Journal of the Arkansas Academy of Science

Volume 56 Article 35

2002

Coccidian Parasites (Apicomplexa: Eimeriidae) of Select Rodents of Western and Southwestern Arkansas and Northeastern Texas

Chris T. McAllister
Texas A&M University-Texarkana

Joshua E. Kessler
Texas A&M University-Texarkana

Coccidian Parasites (Apicomplexa: Eimeriidae) of Select Rodents of Western and Southwestern Arkansas and Northeastern Texas

Chris T. McAllister* and **Joshua E. Kessler**
Department of Biology
Texas A&M University-Texarkana
Texarkana, TX 75505

*Corresponding Author

McAllister et al. (1991b) provided several new host and locality records of coccidia from a survey of 147 rodents from five states in the southwestern and western United States (Arizona, Colorado, New Mexico, Texas, and Utah). In addition, several taxa of rodents from northcentral, western, and southwestern Texas have been reported to harbor previously described and/or new species of *Eimeria* or *Isospora* (McAllister and Upton, 1988, 1989a, b; Ford et al., 1990; Levine and Ivens, 1990; McAllister, et al., 1991a; Upton et al., 1992; Duszynski and McAllister, 1995). However, to our knowledge, nothing has been previously documented on the coccidian parasites of rodents from northeastern Texas, and rodents from all of the 75 counties of the state of Arkansas have been entirely neglected in coccidial surveys. As part of an ongoing study on the ecology of select rodents of the Ark-La-Tex region, we surveyed rodents for coccidia from four counties of northeastern Texas and two counties of western and southwestern Arkansas.

Between August 2000 and February 2002, 30 rodents (see Table 1) were collected with baited Museum Special® snap-traps and Sherman live traps and examined for coccidial parasites. They were returned to the laboratory and killed by cervical dislocation. A portion of the intestinal contents and feces was removed from each rodent, placed in vials containing a small volume of 2.5% (w/v) aqueous potassium dichromate, and stored briefly at room temperature (ca. 23°C). Samples were screened twice for coccidia following flotation in Sheather's sugar solution (specific gravity = 1.30). Negative samples were discarded and those samples containing unsporulated oocysts were allowed to sporulate for up to one week at room temperature in Petri dishes containing a thin layer of 2.5% potassium dichromate. Upon sporulation, oocysts were concentrated again with Sheather's and identified using a compound microscope equipped with Nomarski interference-contrast (DIC) optics. Oocysts were 30 days old when examined.

Voucher specimens of hosts are deposited in the Arkansas State University Museum of Zoology (ASUMZ). Rodent common and family names follow Wilson and Cole (2000).

Of the 30 rodents examined, five (23%) were found to be harboring at least one of four eimerians (Table 1). Of the infected rodents, only one (20%) hispid cotton rat (*Sigmodon hispidis*) had a multiple infection of two coccidian species. Although no new host records are reported, we document three new geographic records for coccidia (Table 1).

Eimeria langebarteli Ivens, Kruidenier, and Levine, 1959 has been reported previously from the Texas mouse (*Peromyscus attwateri*) and the white-ankled mouse (*Peromyscus pectoralis*) in Hood and Kimble counties, Texas, respectively (Duszynski and McAllister, 1995). This coccidian has now been reported from at least six species of *Peromyscus* and *Reithrodontomys* from the southwestern United States and Mexico (Ivens et al., 1959; Reduker et al., 1985; Duszynski et al., 1992) (see Table 2). Herein, we report the coccidian species in Arkansas for the first time. Our Polk County site on Rich Mountain (8 km NW Mena at Blue Haze Vista Overlook off St. Hwy 88), represents the northern and easternmost geographic distributional record ever reported for *E. langebarteli* in the United States (Table 2).

Eimeria lancasterensis Joseph, 1969 is one of the most prevalent coccidians infecting the rodent family Sciuridae. It has been reported previously from eastern fox squirrels (*Sciurus niger*) in northcentral Texas (McAllister and Upton, 1989a) and Nebraska (Spurgin and Hnida, 2002) and eastern gray squirrels (*Sciurus carolinensis*) in Massachusetts (Joseph, 1969, 1972) and Florida (Forrester et al., 1977). McAllister (unpublished data) also found *E. lancasterensis* during December 1988 in five of five (100%) *S. carolinensis* from Franklin (1/1), Madison (1/1), Pulaski (2/2), and Scott (1/1) counties, Arkansas, which represents a new state record for the coccidian. Bowie County, Texas, is a new county record for *E. lancasterensis*.

Eimeria sigmodontis Barnard, Ernst, and Dixon, 1974 was originally described from *S. hispidis* in eastern Alabama (Barnard et al., 1974). This coccidian has also been reported from the same host in Dallas and Johnson counties, Texas (McAllister et al., 1991a) and Payne County, Oklahoma (Faulkner and Lochmiller, 1997). We report *E. sigmodontis* in Arkansas *S. hispidis* for the first time.

