New Host and Distributional Records for Helminth Parasites (Trematoda, Cestoidea, Nematoda) of Herpetofauna from Southeastern Oklahoma

Chris T. McAllister
Science and Mathematics Division, Eastern Oklahoma State College, 2805 NE Lincoln Road, Idabel, Oklahoma 74745

Charles R. Bursey
Department of Biology, Pennsylvania State University-Shenango Campus, 147 Shenango Avenue, Sharon, Pennsylvania 16146–1537

We examined nine amphibian and ten reptilian species from southeastern Oklahoma for helminth parasites. The following herpetofauna were found to be infected: central newt (*Notophthalmus viridescens louisianensis*), Rich Mountain salamander (*Plethodon ouachitae*), Cope's gray treefrog (*Hyla chrysoscelis*), southern black racer (*Coluber constrictor priapus*), prairie ringneck (*Diadophis punctatus arnyi*), western mudsnake (*Farancia abacura reinwardtii*), diamondback water snake (*Nerodia rhombifer*), and Mississippi mud turtle (*Kinosternon subrubrum hippocrepis*). Ten previously described helminth (four trematodes, two cestodes, and four nematodes) species were found. We document four new host records and nine new geographic distribution records for these select parasites.

INTRODUCTION

Because of its diverse habitats (12 ecoregions), Oklahoma is home to a great variety of amphibians and reptiles, including 58 amphibian and 99 reptile species and subspecies (Sievert and Sievert 2011). Yet, comparatively little has been published on their helminths. Indeed, only 15 (26%) of the amphibians and 13 (13%) of the reptiles of the state have been reported to harbor helminth parasites. There are many fragmented studies reporting various helminths from Oklahoma herpetofauna (La Rue 1911; Guberlet 1919, 1920, 1926; Hannum 1925; Harwood 1931; Mackin, 1936; Hubbard, 1938; Steelman 1938, 1939a, b; Rodgers and Kuntz 1940; Crozier and Self 1941; Hill 1941; Morgan 1941, 1942; Rodgers 1941; Hughes and Moore 1943a, b; Self and McMurray 1948; Reeves 1949; Fulhage 1954; Malewitz, 1956; Roberts 1956; Morrison 1967; Dyer and Brandon 1973; Brooks 1975; Schaefer and Self 1978; Jones 1987; Stevenson and Pisani 1991; Cross and Hranitz 2000; McAllister and Bursey 2007; Bonett et al. 2011; McAllister et al. 2011); however, there are fewer indepth surveys (Trowbridge and Hefley 1934; Kuntz 1941; Kuntz and Self 1944; Williams 1953; Everhart 1958; McKnight 1959; McAllister et al. 1995, 2005; McAllister and Bursey 2004).

We recently reported new host and distributional records on protozoan and helminth parasites from variety of amphibians and reptiles from Arkansas and Texas (McAllister et al., 2008). To that end, we examined some additional herptiles for helminths from neighboring Oklahoma and report herein those results.

MATERIALS AND METHODS

During January 2004, and again between April 2010 and May 2012, a total of 21 amphibians, including three Blanchard's cricket

frogs (*Acris blanchardi*), one dwarf American toad (*Anaxyrus americanus charlesmithi*), two green treefrogs (*Hyla cinerea*), three Cope's gray treefrogs (*Hyla chrysoscelis*), two bronze frogs (*Lithobates clamitans clamitans*), two pickerel frogs (*Lithobates palustris*), two southern leopard frogs (*Lithobates sphenocephalus utricularius*), three central newts (*Notophthalmus viridescens louisianensis*) and three Rich Mountain salamanders (*Plethodon ouachitae*), and 20 reptiles, including two southern black racers (*Coluber constrictor priapus*), three prairie ringneck snakes (*Diadophis punctatus arnyi*), one western mudsnake (*Farancia abacura reinwardtii*) one Mississippi mud turtle (*Kinosternon subrubrum hippocrepis*), one blotched water snake (*Nerodia erythrogaster transversa*), eight diamondback water snakes (*Nerodia rhombifer*), one five–lined skink (*Plestiodon fasciatus*), one ground skink (*Scincella lateralis*), one stinkpot (*Sternotherus odoratus*), and one flathead snake (*Tantilla gracilis*) were collected by hand, aquatic dipnet or snake tong from Latimer, Le Flore, and McCurtain counties and examined for helminths. Methods for necropsy and examination and processing of parasites have been previously described (McAllister and Bursey, 2005). Parasites were deposited in the United States National Parasite Collection (USNPC), Beltsville, Maryland. Host voucher specimens are deposited in the Arkansas State University Herpetological Collection (ASUMZ), State University, Arkansas, or the Henderson State University Herpetological Collection (HSU), Arkadelphia, Arkansas.

