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Seasonal Activity of the Ozark Highlands Leech, *Macrobdella diplotertia*, (Annelida: Hirudinea) in North-central Arkansas

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Abstract

The Ozark Highlands Leech, *Macrobdella diplotertia*, occurs intermittently throughout Arkansas, Kansas, and Missouri. Limited natural history of this species is known. Herein, we report a new county occurrence for this leech from a cattle pond in southern Marion County, Arkansas. We also report on the seasonal activity and novel hosts of this species. We surveyed the inhabited pond monthly to determine activity and collected natural history data on this species. This study indicated that this species appears to be most active in spring, summer, and early fall, but inactive during the winter. We also documented five new anuran hosts for this species. The Central Newt, *Notophthalmus viridescens,* was also present in this pond, which further supports a mimetic relationship previously proposed between these two animals.

Introduction

There are currently 77 described species of leeches occurring in North American north of Mexico (Klemm et al. 2009). Of these 77 species, 22 are known to occur in Arkansas (Moser et al. 2006). The distribution and natural histories of many of these species have yet to be determined completely (Klemm 1985). Herein, we report on the natural history of one of these species, the Ozark Highlands Leech (*Macrobdella diplotertia*). *Macrobdella* is a monophyletic genus with four species in North America (Phillips and Siddall 2005). Two species of *Macrobdella* occur in Arkansas, *M. diplotertia* in the north and *M. ditetra* in the south (Moser et al. 2006). *M. diplotertia* has been previoulsly reported from two counties in Missouri (Meyer 1975, Trauth and Neal 2004), three counties in Kansas (Klemm et al. 1979) and two counties in Arkansas (Turbeville and Briggler 2003). No additional specimens, however, were discovered during a leech survey of northern Arkansas (Moser et al. 2006).

Macrobdella diplotertia is an omnivore known to be an amphibian egg predator and a sanguivore (Turbeville and Briggler 2003, Trauth and Neal 2004). It is also known to have a mimetic relationship with the Central Newt (McCallum et al. 2008). Interestingly, the leech *Placobdella picta* has been observed attached to the Ozark Highlands leech (Turbeville and Briggler 2003). Currently, no reports of these leeches feeding on adult amphibians have been published.

Methods

Leeches were observed and collected in a manmade cattle pond in southern Marion County, Arkansas (UTM 15N 0535878E, 3992944N). In order to obtain data on seasonal activity of the leeches, the pond was surveyed monthly during daylight hours for a year from June 2009 to May 2010. One of the authors (MBC) slowly walked around a section of the pond perimeter (~25 m) at a water depth of ~30 cm for 10 min each month and collected all observed leeches with a ~6 mm mesh dipnet. To supplement the survey, 5 single dipnet collections of the benthic substrate were collected every month and sifted through to collect any leeches in this material. We also opportunistically captured amphibians and examined them for leech parasitism. We also sampled the pond for the presence of Central Newts to provide further support of the proposed mimetic relationship between these two species (McCallum et al. 2008). All collected leeches were deposited in the Invertebrate Zoology collections of the National Museum of Natural History, Smithsonian Institution, Washington, DC, for further studies.

Results

Marion County (Arkansas) represents a new county occurrence for M. diploterita (Fig. 1). We recorded these leeches to be most active in spring, summer, and early fall, but inactive during the winter

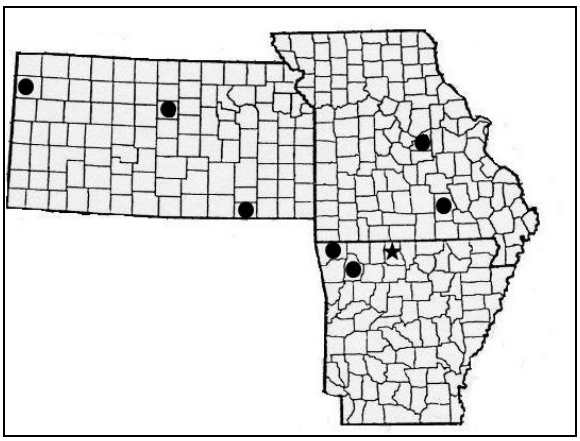

Figure 1: Distribution of the Ozark Highlands Leech (*Macrobdella diplotertia*) in Kansas, Missouri, and Arkansas. Previous records (dots); new record (star).

