New Host and Distributional Records for Helminth and Arthropod Parasites of Birds (Aves: Strigiformes; Accipitriformes; Piciformes; Passeriformes) from Southeastern Oklahoma

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Abstract: Between November 2020 and March 2022, 14 individual salvaged birds (11 species) within four orders and nine families from McCurtain County, Oklahoma, were examined for ecto- and endoparasites. Avian orders (families) and host species included: Strigiformes (Strigidae): barred owl (*Strix varia*) and two great-horned owls (*Bubo virginianus*); Accipitriformes (Accipitridae): red-tailed hawk, (*Buteo jamaicensis*); Piciformes (Picidae): red-headed woodpecker (*Melanerpes erythrocephalus*) and downy woodpecker (*Dryobates pubescens*); Passeriformes (Turdidae, Troglodytidae, Mimidae, Parulidae, Paridae, Icteridae): two American robins (*Turdus migratorius*), Carolina wren (*Thryothurus ludovicianus*), brown thrasher (*Toxotoma rufum*), two yellow warblers (*Setophaga petechia*), tufted titmouse (*Baeolophus bicolor*), and common grackle (*Quiscalus quiscula*). Eighteen parasite taxa were found in the birds examined, including four digenean trematodes, four cestodes, three nematodes, two acanthocephalans, and five lice. We document five new host and 14 new geographic distributional records for the parasites from select birds of the state.

Introduction

Recently, our research collaborative provided novel information on parasites of raptors of Oklahoma (McAllister et al. 2017, 2018, 2019a, 2019b, 2019c; McAllister and Robison, 2020; Woodyard et al. 2021). However, Oklahoma supports 488 species of birds (Oklahoma Birds Records Committee 2022) and obviously many species remain to be surveyed for parasites. Indeed, there has been a general void of information on their parasites, especially those from songbirds (Passeriformes). To that end, we report new geographic and host records for several parasites of birds, including six species of passeriforms, from southeastern Oklahoma.

Methods

Between November 2020 and June 2022, 14 individual birds, including those within the orders **Strigiformes:** barred owl, *Strix varia* Barton, two great-horned owls, *Bubo virginianus* (Gemlin); **Accipitriformes:** red-tailed hawk, *Buteo jamaicensis* (Gmelin); **Piciformes:** red-headed woodpecker, *Melanerpes erythrocephalus* (L.) and downy woodpecker, *Dryobates pubescens* (L.); and **Passeriformes:** two American robins, *Turdus migratorius* L., Carolina wren, *Thryothorus ludovicianus* (Latham), two yellow warblers, *Setophaga*

petechia (L.), brown thrasher (*Toxotoma rufum*), tufted titmouse, *Baeolophus bicolor* (L.), and common grackle, *Quiscalus quiscula* (L.) from various sites in McCurtain County were examined for ecto- and endoparasites. Birds were either found freshly dead on the road (DOR), found dead in the field (for unknown reasons), killed by feral cats (*Felis catus*), or died after hitting glass windows at private residences. Specimens were placed in collection bags on ice and taken to the laboratory within 24 hr for necropsy. Their feathers were vigorously brushed over a white enamel tray to collect ectoparasites. Those found were placed in a vial of 70% (v/v) DNA grade ethanol; specimens were cleared in 10% (v/v) potassium hydroxide, dehydrated through an ethanol series, further cleared in methyl salicylate or xylene, and slide-mounted in Canada balsam (Price et al. 2003).

A mid-ventral incision was made from the cloaca to throat of each bird to expose the trachea, lungs, air sacs, esophagus, proventriculus, gizzard, gallbladder, liver, kidneys, and intestines. Organs were placed in individual Petri dishes containing 0.9% (v/v) saline, opened, and their contents washed. Several 100 mm sections of the tissues were cut, split lengthwise, and examined under a stereomicroscope at 20 to 30× to aid in locating endoparasites. Trematodes and cestodes were fixed in nearly boiling tap water without coverslip pressure, transferred to 70% DNA grade ethanol, stained with acetocarmine, dehydrated in a graded ethanol series, cleared in methyl salicylate or xylene, and mounted in Canada balsam. Nematodes were fixed in hot tap water, transferred to ethanol (as above), and studied as temporary mounts on a microscopic slide in a drop of glycerol. Acanthocephalans were placed in tap water overnight in a refrigerator, transferred to 70% ethanol, and cleared in 80% phenol.