RESULTS

Fifteen of 41 (37%) of the herpetofauna examined harbored helminths, including seven (33%) of the amphibians and eight (40%) of the reptiles; *A. blanchardi*, *A. a. charlesmithi*, *H. cinerea*, *L. c. clamitans*, *L. palustris*, *L. s. utricularius*, *S. odoratus*, *P. fasciatus*, *S. lateralis*, and *T. gracilis* were negative. An annotated list of the helminths found and the host data follows.

Trematoda: Monogenea: Polystomatidae
***Polystomoidella whartoni* Price, 1939**

A single adult *Kinosternon subrubrum hippocrepis* collected on 5 May 2012 from Red Oak (Latimer County) harbored 12 *Polystomoidella whartoni* (USNPC 10578) in its urinary bladder. This monogene was previously reported from the striped mud turtle (*Kinosternon baurii*) and Florida mud turtle (*Kinosternon subrubrum steindachneri*) from Florida (Price 1939), eastern snapping turtle (*Chelydra serpentina serpentina), K. s. hippocrepis* and yellow mud turtle (*Kinosternon flavescens*) from Texas (Harwood 1932; McAllister et al. 2008), and rough-footed mud turtle (*Kinosternon hirtipes*), Mexican mud turtle (*Kinosternon integrum*) and white-lipped mud turtle (*Kinosternon leucostomum*) from Mexico (Caballero 1938, 1940; Caballero and Herrera 1947; Lamothe–Argumendo 1972). Oklahoma is a new locality record and the northernmost Nearctic distribution for *P. whartoni*.

Digenea: Brachycoeliidae
***Brachycoelium salamandrae* (Frölich, 1789) Dujardin, 1845**

Three of three (100%) juvenile *Notophthalmus viridescens louisianensis* collected on 24 January 2004 from Idabel (McCurtain County) were infected in their small intestine with a total of 18 *Brachycoelium salamandrae* (mean ± 1SD intensity = 6.3 ± 5.0, range 1–11). This digene has been reported from a plethora of amphibian and reptile hosts, including various subspecies of *N. viridescens* (see summation by Bursey et al. 2012). However, although *B. salamandrae* has been reported previously from 22 states (including Arkansas, Louisiana, Missouri, and Texas) and British Columbia and Ontario, Canada (Bursey et al. 2012), this is the first time *B. salamandrae* has been reported from Oklahoma.

Digenea: Ochetosomatidae
***Dasymetra conferta* Nicoll, 1911**

One of eight (13%) adult *Nerodia rhombifer* collected on 4 April 2012 from

the vicinity of Broken Bow at Lukfata (McCurtain County) was found to harbor five *Dasymetra conferta* (USNPC 105882) in its oral cavity. This digene was originally described by Nicoll (1911) from *N. rhombifer* (as *Tropidonotus rhombifer*) from an unknown North American locality. It has since been reported only from *Nerodia* spp., including plainbelly water snake (*N. erythrogaster*), southern water snake (*N. fasciata*), *N. rhombifer*, and northern water snake (*N. sipedon*) from Alabama, Missouri, and Texas (Ernst and Ernst 2006). This is the first time *D. conferta* has been reported from Oklahoma.

***Renifer* (=*Ochetosoma*) *aniarum* (Leidy, 1891)**

Three of eight (38%) adult *N. rhombifer* collected on 4 April 2012, 17 May 2012 and 13 June 2012 from the vicinity of Broken Bow at Lukfata (McCurtain County) were found to harbor one, 16, and three *Renifer aniarum* (USNPC 105883) in their oral cavity and trachea, respectively. This digene is a common parasite of snakes and has been reported previously from at least 23 species / subspecies (21 colubrids, 2 viperids) (McAllister and Bursey 2008). The geographic range includes Alabama, Arkansas, Florida, Georgia, Kansas, Illinois, Louisiana, Michigan, Mississippi, Nebraska, North Carolina, Pennsylvania, Tennessee, Texas and Nuevo Leon, Mexico (see McAllister and Bursey 2008). This is the first report of *R. aniarum* from Oklahoma.

