Mathematics Division, Eastern Oklahoma State College, Idabel, OK 74745*
Department of Biological Sciences, Southeastern Louisiana University, Hammond, LA 70402
[3]*9717 Wild Mountain Drive, Sherwood, AR 72120*

*Correspondence: cmcallister@se.edu

Running Title: Trematode from Midget Crayfish

The midget crayfish, *Orconectes* (*Procericambarus*) *nana* Williams is a diminutive species (maximum length = 3.0 cm) that is found in the Neosho River Basin of northwest Arkansas and northeast Oklahoma (Reimer 1963, Hayes 1973, Morehouse and Tobler 2013). In addition, *O. nana* has been reported in the Illinois River (Bergey et al. 2005), and into the White River drainage (Prairie Creek) of Arkansas (C. Taylor, *pers. comm*.). In Arkansas, it has been collected from sites in Benton and Washington counties. The midget crayfish is found in clear-flowing, permanent small creeks and larger streams with substrate consisting of limestone gravel and cobble (Williams 1952, 1954). It was once thought to consist of two subspecies (Williams 1952, Hayes 1973) but a recent mtDNA study by Dillman et al. (2010) supported full species status originally suggested by Hobbs (1972) and Fitzpatrick (1987) for both *O. nana* and the Neosho midget crayfish, *O. macrus* Williams. This species' habitat is under constant threat from agriculture, road construction and urbanization, causing sedimentation and water pollution, in addition to construction of dams. Thus, this species has a State Heritage rank of S2 (imperiled) by NatureServe (2014) and has been assessed as vulnerable by the American Fisheries Society (Taylor et al. 2007).

Although information is available on the ecology of *O. nana* (see citations above), nothing, to our knowledge, has been published on any parasite of this crayfish. Here, we report a trematode parasite from *O. nana* from Arkansas.

Nine adult *O. nana* were collected on 19 November 2011 with a dipnet by overturning rocks at Flint Creek (Illinois River drainage) off St. Hwy. 59S, 0.5 km S of Gentry, Benton County (36.242699°N, 94.487472°W). In addition, on the same date, 7 adult *O. macrus* were taken with a dipnet from a tributary of Spavinaw Creek off St. Hwy 102, SE of Maysville, Benton County (36.364594°N, 94.551124°W). Specimens were placed in aerated creek water and transported to the laboratory within 24 hr. They were killed by immersion in a concentrated Chloretone solution and their antennal glands, hepatopancreas and heart were placed in Petri dishes containing 0.6% w/v saline and examined for encysted parasites. Metacercaria were carefully teased from antennal gland cysts using insulin needles and fixed in hot ethanol, stained with acetocarmine and mounted in Canada balsam. Parasites were deposited in the United States National Parasite Collection (USNPC), Beltsville, Maryland, and vouchers of crayfish were deposited in the Henderson State University (HSU) Collection, Arkadelphia.

None of the *O. macrus* were found to be infected, however, 2 of 9 (22%) *O. nana* were each found to be harboring one metacercaria (USNPC 105277–105278) in their antennal glands that fit the description of *Crepidostomum cornutum* (Osborn, 1903) Stafford, 1904, given by Cheng (1957). Morphological features of these 2 metacercaria are as follows: genital pore slightly posterior to cecal bifurcation; anterior extent of vitellaria at genital pore; posterior extent of vitellaria near posterior end; prostate in anterior one-half of cirrus sac; posterior extent of cirrus sac at anterior margin of anterior testis; prostate in anterior two-thirds of cirrus sac. Measurements are as follows (in µm, length × width): body, 1,872–2,541 × 474–498; oral sucker, 269–284 × 316–395; pharynx, 98–117 × 82; ventral sucker, 222–254 × 230–242; ovary, 144–148 × 117–137; anterior testis, 234–250 × 203–238; posterior testis, 226–242 × 211–234.