Ectoparasites were deposited in the General Ectoparasite Collection (L-series) in Department of Biology, Georgia Southern University Collection, Statesboro, Georgia or the Price Institute of Parasite Research (PIPR), School of Biological Sciences, University of Utah, Salt Lake City, Utah. Actual specimens of helminth parasites (or photovouchers) were deposited in the Harold W. Manter Laboratory of Parasitology (HWML), University of Nebraska-Lincoln; specimens without HWML numbers at this time are being retained for further study. Host voucher specimens (in ethanol) are deposited in the Eastern Oklahoma State College Collection (EOSC), Idabel, Oklahoma.

Results and Discussion

Eighteen parasite taxa were found in the avians examined, including four digenean trematodes, four cestodes, three nematodes, two acanthocephalans, and five lice (Table 1). Their data is presented below in annotated format.

Trematoda: Plagiorchiida: Dicrocoeliidae

***Lutztrema monenteron* (Price and McIntosh, 1935) Travassos, 1941 –** a single American robin, collected DOR on 10 January 2021 from just N of Broken Bow off US 259 (34°04’22.479”N, -94°44’21.4764”W), harbored four *L. monenteron* (Fig. 1, HWML 216476, 216908) in its gall bladder. Specimens possessed a single cecum with a sinuous curve in the middle of the body, a defining taxonomic characteristic of the genus.

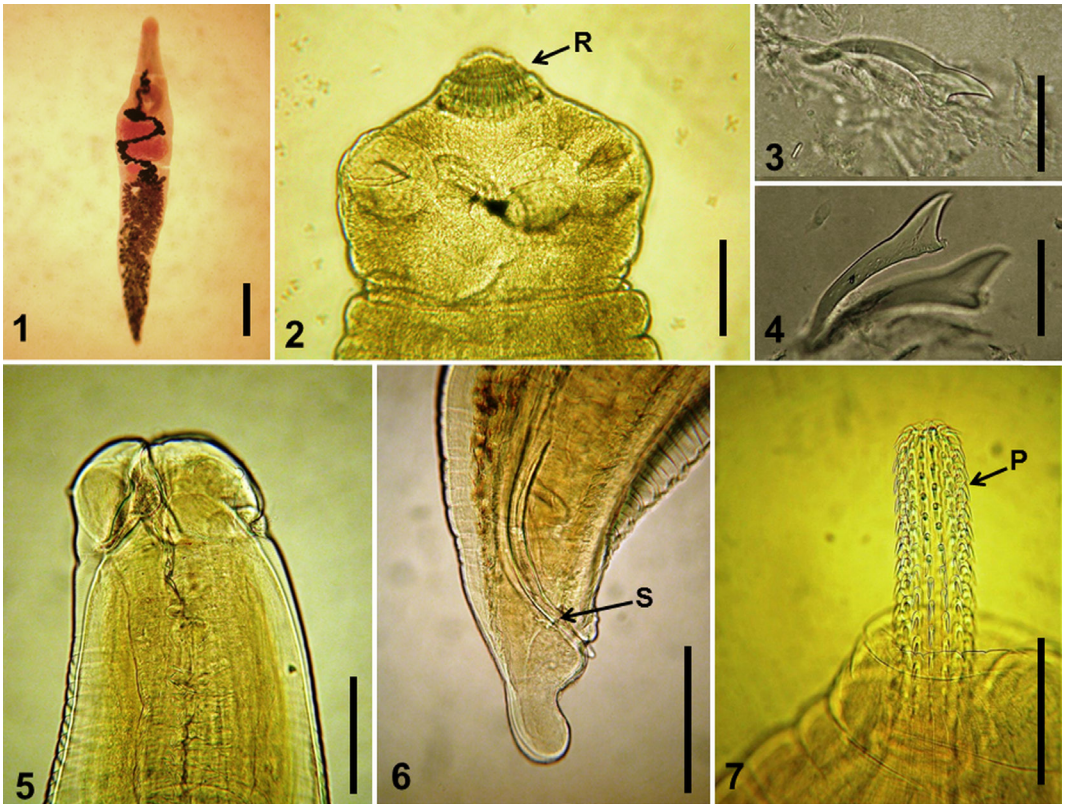
Interestingly, no type host or type locality was specifically designated for the trematode in the original description by Price and McIntosh (1935). They listed *T. migratorius* from Charlottesville, Albermarle County, Virginia, and Washington, D.C., and the eastern bluebird, *Sialia sialis* L., from Falls Church, Fairfax County, Virginia as co-hosts of *L. monenteron*. This worm is a commonly reported trematode as it has also been documented from this host from Colorado, Georgia, Illinois, Ohio, North Carolina, New York, Tennessee, and Texas, and Canada (Webster 1943; Denton and Byrd 1951; Slater 1967; Cooper and Crites 1974; Hamer and Muzzall 2013). In addition, the species has little host specificity as members of six families of passerine birds have been reported as natural definitive hosts of *L. monenteron*, including *Catharus guttata* (Pallas), *Cyanocitta cristata* (L.), *Cyanocorax chrysops* (L.), *Corvus corona* L., *Corvus frugilegus* (L.), *Ixoreus*