Cestoidea: Proteocephalidea: Monticelliidae

***Ophiotaenia perspicua* (La Rue, 1911)**

Two of three (75%) adult *Diadophis punctatus arnyi* collected on 30 September 2011 and 10 May 2012 from Beavers Bend State Park (McCurtain County) harbored 1 and 2 *Ophiotaenia perspicua* (USNPC 105881) in their small intestine, respectively. This tapeworm has been previously reported from numerous colubrid and viperid snakes from Alabama, Florida, Idaho, Illinois, Louisiana, Mississippi, North Carolina, Ohio, Oklahoma, Texas, and Quebec, Canada, and Hidalgo and Veracruz, Mexico (see Ernst and Ernst 2006; Goldberg et al. 2012). La Rue (1911, 1914) reported *O. perspicua* (syn. *O. lactea*) from *N. rhombifer* from Oklahoma. Interestingly, Roberts (1956) reported *Ophiotaenia grandis* La Rue, 1911 from cottonmouths (*Agkistrodon piscivorus leucostoma*) from the Little River and Beavers Bend State Park. The life cycle involves a copepod first intermediate host and tadpoles as second intermediate hosts, the later eaten by definitive host snakes (Thomas 1941). The prairie ringneck snake is a new host of *O. perspicua*.

Proteocephalidae

***Proteocephalus* sp.**

A single *Farancia abacura reinwardtii* collected on 8 April 2012 from Yashau Creek in Broken Bow (McCurtain County) was found to be infected in its intestine with numerous free and encysted proteocephalid tapeworms (USNPC 106131). Although identification to species was not possible, they were most likely *Proteocephalus faranciae* (MacCallum, 1921) Harwood, 1932. This tapeworm was described by MacCallum (1921) from a captive mudsnake (*F. abacura*) without locality data. It has also been reported previously from the Florida green watersnake (*Nerodia floridana*) from Florida (Brooks 1978), eastern mudsnake (*F. a. abacura*) from Florida (Brooks 1978), and *F. a. reinwardtii* from Arkansas (McAllister et al. 2008) and Texas (Harwood 1932). Oklahoma represents a new locality record for this tapeworm.

Ascaridida: Ascarididae

***Porrocaecum* sp. (larvae)**

One of three (33%) adult *Plethodon ouachitae* collected on 24 April 2010 from the Choctaw Nation Historic Site (Le Flore County) harbored larval *Porrocaecum* sp. (USNPC 105887) in its mesentaries. McAllister et al. (2013) recently summarized records of larval *Porrocaecum* sp. in amphibians and reptiles. Although more commonly encountered in anurans, lizards, and snakes,

only two caudate amphibians, the two–toed amphiuma (*Amphiuma means*) and spotted dusky salamander (*Desmognathus conanti*) are reported as hosts (Walton 1933; McAllister et al. 2013). The geographic range of this nematode (as larvae) includes Arkansas, Texas, Bahamas, British Virgin Islands, Cayman Islands, Colombia, Costa Rica, Cuba, Dominica, Grenada, Guadeloupe, Hispaniola, Marie–Galante, Mexico, Peru, St. Lucia, and Tobago (see McAllister et al. 2013). *Porrocaecum* nematodes are intestinal parasites of birds (Moravec and Kaiser 1995). In the life cycle, ova must be ingested by earthworms in which they hatch and develop into third–stage larvae (Anderson 2000). Paratenic hosts include small mammals that ingest earthworms that, in turn, transfer the nematode to the definitive avian host (Anderson 2000). Larval *Porrocaecum* in a salamander of the present study suggests they too can pass from one host to another through predation and reinvasion of new host tissues. We document a new host and locality record for *Porrocaecum* larvae.

Ascaridida: Cosmocercidae
***Cosmocercella haberi* Steiner, 1924**

Three of six (50%) adult *Hyla chrysoscelis* collected between 20–25 April 2011 from Broken Bow (McCurtain County) harbored 117, 8, and 41 *Cosmocercella haberi* (USNPC 105888) in their small intestine, respectively. This nematode has been reported previously from hylid (including *H. chrysoscelis*) and ranid frogs from Arizona, Arkansas, Florida, Georgia, Mississippi, Texas, Utah, and Virginia, and Ontario, Canada and Mexico (see McAllister et al. 2008). This is the first time *C. haberi* has been reported from Oklahoma.

