

1970

Helminths from Six Species of Iowa Bats

Harvey D. Blankespoor
Iowa State University

Martin J. Ulmer
Iowa State University

Let us know how access to this document benefits you

Copyright ©1970 Iowa Academy of Science, Inc.

Follow this and additional works at: <https://scholarworks.uni.edu/pias>

Recommended Citation

Blankespoor, Harvey D. and Ulmer, Martin J. (1970) "Helminths from Six Species of Iowa Bats," *Proceedings of the Iowa Academy of Science*, 77(1), 200-206.
Available at: <https://scholarworks.uni.edu/pias/vol77/iss1/30>

This Research is brought to you for free and open access by the Iowa Academy of Science at UNI ScholarWorks. It has been accepted for inclusion in Proceedings of the Iowa Academy of Science by an authorized editor of UNI ScholarWorks. For more information, please contact scholarworks@uni.edu.

Helminths from Six Species of Iowa Bats¹

HARVEY D. BLANKESPOOR and MARTIN J. ULMER²

Abstract. Sixty-four bats, representing six species, namely, *Eptesicus fuscus* (big brown bat), *Lasionycteris noctivagans* (silver-haired bat), *Lasiurus borealis* (red bat), *Lasiurus cinereus* (hoary bat), *Myotis lucifugus* (little brown bat) and *Pipistrellus subflavus* (eastern pipistrel bat), were collected in thirteen counties in Iowa and examined for helminths during October, 1965 to August, 1966. Ten species of trematodes, two species of cestodes and three species of nematodes were identified from these hosts. This study results in twelve new host records for seven trematodes, one cestode and one nematode. Trematodes constitute the major group of helminths recovered, 76.6% of the hosts being parasitized; nematodes were next in abundance (28.1 per cent), and cestodes 7.0%.

Records of chiropteran helminths extend from the early 19th century to the present. Many of the early studies, reviewed by Gilford (1952), were conducted in Europe, Egypt, Brazil and the Orient. As a result of his studies on the helminth fauna of Egypt, Looss (1896) provided morphological data on bat trematodes and established the bases for much of their taxonomy. Bhalaoero (1926, 1936) and Northup (1928) reported many parasites recovered from bats in Burma. Modlinger (1930), in a study of the parasite fauna of Hungarian bats, described new species and redescribed many of the earlier known ones. Bat trematodes from Japan and the Philippine Islands were described by Ozaki (1929) and Tubangui (1933), respectively.

Prior to 1932, only three trematodes were known from bats in the United States. Stiles and Nolan (1931) reported on the known bat parasites of the world and their health importance. Since 1930, Macy's contributions (1931-1960) have added much to our knowledge of the biology of North American chiropteran helminths. Caballero (1940, 1942, 1943) conducted extensive surveys of bat helminths collected in Mexico and more recently, Dubois (1955-1964) undertook revisions of several genera of chiropteran trematodes. Mexican free-tailed bats, *Tadarida brasiliensis*, collected in Carlsbad Caverns, New Mexico, were examined for helminths by Cain (1966). Williams (1962) reported on the helminths of the cave bat, *Myotis sodalis*, collected in Ohio and Kentucky.

In the Midwest, Ubelaker (1966) surveyed the parasites of the grey bat, *Myotis grisescens* in Kansas, and Nickel and Hansen (1967) reported on the helminths recovered from eight species of bats collected in Kansas, Nebraska and Oklahoma. In 1968, Kunz

¹ This study was supported in part by National Science Foundation grant GB5465X

² Department of Zoology and Entomology, Iowa State University, Ames, Iowa 50010, and Iowa Lakeside Laboratory, Milford, Iowa 51351

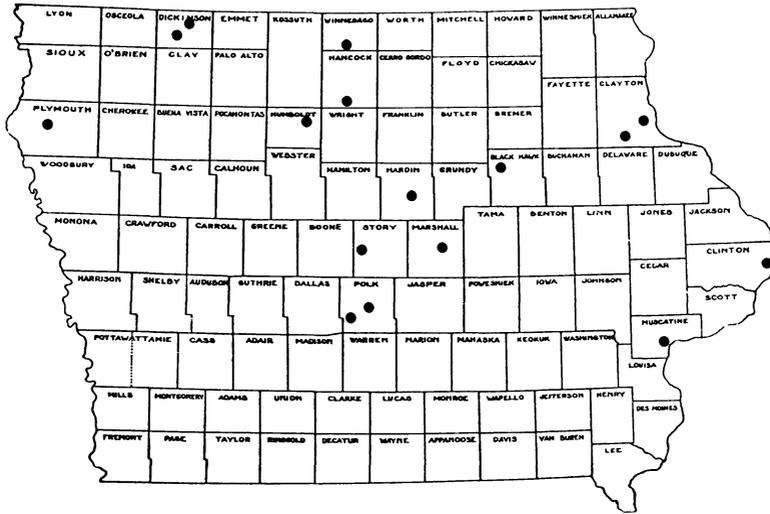


Fig. 1. Map showing collection sites of Iowa bats

reported on helminths collected from two red bats, *Lasiurus borealis* in Iowa.