(Fig. 2). During the warmer months, leeches were collected while freely swimming in the pond. The leeches were documented to feed on the eggs of gray treefrogs (*Hyla versicolor*) *in situ*. We also observed these leeches to feed from five novel adult anuran host species: Spring Peeper (*Pseudacris crucifer*); Gray Treefrog; Pickerel Frog (*Lithobates palustris*); Green Frog (*L.* clamitans); and American Bullfrog (*L. catesbeianus*). An adult leech was attached to the gular region of the Spring Peeper. An adult leech was attached adjacent to the orbit of the eye on the treefrog. A juvenile was attached to the inner thigh of the bullfrog. While in captivity directly after collection, we observed an adult leech attach to the dorsal cephalic region of a Spotted Salamander (*Ambystoma maculatum*) larva and feed there. Additionally, while in captivity we observed two different individuals attach to the web of the hind foot of a Pickerel frog and Green frog. We also observed on several occasions, we observed the leech *Placobdella picta* attached to *Macrobdella diplotertia*. The Central Newt was very common within the pond providing further evidence for potential interactions between these two species.

Discussion

The discovery of this population of *Macrobdella diplotertia* in Marion County expands the distribution of this species eastward in Arkansas. Other populations may occur elsewhere within the Ozark Highlands region in the state. Amphibians that either live or reproduce within ponds that contain populations of these leeches may sustain substantial parasitism; however, the extent of this parasitism is currently unknown. The observations of both amphibian adult and egg predation suggest that *M. diplotertia* affect the fitness of adult amphibians as well as survival of developing larvae.

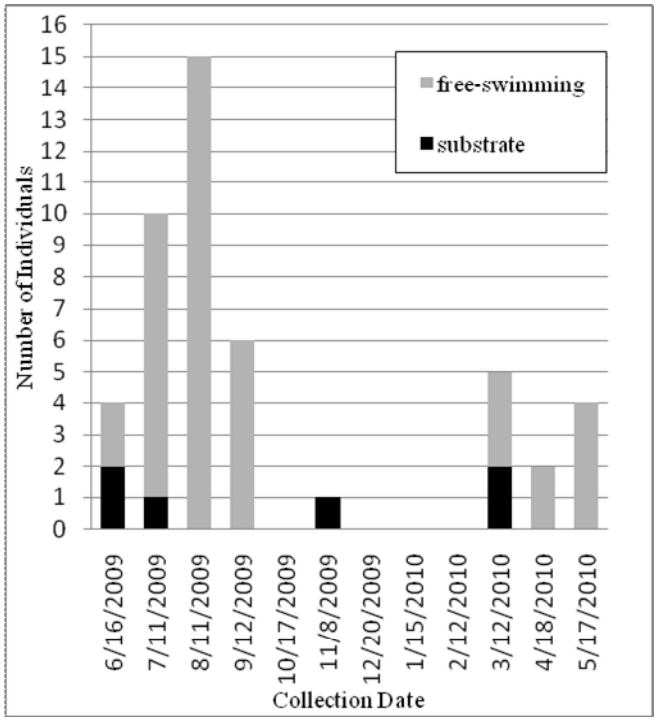

Figure 2: Seasonal activity of the Ozark Highlands Leech (*Macrobdella diplotertia*) in a manmade cattle pond in Marion County, Arkansas.

The genus *Macrobdella* typically feed on amphibian adults and their larvae. *M. decora* has been reported feeding on brook trout, *Salvelinus fontinalis* (Rupp and Meyer 1954) and amphibian eggs, including *Ambystoma maculatum* (Cargo 1960), *Bufo terrestris* (Travis and Trexler 1986), *Lithobates catesbeianus* (Howard 1978), and *L. sylvatica* (Cory and Manion 1953). *M. ditetra* has been reported feeding on sirens, *Siren intermedia*, (Graham and Borda 2010) and southern leopard frogs, *L. sphenocephala* (Beckerdite and Corkum 1973). An unusual case of hirudiniasis was reported with *M. ditetra* feeding on cattle, *Bos taurus* (Meyer 1959). Moore (1953) reported that *M. ditetra* readily consumed the eggs of *L. catesbeianus*. Because *M. sestertia* is quite rare, host preferences have not been determined, although Smith (1977) stated that beach patrons reported that these leeches commonly fed on humans. By combining our results with those of Trauth and Neal (2004) and Turbeville and Briggler (2003), *M. diplotertia* is now known to feed on adult

amphibians, including Spring Peepers, Gray Treefrogs, Pickerel Frogs, Green Frogs, and American Bullfrogs, as well as the eggs of five amphibian species (*A. maculatum*, *H. versicolor, L. clamitans, L. sphenocephala,* and *L. sylvatica*). Our results have augmented the known food sources for *M. diplotertia*, although further studies are required to assess the impact this species has on amphibian fitness and survival.

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