Spirurida: Physalopteridae
Physalopteridae gen. sp.

A single adult *K. s. hippocrepis* collected on 5 May 2012 from Red Oak (Latimer County) harbored 3 physalopterid larvae (USNPC 105879) in its stomach. The only previously reported physalopteran reported from turtles is *Abbreviata* (syn. *Physaloptera*) *terrapenis* (Hill, 1941) Morgan, 1945 from seven of 49 (14%) ornate box turtles (*Terrapene ornata*) from Oklahoma (Hill, 1941) and one of five (20%) *T. ornata* from Texas (McAllister et al. 2008). Other hosts of physalopterid larvae include various lizards and snakes from Arkansas, Arizona, and Mexico (see McAllister et al. 2008). Since only larvae were found in our host, it is not possible to provide a specific identification. The Mississippi mud turtle is a new host of physalopteran larvae.

***Physaloptera abjecta* Leidy, 1856**

One of two (50%) adult *Coluber constrictor priapus* collected on 6 May 2012 from Smithville (McCurtain County) harbored nine (1 male, 2 female, six third–stage larvae) *Physaloptera abjecta* (USNPC 105880) in its stomach. Previously reported hosts include the eastern glass lizard (*Ophiosaurus ventralis*), eastern glossy snake (*Arizona elegans*), eastern racer (*Coluber constrictor*), eastern hognose snake (*Heterodon platirhinos*), prairie kingsnake (*Lampropeltis calligaster calligaster*), smooth greensnake (*Liochlorophis vernalis*), eastern coachwhip (*Masticophis flagellum flagellum*), eastern pine snake (*Pituophis melanoleucus*), and common garter snake (*Thamnophis sirtalis*) (see McAllister et al. 2008). The geographic range of *P. abjecta* includes Arkansas, California, Florida, Georgia, Illinois, Iowa, New Jersey, Pennsylvania and Wisconsin, and Quebec, Canada (McAllister et al. 2008). We report *P. abjecta* from Oklahoma, and the black racer for the first time.

Strongylida: Molineidae
Oswaldocruzia euryceae Reiber, Byrd and Parker, 1940

One of three (33%) *P. ouachitae* collected on 24 April 2010 from the Choctaw Nation Historic Site (Le Flore County) was infected with five immature *Oswaldocruzia euryceae* (USNPC 105886) in its large intestine. This nematode was described from three–lined salamanders (*Eurycea guttolineata*) from Georgia (Reiber et al. 1940). It has also been

previously reported from *P. ouachitae* (McAllister et al. 2002) as well as the Ouachita dusky salamander (*Desmognathus brimleyorum*), cave salamander (*Eurycea lucifuga*), dark-sided salamander (*Eurycea longicauda melanopleura*), Oklahoma salamander (*Eurycea tynerensis*), Caddo Mountain salamander (*Plethodon caddoensis*), Kiamichi Mountain salamander (*Plethodon kiamichi*), and southern red–backed salamander (*Plethodon serratus*), all from Arkansas (Saltarelli 1977; Winter et al. 1986; McAllister et al. 2002; McAllister and Bursey 2004). This is the first time *O. euryceae* has been reported from Oklahoma.

DISCUSSION

We report herein four new host records and nine new geographic distribution records for these select parasites from Oklahoma herpetofauna. As noted previously, only a small percentage (38 of 257 species/subspecies or 18%) of Oklahoma's amphibians and reptiles had been previously reported with helminth parasites. Herein, we document and add eight (three amphibians, five reptiles) more hosts to that list; however, additional surveys on those species which haven't yet been examined in the state could reveal additional host and geographic records, and perhaps new species.

ACKNOWLEDGMENTS

CTM thanks the Oklahoma Department of Wildlife Conservation and USDA–Forest Service, Ouachita National Forest for Scientific Collecting Permits. We also thank P. A. Pilitt (USNPC), S. E. Trauth (ASUMZ), and R. Tumlison (HSU) for expert curatorial assistance, and N. H. McAllister for assistance with collecting.

LITERATURE CITED

Anderson RC. 2000. Nematode Parasites of Vertebrates: Their Development and Transmission, 2nd ed. CAB International, Wallingford, Oxon, U.K. 650 p.