Since 1953, more than 3,500 vertebrates from central and northwestern Iowa have been examined for helminth parasites at the Iowa Lakeside Laboratory at West Lake Okoboji. Mammals constitute approximately 400 of these hosts. Since these unpublished records contain no data on helminths from chiropteran hosts, the present study was undertaken to determine the helminth fauna of Iowa bats. Collecting sites involved in this study include localities in 13 Iowa counties (Fig. 1).

MATERIALS AND METHODS

Several methods of collecting hosts were used in this study. Bats inhabiting caves and buildings were collected with leather gloves, insect nets, a large forceps or 20 inch tongs. During one operation, a mist net was tied between two trees and bats were captured as they fed on flying insects. Birdshot in a 0.22-caliber rifle proved effective for killing flying bats and those attached to trees or lodged between rafters in barns. Additional bats, previously examined for rabies, were contributed by the College of Veterinary Medicine of Iowa State University.

Living bats were placed in a closed container with a wad of cotton previously soaked with chloroform; death resulted in less than ten minutes.

After each bat was killed, it was dissected for internal study. As various organs were removed, they were placed into separate

dishes containing mammalian saline to determine location of helminths as precisely as possible. Organs isolated included: brain, eyes, esophagus, stomach, intestine, trachea, lungs, liver, gallbladder, heart, spleen, gonads, urinary bladder, and diaphragm. With the use of a dissecting microscope, a thorough examination of the oral, nasal, cranial and coelomic cavities, and muscle tissue followed. Carcasses were then placed in saline solution and washings examined periodically.

Organs placed in Petri dishes were teased apart and examined under a dissecting microscope. Several re-examinations at approximately one hour intervals revealed many previously overlooked parasites. A press preparation of diaphragm, as well as blood smears from the heart, concluded the study.

Trematodes and cestodes were fixed in A.F.A. Cestodes were slightly flattened with a brush as the fixative was added. Nematodes were fixed by pipetting them into a hot solution of 10 parts of glycerine and 90 parts of 70 per cent ethanol. Press preparations were made of the encysted nematodes.

Cestodes and trematodes were stained with Mayer's paracarmine. Fast green, used as a counterstain, proved useful for study of tegumental structures. After dehydration, specimens were cleared in methyl salicylate and mounted in Permount. Nematodes were not stained, but following fixation were placed in 70 per cent glycerine alcohol and later mounted in glycerine jelly using a double coverslip technique.

RESULTS AND DISCUSSION

As indicated in Table 1, 54 of 64 bats (84.4 per cent) collected during this study were infected with helminths. Because of the great variation in number of hosts collected in various counties, justifiable comparisons as to incidence of infection cannot be made. However, of the two most abundant hosts (*Eptesicus fuscus* and *Myotis lucifugus*) helminths were recovered from 75 and 96%, respectively. Included among the helminths recovered were ten species of trematodes, two species of cestodes and at least three species of nematodes.

Trematodes constitute the major group of helminths recovered, 76.6% of all hosts examined being parasitized by flukes. The collection includes representatives of five families of trematodes, two families of cestodes and three orders of nematodes. Worms were found in the host's digestive tract and bile duct. Except for two species of trematodes and one species of nematode, all helminths were recovered from the intestine. A lecithodendriid fluke, *Limatulum gastroides* and the trichuroid nematode *Capillaria palmata* infect the stomach; the dicrocoeliid, *Dicrocoelium rileyi* was recovered from the bile duct and gallbladder of its host.