Table 1. Parasites of selected birds from McCurtain County, Oklahoma.

Phylum/Parasite Species	Host	New Host Record	New Locality Record
Platyhelminthes			
Lutztrema monenteron	*Turdus migratorius*	No	Yes
Strigea elegans	*Bubo virginianus**	No	Yes
S. macroconophora	*Buteo jamaicensis**	No	Yes
Neodiplostomum reflexum	*Strix varia*	No	Yes
Raillietina sp.	*Dryobates pubescens*	Yes	No
Dilepis undula	*T. migratorius* *	No	Yes
Anomotaenia sp.	*Thryothorus ludovicianus*	Yes	Yes
Anonchotaenia sp.	*Setophaga petechia*	Yes	Yes
	Baeolophus bicolor	Yes	No
Nematoda			
Capillaria exilis	*T. migratorius* *	No	Yes
Porrocaecum angusticolle	*B. jamaicensis* *	No	Yes
P. depressum	*B. virginianus**	No	No
Acanthocephala			
Plagiorhynchus cylindraceus	*Toxotoma rufum*	Yes	Yes
Mediorhynchus robustus	*T. migratorius* *	No	No
Arthropoda			
Strigiphilus oculatus	*B. virginianus**	No	Yes
Philopterus quiscali	*Quiscalus quiscula**	No	Yes
Menacanthus quiscali	*Q. quiscula**	No	Yes
Brueelia straminea	*Melanerpes erythrocephalus*	No	No
Picicola snodgrassi	*M. erythrocephalus*	No	Yes

*Type-host.

naevius (Gmelin), *Mimus polyglottos* (L.), *Pipilo erythrophthalmus* (L.), *Sialia sialis* (L.), *Sturnella magna* (L.), *Sturnus vulgaris* L., *T. rufum*, *Turdus pilaris* (L.), *Turdus merula* (L.), *Turdus philomelos* (L.), and *Turdus viscivorus* (L.). This species has one of the widest geographical distributions known for a member of the genus, including North America, Europe (Czech Republic, England, France, Germany), and South America (Brazil) (Dollfus 1957; Mettrick 1958; Rysavý 1960; Groschaft 1969; Odening 1970; Binder 1971; Rietschell 1971). In North America alone, this trematode is widespread in the eastern and southeastern states with a few reports from the northwestern states; reports of this fluke are mostly lacking



Figures 1–7. Helminth parasites of Oklahoma birds. (1) *Lutztrema monenteron* from *Turdus migratorius*; scale bar = 1 mm. (2) *Dilepis undula* from *T. migratorius*; scale bar = 200 µm. (3) Small rostellar hook of *D. undula*; scale bar = 100 µm. (4) Large rostellar hook of *D. undula*; scale bar = 100 µm. (5) *Porrocaecum depressum* from *Bubo virginianus*; scale bar = 100 µm. (6) Spicule of *P. depressum*; scale bar = 200 µm. (7) *Plagiorhynchus cylindraceus* from *Toxotoma rufum*; scale bar = 1mm. Abbreviations: P (proboscis); R (rostellum); S (spicule).

from the southwestern states, there is only one report from the middle west, including Colorado, Connecticut, Georgia, Idaho, Illinois, Iowa, Michigan, Montana, New York, North Carolina, Ohio, Oklahoma (this report), Tennessee, Texas, Virginia, Washington, Washington, D.C., and Alberta and Quebéc, Canada (Webster 1943; Krissinger 1975).