Eimeria webbae Barnard, Ernst, and Dixon, 1974, was originally described from *S. hispidis* in eastern Alabama (Barnard et al., 1974). Additional reports of *E. webbae* include infections in populations of *S. hispidis* in northcentral Texas (McAllister et al., 1991b) and northeastern Oklahoma (Faulkner and Lochmiller, 1997).

Table 1. Rodents surveyed for coccidia from counties of Arkansas (AR) and Texas (TX) and the *Eimeria* species collected.

Rodent taxa	Locality*	Prevalence**	*Eimeria* spp.
Geomyidae			
Geomys breviceps	BC	0/4 (0%)	
Muridae			
Mus musculus	LRC	0/1 (0%)	
Neotoma floridana	LRC	0/1 (0%)	
Oryzomys palustris	CC	0/1 (0%)	
Peromyscus attwateri	PC	1/4 (25%)	*E. langebarteli*
Peromyscus leucopus	CC	0/1 (0%)	
Reithrodontomys fulvescens	CC	0/3 (0%)	
	RRC	0/1 (0%)	
Reithrodontomys humulis	MC	0/1 (0%)	
Sigmodon hispidis	CC & LRC	2/9 (22%)	*E. sigmodontis*
	LRC	1/9 (11%)	*E. webbae*
Sciuridae			
Sciurus carolinensis	BC	2/2 (100%)	*E. lancasterensis*
Sciurus niger	BC	2/2 (100%)	*E. lancasterensis*

*Locality abbreviations: LRC (Little River Co., AR); PC (Polk Co., AR); BC (Bowie Co., TX); CC (Cass Co., TX); MC (Marion Co., TX); RRC (Red River Co., TX).

**Number infected/number examined (%).

In conclusion, of the 27 species of rodents found in Arkansas (Sealander and Heidt, 1990), only five species (19%) have now been examined for coccidia, and three were found to harbor infections. A similar situation exists for Arkansas bats, as only one of 16 species (6%) has been surveyed previously (McAllister et al., 2001). We suggest additional Arkansas rodent taxa be examined to include larger sample sizes and additional locales in other counties in an effort to further characterize their coccidian parasite communities.

We thank the Arkansas Game and Fish Commission for Scientific Collecting Permit No. 3029. We also thank the TAMU-T Summer 2001 Vertebrate Field Biology class (particularly Beverly Allen) for assistance with collecting and Dr. Steve J. Upton (Kansas State University) for providing some helpful information. Drs. John Johnson and Gene Mueller (TAMU-T) aided in obtaining travel support for the senior author.

Table 2. Summary of the rodent hosts and localities for *Eimeria langebarteli.*

Host	Locality*	Prevalence**	Reference(s)
Peromyscus attwateri	Hood Co., TX	4/5 (80%)	Duszynski and McAllister, 1995
	Polk Co., AR	1/4 (25%)	This report
P. boylii	Chihuahua, MX	2/4 (50%)	Ivens et al., 1959
P. leucopus	Socorro Co., NM	4/17 (24%)	Reduker et al., 1985
P. pectoralis	Kimble Co., TX	5/6 (83%)	Duszynski and McAllister, 1995
P. truei	Baja California, MX	12/37 (32%)	Reduker et al., 1985
	Cochise Co, AZ	2/2 (100%)	
	Los Angeles Co., CA	2/21 (10%)	
Reithrodonomys	Madera Co., CA	3/4 (75%)	Duszynski et al., 1995
megalotis	San Bernardino, Co., CA	1/1 (100%)	
	Ixtlan District, MX	2/7 (29%)	
	Veracruz, MX	1/2 (50%)	
	Zacatecas, MX	1/3 (33%)	
	Nevada de Toluca, MX	1/3 (33%)	
	Total =	41/116 (35%)	

*Number infected/number examined (%).

Literature Cited

Barnard, W. P., J. V. Ernst, and **C. F. Dixon.** 1974. Coccidia of the cotton rat, *Sigmodon hispidis*, from Alabama. J. Parasitol. 60:406-414.

Duszynski, D. W. and **C. T. McAllister.** 1995. Coccidian parasites of *Peromyscus attwateri* and *P. pectoralis* in Texas with a description of a new species from *P. pectoralis laceianus.* Occ. Pap. Mus. Texas Tech Univ. 156:1-8.

Duszynski, D. W., M. J. Patrick, L. Couch, and **S. J. Upton.** 1992. Eimerians in harvest mice, *Reithrodontomys* spp., from Mexico, California, and New Mexico, and phenotypic plasticity in oocysts of *Eimeria arizonensis.* J. Protozool. 39:644-648.