1970]

HELMINTHS FROM BATS

203

Table 1. Summary of bats examined

Species	County	No. exam.	No. Inf.
<i>Eptesicus fuscus</i> Palisot de Beauvois, 1796	Marshall	2	2
	Muscatine	1	1
	Plymouth	8	5
	Polk	1	1
	Story	16	12
<i>Lasionycteris noctivagans</i> Le Conte, 1831	Clinton	1	1
<i>Lasiurus borealis</i> Müller, 1776	Dickinson	1	1
	Story	2	1
<i>Lasiurus cinereus</i> Palisot de Beauvois, 1796	Polk	1	0
	Story	1	1
<i>Myotis lucifugus</i> Le Conte, 1831	Clayton	14	13
	Dickinson	8	8
	Hancock	1	1
	Humboldt	1	1
	Story	1	1
	Winnebago	3	3
<i>Pipistrellus subflavus</i> F. Cuvier, 1832	Black Hawk	1	1
	Hardin	1	1
		totals 64	54

Life histories of only two species of flukes represented in this collection have been reported in the literature. Knight and Pratt (1955) found that aquatic snails (*Fluminicola virens*) and caddis fly larvae of the genus *Limnophilus* serve as first and second intermediate hosts, respectively, for *Allassogonoporus vespertilionis*. Experimentally, metacercariae were fed to hamsters and adult trematodes recovered from the small intestine. In a restudy of the genus *Allassogonoporus*, Gilford (1955) placed *A. vespertilionis* in synonymy with *A. marginalis*. In the second known life cycle, that of *Plagiorchis vespertilionis*, the first intermediate host, according to Macy (1960), is the aquatic snail *Lymnaea stagnalis*. Cercariae encyst in trichopterous, ephemeropterid and mosquito larvae, as well as in dragonfly nymphs. No life cycles of cestodes or nematodes collected in this survey have been reported in the literature.

With the exception of four species of trematodes, one species of cestode and two species of nematodes, each of the helminths recovered from bats in this study was found in a single species of host (Table 2). *Acanthatrium lunatum*, *Prosthodendrium* sp. and *Hymenolepis roudabushi* were found in two species of hosts; *Prosthodendrium swansoni* and *Capillaria palmata* were recovered from three species of chiropterans, and four species of bats were infected with *Plagiorchis vespertilionis*. Unidentified immature nematodes.

Blankespoor and Ulmer: Helminths from Six Species of Iowa Bats

Table 2. Summary of helminths recovered from bats in Iowa

Helminths recovered	Chiropteran hosts (No. examined in parentheses)					
	<i>Eptesicus fuscus</i> (28)	<i>Lasionycteris noctivagans</i> (1)	<i>Lasiurus borealis</i> (3)	<i>Lasiurus cinereus</i> (2)	<i>Myotis lucifugus</i> (28)	<i>Pipistrellus subflavus</i> (2)
	No. inf.	No. inf.	No. inf.	No. inf.	No. inf.	No. inf.
TREMATODA						
Allasongonoporidae						
<i>Allasongonoporus marginalis</i> Olivier, 1938	—	—	—	—	15	—
Dicrocoeliidae						
<i>Dicrocoelium rileyi</i> Macy, 1936	1*	—	—	—	—	—
Lecithodendriidae						
<i>Acanthatrium eptesici</i> Alicata, 1932	—	—	1*	—	—	—
<i>Acanthatrium lunatum</i> Williams, 1962	1	—	1*	—	—	—
<i>Limatulum gastroides</i> Macy, 1935	—	—	—	—	14	—
<i>Prosthodendrium nokomis</i> Macy, 1937	—	—	1*	—	—	—
<i>Prosthodendrium swansoni</i> Macy, 1936	3*	—	1*	—	16	—
<i>Prosthodendrium</i> sp.** Blankespoor	2	—	1	—	—	—
Plagiorchiidae						
<i>Plagiorchis vespertilionis</i> Müller, 1784	8	—	—	1*	7	—

Table 2. (Continued)

Helminths recovered	Chiropteran hosts (No. examined in parentheses)					
	<i>Eptesicus fuscus</i> (28) No. inf.	<i>Lasionycteris noctivagans</i> (1) No. inf.	<i>Lasiurus borealis</i> (3) No. inf.	<i>Lasiurus cinereus</i> (2) No. inf.	<i>Myotis lucifugus</i> (28) No. inf.	<i>Pipistrellus subflavus</i> (2) No. inf.
Urotrematidae						
<i>Urotrema scabridum</i> Caballero, 1942	—	—	—	—	7*	—
CESTODA						
Anoplocephalidae						
<i>Cyclokrjabinia taborensis</i> (Loewen, 1934)	—	—	1	—	—	—
Hymenolepididae						
<i>Hymenolepis roudabushi</i> Macy and Rausch, 1946	2	—	—	—	2*	—
NEMATODA						
Rictulariidae						
<i>Rictularia lucifugus</i> Douvres, 1956	—	—	—	—	3	—
Trichostrongylidae						
<i>Allintoshius travassosi</i> Chandler, 1938	2	—	—	—	—	—
Trichuridae						
<i>Capillaria palmata</i> Chandler, 1938	3*	1*	—	—	4*	—
Unidentified spiruroids (immature)	1	—	2	—	1	1
*new host record						
**new species, not yet described						

1970]

HELMINTHS FROM BATS

205

belonging to the other Spiruroidea, infected four species of hosts.