The American robin has been reported by numerous investigators as a natural definitive host of this digenean in North America. It appears from these reports that *T. migratorius* is the primary definitive host for *L. monenteron* with the other passerine species serving as secondary or accidental hosts. We document *L. monenteron* from an Oklahoma host for the first time.

Diplostomida: Strigeidae

***Strigea elegans* (Chandler and Rausch, 1947) Dubois and Rausch, 1950 –** a DOR *B. virginianus* collected on 10 January 2021 from off US 70, east of Broken Bow (34°02'30.7968"N, -94°37'36.9696"W), harbored this trematode (HWML 118080) in its small intestine. The type host and type locality of *S. elegans* is *B. virginianus* from Poynette, Columbia County, Wisconsin (Chandler and Rausch 1947). Other reported hosts include *S. varia* from Florida (Kinsella et al. 2001) and *B. virginianus* from Arkansas (McAllister et al. 2019a). The life

cycle involves snails as first intermediate hosts, bufonid and ranid anuran tadpoles as second intermediate hosts, watersnakes and ducks with tetracotyles as third intermediate hosts, and owls as definitive hosts (Pearson 1959; Miller et al. 1965). We document *S. elegans* from an Oklahoma *B. virginianus* for the first time.

Strigea macroconophora **(Chandler and Rausch, 1947) Dubois and Rausch, 1950 –** this trematode was taken from the small intestine of a DOR *B. jamaicensis* (Gmelin) collected on 24 June 2022 from off St. Hwy 93, just S of Wright City (34°02'30.7862"N, -95°01'2.874"W). Dubois and Rausch (1950) originally described *S. macroconophora* from *B. jamaicensis* from Poynette, Wisconsin. This is the first report of this strigeid from an Oklahoma host.

Diplostomidae

Neodiplostomum reflexum **(syn. *delicatum*) Chandler and Rausch, 1947 –** a single *S. varia* collected DOR on 23 May 2021 from off US 259, 16.1 km N of Hochatown (34°13'35.7162"N, -94°46'47.0424"W) harbored this trematode in its small intestine. The type host and type locality of *N. reflexum* is *B. virginianus* from Michigan (Chandler and Rausch 1947). It has also been reported from *S. varia* from Texas (Little and Hopkins 1975). We document *N. reflexum* from Oklahoma for the first time.

Cestoda: Cyclophyllidea: Davaineidae

Raillietina **sp. Fuhrmann, 1920 –** two specimens representative of this tapeworm genus (HWML 216912) were found in the small intestine of a *D. pubescens* found dead on 24 March 2022 in Hochatown (34°10'17.0286"N, -94°45'05.7414"W). It is cosmopolitan as well as being the most common genus among davaineids with about 295 species reported from a wide variety of both domestic and wild avians as well as mammalian hosts, including humans (Schmidt 1986). Rigney (1943) reported *R. centuri* from a red-bellied woodpecker, *Melanerpes carolinus* (L.) from near Stillwater, Payne County, Oklahoma. Movsesyan (2003), in Osnovy Tsestodologii, did not include *D. pubescens* as a host of *Raillietina*. We therefore document a new host record for a *Raillietina* sp. in a downy woodpecker.

Dilepididae

Dilepis undula **(Schrank, 1788) Fuhrmann, 1908 –** the same *T. migratorius* reported above had a single *D. undula* (Figs. 2–4, HWML 216909) in its small intestine. Other reported hosts of *D. undula* include American robins from Colorado, Illinois, Indiana, New York, Ohio, Washington, D. C., and Newfoundland, Canada (Baker and Hamon 1967; Slater 1967; Cooper and Crites 1974, 1976) and various passerine birds, primarily different species of the genus *Turdus*, as well as mammals (Mettrick 1958; Haukisalmi 2015). The species is cosmopolitan in distribution as there are records from other hosts in Brazil, Bulgaria, Canada, Chile, China, Czech Republic, Finland, Germany, Israel, Nicaragua, New Zealand, Poland, Russia, Spain, Ukraine, the United Kingdom, and the USA (Ohio, Oklahoma) (see Llanos-Soto et al. 2019).