Crepidostomum cornutum has been reported previously in various crayfish (*Cambarus* and *Orconectes* spp.) from Illinois, Kansas, Louisiana, Michigan, Minnesota, Mississippi, New York, Oklahoma, Virginia, and Wisconsin, and Ontario and Quebec, Canada (Faust 1918, Hopkins 1934, Henderson 1938). The life cycle involves cercaria in

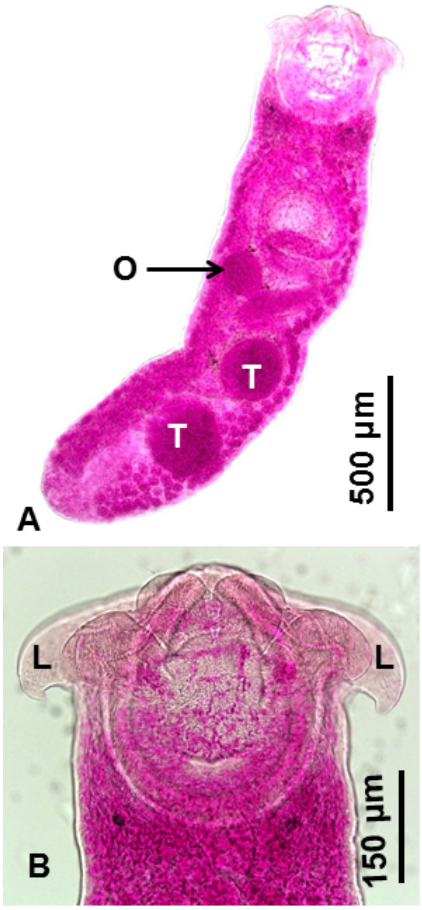

Figure 1. *Crepidostomum cornutum* metacercariae. A. Specimen showing ovary (O) and testes (T). B. Close-up of anterior end of specimen showing lappets (L) characteristic of the genus.

first intermediate freshwater bivalves (*Musculium* and *Sphaerium* spp.), metacercaria encyst in second intermediate host crayfishes, and adults are found in the pyloric ceca and intestinal tract of fish definitive hosts (Ameel 1937, Cheng 1957). There are many fishes reported as hosts including those in the genera *Ambloplites, Amia, Anguilla, Carassius* (experimental), *Gasterosteus, Ictalurus, Lepomis, Micropterus, Morone, Notemigonus, Perca, Pomoxis, Pylodictus, Salmo,* and *Salvelinus* (Hoffman 1999).

Previous reports of *C. cornutum* from Arkansas include specimens from game fishes, including Channel Catfish (*Ictalurus punctatus*), Warmouth (*Lepomis gulosus*), Bluegill (*Lepomis macrochirus*), Spotted Bass (*Micropterus punctulatus*), Largemouth Bass (*Micropterus salmoides*) and White Crappie (*Pomoxis annularis*) (Becker et al. 1966, Becker and Houghton 1969, Becker and Cloutman 1975, Cloutman 1975, Kilambi and Becker 1977). In addition, McAllister et al. (2014) recently reported *Crepidostomum cooperi* Hopkins, 1931 from Banded Sculpin (*Cottus carolinae*) from Flint Creek.

In summary, we document, to our knowledge, the first parasite ever reported from *O. nana*. Turner (1999) reported *Alloglossidium cardicolum* (Corkum and Turner) Smythe and Font from White River crayfish, *Procambarus acutus* from Arkansas. In addition, Turner (2006) reported *Allocorrigia filiformis* Turner and Corkum from red swamp crayfish, *Procambarus clarkii* from Arkansas, and Turner (2009) found *Alloglossidium dolandi* (Turner and McKeever) Smythe and Font in *P. acutus* from Arkansas. The only other previous report on Arkansas crayfish parasites was by McAllister et al. (2011) who reported metacercaria of *Alloglossidium corti* (Lamont) Van Cleave and Mueller from red-spotted stream crayfish, *Orconectes acares* and western painted crayfish, *Orconectes palmeri longimanus*. As Arkansas supports approximately 58 species of crayfishes, additional surveys should increase our knowledge of their parasites, of which we know very little about.

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