Bonett RM, Steffen MA, Trujano–Alvarez AL, Martin SD, Bursey CR, McAllister CT. 2011. Distribution, abundance, and genetic diversity of *Clinostomum* spp. metacercariae (Trematoda: Digenea) in a modified Ozark stream system. J. Parasitol. 97:177–184.

Brooks DR. 1975. A review of the genus *Allassostomoides* Stunkard 1924 (Trematoda: Paramphistomidae) with a redescription of *A. chelydrae* (MacCallum 1919) Yamaguti 1958. J. Parasitol. 61:882–885.

Brooks DR. 1978. Systematic status of proteocephalid cestodes from reptiles and amphibians in North America with descriptions of three new species. Proc. Helminthol. Soc. Wash. 45:1–28.

Brooks DR. 1979. New records for amphibian and reptile trematodes. Proc. Helminthol. Soc. Wash. 46:286–289.

Bursey CR, Goldberg SR, Telford SR Jr, Vitt LJ. 2012. Metazoan endoparasites of 13 species of Central American anoles (Sauria: Polycrotidae: *Anolis*) with a review of the helminth communities of Caribbean, Mexican, North American, and South American anoles. Comp. Parasitol. 79:75–132.

Caballero E. 1938. Algunos tremátodos de reptiles de México. An. Instit. Biol. Univ. Nac. Aut. México 9:103–120.

Caballero E. 1940. Tremátodos de las tortugas de México. An. Instit. Biol. Univ. Nac. Aut. México 11:559–572.

Caballero E, Herrera E. 1947. Tremátodos de las tortugas de México V. Descripción de una nueva especie del género *Telorchis*. An. Instit. Biol. Univ. Nac. Aut. México 18:159–164.

Cross K, Hranitz JM. 2000. Life history notes: *Bufo americanus* (American toad). Endoparasite. Herpetol. Rev. 31:39.

Crozier B, Self JT. 1941. A new host record of the trematode *Neorenifer serpentis*. Proc. Okla. Acad. Sci. 21:31.

Dyer WG, Brandon RA. 1973. Helminths from salamanders in Oklahoma and Missouri. Herpetologica 29:371–373.

Ernst CH, Ernst EM. 2006. Synopsis of helminths endoparasitic in snakes of the United States and Canada. SSAR Herpetol. Circ. No. 34:1–86.

Everhart BA. 1958. Notes on the helminths of *Pseudemys scripta elegans* (Wied, 1838) in areas of Texas and Oklahoma. Proc. Okla. Acad. Sci. 38:38–43.

Fulhage I. 1954. The occurrence of *Cotylaspis insignis* Leidy (Aspidogastridae) in clams and turtles of Lake Texoma. Proc. Okla. Acad. Sci. 35:67–68.

Goldberg SR, Bursey CR, Aldridge RD. 2012. Natural history notes: *Nerodia rhombifer werleri* (Endoparasites). Herpetol. Rev. 43:149.

Guberlet JE. 1920. A new bladder fluke from the frog. Trans. Amer. Microsc. Soc. 39:142–148.

Guberlet JE. 1928. Two new genera of trematodes from a red–bellied water snake. J. Helminthol. 6:205–218.

Hannum CA. 1925. A new species of cestode, *Ophiotaenia magna* n. sp. from the frog. Trans. Amer. Microsc. Soc. 44:148–155.

Harwood PD. 1931. Some parasites of Oklahoma turtles. J. Parasitol. 18:98–101.

Harwood PD. 1932. The helminths parasitic in the Amphibia and Reptilia of Houston, Texas, and vicinity. Proceedings of the United States National Museum 81:1–67.

Hill WCO. 1941. *Physaloptera terrapenis*, a new trematode from a tortoise. Trans. Amer. Micros. Soc. 60:59–64.

Hubbard WE. 1938. A remarkable infection of tapeworm larvae in a whipsnake. Amer. Midl. Nat. 19:617–618.

Hughes RC, Moore GA. 1943a. *Sphyranura euryceae*, a new polystomatid monogenean fluke from *Eurycea tynerensis*. Trans. Amer. Microsc. Soc. 62:286–292.

Hughes RC, Moore GA. 1943b. *Acanthocephalus van–cleavei*, a new echinorhynchid worm, from a salamander. Amer. Midl. Nat. 29:724–729.

Jones MK. 1987. A taxonomic revision of the Nematotaeniidae Lühe, 1910 (Cestoda: Cyclophyllidea) Syst. Parasitol. 10:165–245.