Members of this family are characterized by an armed rostellum possessing a double row of rostellar hooks (Figs. 3–4), a post-ovarian position of the compact vitellarium, a sacciform or lobulated ovary, a single set of reproductive organs per proglottid, lack of seminal vesicles, numerous testes, and a ventral position of the persistent uterus (Mariaux et al. 2017). The life cycle includes larval *D. undula* developing in earthworm intermediate hosts, which are the most important food items of birds of the subfamily Turdinae (Rysavý 1973). We document *D. undula* in an Oklahoma host for the first time.

Anomotaenia **sp. Cohn, 1900** – a single *T. ludovicianus* found dead on 4 July 2021 from off US 259 in Hochatown (34°10'17.0286"N, -94°45'05.7414"W) had three tapeworms in its small intestine belonging to the genus *Anomotaenia* (HWML 216907). These specimens possessed an armed rostellum with two rows of small hooks (~15 µm) with irregularly alternating genital pores. Generic identification of this specimen was confirmed with molecular analysis (VV Tkach *pers. comm.*); however, there are no comparative sequence data on North American *Anomotaenia*

spp. in GenBank.

Anomotaenia tapeworms are parasites of birds (Bona 1994) with the majority (27 species) being parasites of waders (suborder Charadrii) (Matevosyan 1963; Spassky 1968; Spasskaya and Spassky 1978). In the life cycle of one species in this genus, ova of *A. brevis* (Clerc, 1902) are transmitted from a definitive host (woodpecker) to the intermediate host (ant, *Leptothorax nylanderi* Foerster) by ingestion of infected bird feces during the ants' larval stage (Plateaux 1972). We document the genus for the first time in this host as well as in Oklahoma. This is also the initial report any helminth parasite, to our knowledge, having been documented in a Carolina wren.

***Anonchotaenia* sp. Cohn, 1900** – a tufted titmouse collected on 2 April 2022 from Hochatown harbored two individual tapeworms (HWML 216911). In addition, two individual yellow warblers found dead on 3 and 13 March 2022 from Hochatown harbored tapeworms belonging to this genus. Specimens possessed an unarmed rostellum as well as a parauterine organ. The genus has been previously reported many other North American passeriform birds as well as other New World warblers (Parulidae), including blue-winged warbler, *Vermivora cyanoptera* Olson and Reveal and yellow-rumped (or myrtle) warbler, *Setophaga coronata* (L.) (Rausch and Morgan 1947). In addition, it appears that members of the family Fringillidae (true finches) in North and South America are the most common hosts of this genus (Voge and Davis 1953).

Our generic identification of these specimens was confirmed with molecular analyses (28S and NADH dehydrogenase subunit 1 [nad1] mitochondrial gene, VV Tkach *pers. comm.*); unfortunately, these data would only be useful when there is a comparison from other species or specimens identified to species. However, there are no data on *Anonchotaenia* from North America in GenBank. Nonetheless, this is the first time the genus has been reported from these two hosts and/or from Oklahoma.

Nematoda: Enoplida: Capillariidae

***Capillaria exilis* (Dujardin, 1845) Travassos, 1915** – the same American robin reported previously had one gravid female and a single male *C. exilis* in its small intestine. Three species of *Capillaria* have been reported from *T. migratorius*, including *C. exilis*, *C. ovopunctatum* (von Linstow, 1873) and *C. caudinflata* = *Aonchotheca caudinflata* (Molin, 1858) from Illinois, and Ohio, and Québec, Canada (Cooper and Crites 1974, 1976). In the Osnovy Nematodologii (Skrjabin et al. 1957), both *C. exilis* and *C. caudinflata* are reported to possess caudal alae (see also Boyd, 1951; host = starlings); however, Lopez-Neyra (1947) does not show caudal alae in *C. exilis*. As the current specimens clearly do not possess caudal alae, we report them as *C. exilis* and also document the species for the first time from Oklahoma.

Ascaridida: Ascaridae

***Porrocaecum angusticolle* (Molin, 1860) Baylis and Daubney, 1922 –** a single specimen was taken from the same *B. jamaicensis* (Gmelin) noted above. This nematode species primarily infects birds of the orders Accipitriformes and Strigiformes. It has been previously reported from *B. jamaicensis* as well as other raptors (Canavan 1929; Morgan and Schiller 1950). More recently, McAllister et al. (2019a) reported *P. angusticolle* from a red-shouldered hawk, *Buteo lineatus* (Gmelin) from Arkansas, and also noted this nematode has been reported from six species of hawks from the Nearctic Realm. We document this ascarid from Oklahoma for the first time.