The following are new host records: *Acanthatrium lunatum*, *A. eptesici*, *Prosthodendrium nokomis* and *P. swansoni* in *Lasiurus borealis*; *Plagiorchis vespertilionis* in *Lasiurus cinereus*; *Capillaria palmata*, *Urotrema scabridum* and *Hymenolepis roudabushi* in *Myotis lucifugus*; *C. palmata* in *Lasionycteris noctivagans*; *C. palmata*, *Dicrocoelium rileyi* and *P. swansoni* in *Eptesicus fuscus*.

ACKNOWLEDGEMENTS

We are indebted to Dr. Ralph W. Macy for confirming the identification of *Prosthodendrium nokomis* and for identifying *P. eptesici*. Appreciation is also extended to Mr. Dave Holland of the College of Veterinary Medicine of Iowa State University for some bat carcasses provided for examination and to the Extension Service of Iowa State University for publicity.

References Cited

- BHALAERO, G. D., 1926. *J. Burma Res. Soc.* 15: 181-195.
 _____, 1936. *J. Helminth.* 14: 163-228.
 _____, 1936. *J. Helminth.* 15: 97-124.
 CABALLERO, E., 1940. *An. Inst. Biol. Univ. Nac. Mexico* 11: 215-225.
 _____, 1942. *An. Inst. Biol. Univ. Nac. Mexico* 13: 641-648.
 _____, 1943. *An. Inst. Biol. Univ. Nac. Mexico* 14: 173-193.
 GAIN, G. D., 1966. *J. Parasitol.* 52: 351-357.
 DUBOIS, G., 1955. *Rev. Suisse Zool.* 62: 469-506.
 _____, 1956. *Rev. Suisse Zool.* 63: 683-695.
 _____, 1960. *Rev. Suisse Zool.* 67: 1-80.
 _____, 1961. *Rev. Suisse Zool.* 68: 273-302.
 _____, 1962. *Rev. Suisse Zool.* 69: 385-407.
 _____, 1964. *Rev. Suisse Zool.* 71: 371-381.
 GILFORD, J. H., 1952. *Studies of the trematodes from certain midwestern bats*. Unpublished M.S. thesis. Urbana, Illinois, Library, University of Illinois.
 _____, 1955. *J. Parasitol.* 41: (6, Sec. 2): 27-28.
 KNIGHT, R. A. & I. PRATT, 1955. *J. Parasitol.* 41: 248-255.
 KUNZ, T. H., 1968. *Amer. Midl. Natural.* 80: 542-543.
 LOOSS, A., 1896. *Mem. Inst. Egyptien* 3: 1-252.
 MACY, R. W., 1931. *Trans. Amer. Micro. Soc.* 50: 344-347.
 _____, 1931. *J. Parasitol.* 18: 28-33.
 _____, 1933. *Trans. Amer. Micro. Soc.* 52: 247-254.
 _____, 1936. *Trans. Amer. Micro. Soc.* 55: 352-359.
 _____, 1947. *Amer. Midl. Natural.* 37: 375-378.
 _____, 1960. *J. Parasitol.* 46: 337-345.
 MODLINGER, G., 1930. *Stud. Zool. Allat. Tanul. (Budapest. Todom.-egy.) Budapest* 1: 191-203.
 NICKEL, P. A. & M. F. HANSEN, 1967. *Amer. Midl. Natural.* 78: 481-468.
 NORTHUP, F. R., 1928. *J. Burma Res. Soc.* 18: 80-97.
 OZAKI, Y., 1929. *Annot. Zool. Japonenses* 12: 91-98.
 STILES, C. W. & M. O. NOLAN, 1931. *Nat. Inst. Health Bull.* 155: 603-742.
 TUBANGUI, M. A., 1933. *Philip. J. Sci.* 52: 180-182.
 UBELAKER, J. E., 1966. *Amer. Midl. Natural.* 75: 199-204.
 WILLIAMS, R. R., 1962. *Ohio J. Sci.* 62: 273.