Kuntz, RE. 1941. The metazoan parasites of some Oklahoma Anura. Proc. Okla. Acad. Sci. 21:33–34.

Kuntz RE, Self JT. 1944. An ecological study of the metazoan parasites of the Salientia of Comanche County, Oklahoma. Proc. Okla. Acad. Sci. 25:35–38.

Lamothe–Argumedo R. 1972. Monogeneos de reptiles I. Redescripción de cuatro especies de monogenea (Polystomatidae) parásitos de la vejiga urinaria de tortugas de México. An. Instit. Biol. Univ. Nac. Aut. México 43:1–16

La Rue GR. 1911. A revision of the cestode family Proteocephalidae. Zool. Anz. 38:473–482.

La Rue GR. 1914. A revision of the cestode family Proteocephalidae. Ill. Biol. Mon. 1:1–350.

MacCallum GA. 1921. Studies in helminthology: Part 1–trematodes, part 2–cestodes, part 3–nematodes. Zoopathol. 1:135–294.

Mackin JG. 1936. Studies on the morphology and life history of nematodes in the genus *Spironoura*. Ill. Biol. Monogr. 14:7–64.

Malewitz TD. 1956. Intestinal parasitism of some mid–western salamanders. Amer. Midl. Nat. 55:434–436.

McAllister CT, Bursey CR. 2004. Endoparasites of the Sequoyah slimy salamander, *Plethodon sequoyah* (Caudata: Plethodontidae), from McCurtain County, Oklahoma. Tex. J. Sci. 56:273–277.

McAllister CT, Bursey CR. 2005. Endoparasites of the eastern narrowmouth toad, *Gastrophryne carolinensis* (Anura: Microhylidae), from northwestern Louisiana and northeastern Texas, U.S.A. Comp. Parasitol. 72:124–128.

McAllister CT, Bursey CR. 2007. First report of the nematode, *Physaloptera squamatae* (Spirurida: Physalopteridae) in Oklahoma, with a summary of hosts. Proc. Okla. Acad. Sci. 87:65–67.

McAllister CT, Bursey CR. 2008. First report of *Ochetosoma aniarum* from the Brazos water snake, *Nerodia harteri*, in Texas, with a summary of definitive hosts of this parasite. Tex. J. Sci. 60:63–68.

McAllister CT, Bursey CR, Conn DB. 2005. Endoparasites of Hurter's spadefoot, *Scaphiopus hurterii* and plains spadefoot, *Spea bombifrons* (Anura: Scaphiopodidae), from southern Oklahoma. Tex. J. Sci. 43:391–397.

McAllister CT, Bursey CR, Trauth SE. 2008. New host and geographic distribution records for some endoparasites (Myxosporea, Trematoda, Cestoidea, Nematoda) of amphibians and reptiles from Arkansas and Texas, U.S.A. Comp. Parasitol. 75:241–254.

McAllister CT, Upton SJ, Trauth SE. 2002. Parasites of four species of endemic *Plethodon* from Arkansas and Oklahoma. J. Ark. Acad. Sci. 56:239–242.

McAllister CT, Bursey CR, Robison HW, Connior MB. 2013. Endoparasites of the spotted dusky salamander, *Desmognathus conanti* (Caudata: Plethodontidae), from southern Arkansas, U.S.A. Comp. Parasitol. 80:(in press).

McAllister CT, Bursey CR, Upton SJ, Trauth SE, Conn DB. 1995. Parasites of *Desmognathus brimleyorum* (Caudata: Plethodontidae) from the Ouachita Mountains of Arkansas and Oklahoma. J. Helminthol. Soc. Wash. 62:150–156.

McAllister CT, Bursey CR, Steffen MA, Martin SE, Trujano–Alvarez AL, Bonett RM. 2011. *Sphyranura euryceae* (Monogenoidea: Polystomatoinea: Sphyranuridae) from the grotto salamander, *Eurycea spelaea* and Oklahoma salamander, *Eurycea tynerensis* (Caudata: Plethodontidae), in northeastern Oklahoma, U.S.A. Comp. Parasitol. 78:188–192.

McKnight TJ. 1959. A taxonomic study of the helminth parasites of the turtles of Lake Texoma [PhD thesis]. Norman (OK): University of Oklahoma. 55 p. Available from: University Microfilms, Ann Arbor, MI: 59–2966.