***Porrocaecum depressum* (Zeder, 1800) –** the same *B. virginianus* collected herein harbored this nematode (Figs. 5–6, HWML 216910) in its small intestine. Specimens were identified as *P. depressum* based on the length of the esophagus and length of the spicules (425 µm) (Fig. 6). Other previously reported hosts include *S. varia* (Nadler and Hudspeth 1998; Kinsella et al. 2001), *A. otus*, Eurasian eagle-owl, *Bubo bubo* L. (Sitko 1994), *M. asio* (McAllister et al. 2019a), and spotted owl, *Strix occidentalis* Xantus de Vesey (Hoberg et al. 1989). Its North American range includes Florida (Kinsella et al.

2001), Louisiana (Nadler and Hudspeth 1998), Oklahoma (McAllister et al. 2019c, this report), Oregon (Hoberg et al. 1989), and Alberta and Manitoba, Canada (Wong et al. 1990). Kinsella et al. (2001) previously reported *P. depressum* from *B. virginianus*. Here, we document the species in *B. virginianus* from Oklahoma for the first time.

Acanthocephala: Polymorphida: Plagiorhynchidae

***Plagiorhynchus* (*Prosthorhynchus*) *cylindraceus* (Goeze, 1782) Schmidt and Kuntz, 1966** – A single specimen (Fig. 7, HWML 118082) was found in the small intestine of a *T. rufum* found dead on 31 March 2022 from the Hochatown site. This acanthocephalan is considered to have a cosmopolitan distribution and has usually been reported from passerine birds (Smales 1988; Hamer and Muzzall 2013). It has been reported from various Eurasian, North American, Australian, and South African avian definitive hosts, including sandpipers, ducks (rarely), and birds of prey (Listsnya 2010); shore and aquatic arthropods (crustaceans and insects) serve as intermediate hosts (Amin et al. 1999). In the US, this parasite has been reported from Colorado, Kansas, Nebraska, New Hampshire, New York, and Oregon (Amin et al. 1999). We document a new host and distributional record for *P.* (*P.*) *cylindraceus*.

***Mediorhynchus robustus* Van Cleave, 1916** – a single immature specimen (HWML 118081) was taken from the small intestine of a *T. migratorius* found dead on 3 March 2022 from Hochatown. This acanthocephalan was previously reported from *T. migratorius* from Ohio (Cooper and Crites 1976). Also, Riggins (1953) previously reported *M. robustus* from killdeer, *Charadrius vociferous* (L.) from Lake Texoma, Oklahoma. Other avian hosts of this parasite include *T. rufum*, northern flicker, *Colaptes auratus* (L.), Florida scrub jay, *Aphelocoma coerulescens* (Bosc), eastern meadowlark, *Sturnella magna* (L.), *Q. quiscala*, red-winged blackbird, *Agelaius phoeniceus* (L.), and eastern towhee, *Pipilo erythrophthalmus* (L.) (Van Cleave 1947; Kinsella 1974). We document the first time *M. robustus* has been reported from a *T. migratorius* in Oklahoma.

Arthropoda: Phthiraptera: Ischnocera: Philopteridae

***Strigiphilus oculatus* (Rudow, 1870) –** Two *B. virginianus*, one of them is the same specimen reported above as well as another individual collected DOR on 10 February 2022 from just NW of Idabel off US 70 (33°56'02.07"N, -94°53'31.07"W) was found to be infested with three females and two nymphs (L-3855, L-3856) and the latter with one male, three females, and eight nymphs (L-3866) of *S. oculatus*. The type host of *S. oculatus* is *B. virginianus* (Rudow 1870; Emerson 1961) and, as far as we know, the only other reported host is the snowy owl, *Bubo scandiacus* (L). This louse has also reported from *B. virginianus* from Alaska, California, Florida, Indiana, Massachusetts, Michigan, Minnesota, Oregon, Nebraska, New York, Pennsylvania, Tennessee, Washington, and Wyoming, and British Columbia and Saskatchewan, Canada (Peters 1936; Carriker 1966; Clayton and Price 1984; Forrester et al. 1995). As Emerson (1940) did not list the species from the state, we report it here from an Oklahoma host for the first time.