Faulkner, B. C. and R. **L. Lochmiller.** 1997. New locality records of coccidian parasites (Apicomplexa: Eimeriidae) of the hispid cotton rat (*Sigmodon hispidis*) from Oklahoma. Proc. Oklahoma Acad. Sci. 77:131-132.

Ford, P. L., D. W. Duszynski, and **C. T. McAllister.** 1990. Coccidia (Apicomplexa) from heteromyid rodents in the southwestern United States, Baja California, and northern Mexico, with three new species from *Chaetodipus hispidis.* J. Parasitol. 76:325-331.

Forrester, D. J., J. D. Shamis, G. L. Huff, and **J. W.**

Journal of the Arkansas Academy of Science, Vol. 56 [2002], Art. 35

Bigher. 1977. Coccidia of urban gray squirrels in northern Florida. J. Parasitol. 63:1045.

Ivens, V. F., J. Kruidenier, and **N. D. Levine.** 1959. Further studies on *Eimeria* (Protozoa, Eimeriidae) from Mexican rodents. Ill. Acad. Sci. Trans. 51:53-57.

Joseph, T. 1969. The coccidia of the grey squirrel *Sciurus carolinensis* with descriptions of two new species. Diss. Abstr. Int. B (Science and Engineering) 30:2961.

Joseph, T. 1972. *Eimeria lancasterensis* Joseph, 1969 and *E. confusa* Joseph, 1969 from the grey squirrel *Sciurus carolinensis.* J. Protozool. 19:143-150.

Levine, N. D. and **V. Ivens.** 1990. The coccidian parasites of rodents. CRC Press, Boca Raton, Florida, 228 pp.

McAllister, C. T. and **S. J. Upton.** 1988. *Eimeria taylori* n. sp. (Apicomplexa: Eimeriidae) and *E. baiomysis* from the northern pygmy mouse, *Baiomys taylori* (Rodentia: Cricetidae), from Texas, U.S.A. Trans. Amer. Microsc. Soc. 110:296-300.

McAllister, C. T. and **S. J. Upton.** 1989a. *Eimeria lancasterensis* (Apicomplexa: Eimeriidae) from the eastern fox squirrel, *Sciurus niger* (Rodentia: Sciuridae), in north-central Texas. J. Parasitol. 75:642-644.

McAllister, C. T. and **S. J. Upton.** 1989b. *Isospora peromysci* Davis, 1967 (Apicomplexa: Eimeriidae) in *Peromyscus leucopus* and *P. maniculatus* (Rodentia: Cricetidae) from Texas. J. Protozool. 36:175-176.

McAllister, C. T., S. J. Upton, and **B. D. Earle.** 1991a. *Eimeria callispermophili* and *E. morainensis* (Apicomplexa: Eimeriidae) from the Mexican ground squirrel, *Spermophilus mexicanus* (Rodentia: Sciuridae), in south central Texas, U.S.A. Trans. Amer. Microsc. Soc. 110:71-74.

McAllister, C. T., S. J. Upton, J. V. Planz, and **T. S. DeWalt.** 1991b. New host and locality records of coccidia (Apicomplexa: Eimeriidae) from rodents in the southwestern and western United States. J. Parasitol. 77:1016-1019.

McAllister, C. T., S. J. Upton, S. E. Trauth, and **D. W. Allard.** 2001. Redescription of *Eimeria macyi* (Apicomplexa: Eimeriidae) from the eastern pipistrelle, *Pipistrellus subflavus* (Mammalia: Chiroptera), from Arkansas. J. Arkansas Acad. Sci. 55:181-183.

Reduker, D. W., L. Hertel, and **D. W. Duszynski.** 1985. *Eimeria* species (Apicomplexa: Eimeriidae) infecting *Peromyscus* rodents in the southwestern United States and northern Mexico with description of a new species. J. Parasitol. 71:604-613.

Sealander, J. A. and **G. A. Heidt.** 1990. Arkansas mammals: their natural history, classification, and distribution. Univ. Ark. Press, Fayetteville, AR. 308 pp.

Spurgin, R. J. and **J. A. Hnida.** 2002. *Eimeria lancasterensis* and *Eimeria ontarioensis* from fox squirrels, *Sciurus niger*, in southeastern Nebraska, U.S.A. Comp. Parasitol. 211-212.

Upton, S. J., C. T. McAllister, D. B. Brillhart, D. W. Duszynski, and **C. D. Wash.** 1992. Cross-transmission studies with *Eimeria arizonensis*-like oocysts (Apicomplexa) in New World rodents of the genera *Baiomys, Neotoma, Onychomys, Peromyscus,* and *Reithrodontomys* (Muridae). J. Parasitol. 78:406-413.

Wilson, D. E. and **F. R. Cole.** 2000. Common names of mammals of the world. Smithsonian Inst. Press, Washington, D.C. 204 pp.