Moravec F, Kaiser H. 1995. Helminth parasites from West Indian frogs, with descriptions of two new species. Carib. J. Sci. 31:252–268.

Morgan BB. 1941. A summary of the Physalopterinae (Nematoda) of North America. Proc. Helminthol. Soc. Wash. 8:28–30.

Morgan BB. 1942. The nematode genus *Skrjabinoptera* Schulz, 1927. Lloydia 5:314–319.

Morrison EO. 1967. *Rhabdias ranae* infections in three species of Oklahoma anura. Southwest. Nat. 12:335–336.

Nicoll W. 1911. On three new trematodes from reptiles. Proc. Zool. Soc. London 2:677–686.

Price EW. 1939. North American monogenetic trematodes. IV. The family Polystomatidae (Polystomatoidea). Proc. Helminthol. Soc. Wash. 6:80-92.

Reeves JD. 1949. A new tapeworm of the genus *Bothriocephalus* from Oklahoma salamanders. J. Parasitol. 35:600–604.

Reiber RJ, Byrd EE, Parker MV. 1940. Certain new and already known nematodes from Amphibia and Reptilia. Lloydia 3:125–144.

Roberts LS. 1956. *Ophiotaenia grandis* LaRue (Cestoda: Proteocephalidae) in McCurtain County, Oklahoma. J. Parasitol. 42:20.

Rodgers LO. 1941. *Diplorchis scaphiopi*, a new polystomatid fluke from the spadefoot toad. J. Parasitol. 27:153–157.

Rodgers LO, Kuntz RE. 1940. A new polystomatid monogenean fluke from a spadefoot. Wasm. Coll. 4:37–40.

Saltarelli WA. 1977. Parasites of Eurycea lucifuga

(Rafinesque), E. longicauda melanopleura (Green), and E. multiplicata (Cope) (Amphibia: Plethodontidae) from northwestern Arkansas. [MS thesis]. Fayetteville (AR): University of Arkansas. 39 p. Available from: University of Arkansas Library.

italicize Eurycea lucifuga, E. longicauda, E. multiplicata

Schaefer GB, Self JT. 1978. *Bothriocephalus euryciensis* n. sp. (Cestoidea, Pseudophyllidea) from the cave salamander *Eurycea longicauda*. Proceedings of the Oklahoma Academy of Science 58:154–155.

Self JT, McMurray FB. 1948. *Porocephalus crotali* Humbolt (Pentastomida) in Oklahoma. J. Parasitol. 34:21–23.

Sievert G, Sievert L. 2011. A field guide to Oklahoma's amphibians and reptiles. Oklahoma City: Oklahoma Dept. Wildl. Conserv. 211 p.

Steelman GM. 1938. A description of *Gorgoderina schistorchis* n. sp. Trans. Amer. Microsc. Soc. 57:383–386.

Steelman GM. 1939a. On a new cestode from the Texas horned lizard. Trans. Amer. Microsc. Soc. 58:452–455.

Steelman GM. 1939b. *Oochoristica whitentoni*, a new anoplocephalid cestode from a land tortoise. J. Parasitol. 25:479–482.

Stevenson BR, Pisani GR. 1991. Notes on early spring parasites and pathologies of Oklahoma *Crotalus atrox*. Herpetol. Rev. 22:88–90.

Thomas LJ. 1941. The life cycle of *Ophiotaenia perspicua* La Rue, a cestode of snakes. Rev. Med. Trop. Parasitol. Bact. Clin. Lab 7:74–78

Trowbridge AH, Hefley HM. 1934. Preliminary studies of the parasite fauna of Oklahoma anurans. Proc. Okla. Acad. Sci. 14:16–19.

Walton AC. 1933. The Nematoda as parasites of Amphibia. J. Parasitol. 20:1–33.

Williams RW. 1953. Helminths of the snapping turtle, *Chelydra serpentina*, from Oklahoma, including the first report and description of the male of *Capillaria serpentina* Harwood, 1932. Trans. Amer. Microsc. Soc. 72:175–178.

Winter DA, Zawada WM, Johnson AA. 1986. Comparison of the symbiotic fauna of the family Plethodontidae in the Ouachita Mountains of western Arkansas. Proc. Ark. Acad. Sci. 40:82–85.

Received: July 30, 2012; Accepted September 21, 2012.