***Philopterus quiscali* (Osborn, 1896) –** a single male *P. quiscali* (L-3864) was taken from a DOR adult *Q. quiscula* collected on 7 November 2021 in Idabel (33°52'24.8"N, -94°47'35.2"W). Peters (1936) reported *P. quiscali f*rom *Q. quiscula* but no locality or date was given. In addition, Emerson (1940) did not list this louse from the state so the finding here represents the first report of *P. quiscali* from Oklahoma. *Quiscalus quiscula* is the only host listed for *P. quiscali* by Price et al. (2003).

***Menacanthus quiscali* (Price, 1977) –** the same *Q. quiscula* reported above harbored two male (Fig. 8, L-3863, L-3865) and one female *M. quiscali* (L-3866). Emerson (1940) did not list the species from Oklahoma. Interestingly, there are three specimens of *M. quiscali* collected on 2 July 1957 by G. M. Sutton in the PIPR collection (#001-967) from a great-tailed grackle, *Quiscalis mexicanus* (Gemlin) from Willis, Marshall County, Oklahoma (see https://scan-bugs.org/imglib/scan/misc/202003/

Figures 8–9. Lice from Oklahoma birds. (8) *Menacanthus quiscali*; scale bar = 500 µm. (9) *Picicola snodgrassi* from *Melanerpes erythrocephalus*; scale bar = 500 µm.

PIPR001967.jpg). However, we document this louse for the first time from the state in a refereed publication. *Quiscalus quiscula* is the type host for *M. quiscali* but Price et al. (2003) list two additional species of *Quiscalus* as hosts as well as rusty blackbird, *Euphagus carolinus* (Muller) and brown-headed cowbird, *Molothrus ater* (Boddaert). However, the latter two avian species are probably accidental hosts.

***Brueelia straminea* Denny, 1842** – a red-headed woodpecker found dead in Hochatown on 2 November 2021 harbored this louse (PIPR collection). Emerson (1940) listed this louse from Oklahoma without providing host information; later he (Emerson 1972) provided a host list without localities. Dalgleish (1971) reported the species from *M. erythrocephalus* from Minnesota and Nebraska as well as other piciform birds from various US states. The genus is one of the largest taxa within Ischnocera, containing about 426 described species of which roughly 90% are host specific (Gustaffson and Bush 2017). We document the first report of *B. straminea* from a specified Oklahoma avian host.

***Picicola snodgrassi* Kellogg, 1896** – the same *M. erythrocephalus* listed above also was infested with a male and female *P. snodgrassi* (L-3858, Fig. 9). It was originally described as *Lipeurus snodgrassi* from the rufous hummingbird, *Selasphorus rufus* (Gmelin) from California (Kellogg 1896). Emerson (1972) lists *M. erythrocephalus* as well as other North American piciform birds as hosts but without localities. In addition, Dalgleish (1969) provides records of *P. snodgrassi* from other woodpecker species from California, Oregon and British Columbia, Canada. Since then, it has also been reported from various piciform birds (https://phthiraptera.myspecies.info/). However, Emerson (1940) did not include this louse in his list of bird lice from Oklahoma; therefore, to our knowledge, this is the first time *P. snodgrassi* has been reported from the state.

In conclusion, we document five new host and 14 new distributional records for various parasites of birds collected in Oklahoma. Although this survey included only a few species examined for parasites, it continues to illustrate the significance of salvaging DOR raptors and other birds. Indeed, this data can yield knowledge, all in the spirit of conservation on bird parasites, that could not be obtained otherwise because of state and federal restrictions on collecting and euthanizing live migratory birds,. As many avian species remain to be surveyed in the state, additional records for their parasites should be expected, including the possibility of discovery of novel species with the use of molecular techniques.

Acknowledgments

The Oklahoma Department of Wildlife Conservation and the US Fish and Wildlife Service issued Scientific Collecting Permit nos. 21010166 and MB84782C-0, respectively, to CTM. We thank Drs. Scott L. Gardner and Gabor Racz (HWML) for expert curatorial assistance, Vasyl V. Tkach (University of North Dakota, Grand Forks, ND) for assistance with initial molecular analyses and helminth identification, J. Michael Kinsella (Helm-West, Missoula, MT) for help in helminth identification and some photomicrographs, and Sarah E. Bush (Curator, PIPR collection, University of Utah, Salt Lake City, UT) for aid in the identification of some lice.

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Submitted November 1, 2022 Accepted November 22, 2022