Additional Records of Ectoparasitic Insects on Bats in Oklahoma[1]

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Numerous collections of bat parasites have been made in Oklahoma from time to time, but little information concerning their biology or distribution has been published. Some individual records regarding the distribution of these parasites in Oklahoma have been published by Smith (1934), Jobling (1938), Kessel (1952) and Kohls (1954). Records of distribution, observations on the biology, and external morphological variations of the genus *Trichobius* (Diptera, Streblidae) appeared in an earlier paper (Zeve,

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1959). During the past two years the author has been investigating the morphology and the biology of *Trichobius* from bats in western Oklahoma. This study provided an excellent opportunity to collect and observe other ectoparasites as well.

Nineteen caves were explored, but data for only fourteen of these are represented here as distribution sites of ectoparasites. On many occasions evidence in the form of guano deposits and known ectoparasites of bats was found which indicates the presence of bats in these caves at other times of the year. For the purposes of this paper, only data from caves where bats or ectoparasites were found are reported. These caves are located in Cimarron, Greer, Harmon, Major, Washita, Woods, and Woodward Counties. For a more detailed location of these caves and other known bat caves in Oklahoma the reader is directed to Glass and Ward (1959) and Zeve (1959).

Caves were inspected for bats and known ectoparasites with the aid of flashlights. Bats were collected by hand and by a long-handled insect net, placed in cages, and removed to the cave entrance where they were inspected for parasites. Bats were also collected by Japanese mist nets (Dalquest, 1954) which were placed across the entrances to caves shortly after sunset. This method provided specimens of *Antrozous pallidus* (LeConte), a species not obtained by other means. Cave walls and ceilings were examined and ectoparasites were collected by the use of forceps or aspirating tubes. On many occasions, when conditions were satisfactory, specimens were collected from bats in the caves. Guano samples were taken from cave floors and placed in plastic bags for later detailed examination. All arthropod material was placed in seventy percent alcohol or Bouin's fixative. Identifications were made from mounted and unmounted material.

As an addition to the known distribution of ectoparasites of bats in Oklahoma, the following data representing the Nycteribiidae, Streblidae (Diptera) and Ischnopsyllidae (Siphonaptera) are presented. Four species of bats, *Antrozous pallidus* (LeConte), *Myotus velifer incautus* (Allen), *Plecotus townsendii pallescens* (Miller) and *Tadarida brasiliensis mexicana* (Saussure) were found to be parasitized (Table 1).

Antrozous pallidus (LeConte), the Pallid Bat.

Numerous specimens of this bat were trapped in mist nets on two occasions during the summer months. Ectoparasites included the nycteribiid, *Basilia antrozoi* Townsend from Alabaster Caverns and Pigeon Cave and the ischnopsyllid, *Myodopsylla palposa* (Rothschild) from Alabaster Caverns. To date no streblids have been found in association with this host.

Myotus velifer incautus (Allen), the Cave Bat.

This species of bat occurs in large aggregations while hibernating in caves during the winter months. This habit greatly facilitates their collection. Ectoparasites were removed directly from bats in hibernating and active colonies. These included *Myodopsylla collinsi* Kohls from Alabaster Caverns, Griever Creek, Reed No. 2 and Vickery No. 2 Caves. On one occasion this species was taken from *M. velifer* in a barn at Mooreland, Oklahoma. *Trichobius corynorhini* Cockerell was taken at Reed No. 2 Cave and *Trichobius major* Coquillet from Alabaster Caverns, Anderson Creek, Griever Creek, Icebox, Reed No. 2, Vickery No. 1 and No. 2 Caves. The latter fly was taken from the outer ears and less frequently from other body regions of hibernating *M. velifer*. Infestations ranged from one to four per bat.

Table 1. Host-parasite relationships and distribution of some ectoparasitic insects on bats in Oklahoma.

Hosts	*M.c.	M.p.	S.t.	B.a.	B.c.	T.c.	T.m.	T.s.	Locations
Antrozous pallidus (LeConte)		X		X					Alabaster Caverns
				X					Pigeon Cave
Myotus velifer incautus (Allen)	X						X		Alabaster Caverns
							X		Anderson Creek Cave
	X						X		Griever Creek Cave
							X		Icebox Cave
	X								Mooreland, Oklahoma
	X					X	X		Reed No. 2 Cave
							X		Vickery No. 1 Cave
	X						X		Vickery No. 2 Cave
Plecotus townsendii pallescens (Miller)						X			Alabaster Caverns
						X			Anderson Creek Cave
						X			Corn Caves
						X			Griever Creek Cave
	X					X			Icebox Cave
						X			Lake Cave
						X			Merrihew Cave
					X	X			Reed No. 2 Cave
						X			Vickery No. 1 Cave
Tadarida brasiliensis mexicana (Saussure)			X				X		Alabaster Caverns
			X				X	X	Conner's Cave
			X				X	X	Merrihew Cave
			X				X	X	Reed No. 1 Cave
			X				X	X	Selman's Cave
			X				X	X	Vickery No. 1 Cave

*M.c. - *Myodopsylla collinsi*, M.p. - *M. palposa*, S.t. - *Sternopsylla texana*, B.a. - *Basilia antrozoi*, B.c. - *B. corynorhini*, T.c. - *Trichobius corynorhini*, T.m. - *T. major*, T.s. - *T. sphaeronotus*.

Plecotus townsendii pallescens (Miller), the Western Longeared Bat.

This bat has been referred to in earlier works as *Corynorhinus rafinesquei pallescens* Miller. Handley (1959) now places *Corynorhinus* as a subgeneric name under the genus *Plecotus*. Examinations of this host were made mainly during the winter months. Ectoparasite collections were made directly from hibernating and active colonies. The nycteribiid, *Basilia corynorhini* Ferris was represented by a single specimen from Reed No. 2 Cave. The ischnopsyllid, *M. collinsi* was taken at Icebox Cave. *Trichobius corynorhini* was collected at Alabaster Caverns, Anderson Creek, Corn, Griever Creek, Icebox, Lake, Merrihew, Reed No. 2 and Vickery No. 1 Caves. This streblid was found in the region of the interfemoral membrane and infestations ranged from two to twelve per hibernating bat.

Tadarida brasiliensis mexicana (Saussure), the Mexican Free-tailed Bat.

This bat is extremely abundant in some caves during the summer months with populations reaching the millions. Collecting in free-tail caves is greatly hampered by large bat populations and from annoyance by a large arthropod fauna. Due to the lack of free air circulation, high ammonia content and high temperatures prevail throughout the summer. Open-flame lanterns as a light source were abandoned because of insufficient amounts of oxygen. It was noted that incomplete combustion produced fumes which had a tendency to drive bats from the caves.

Several known ectoparasites of bats inhabit free-tail caves, but it appears that many of these only cling to their host while feeding. This phenomenon was reported by Smith (1934) and Jameson (1959). Numerous free-tails were examined, but only fleas belonging to the genus *Sternopsylla* were removed directly from this host. Observations of roosting bats reveal that streblids feed on this host, but leave as soon as the bat is disturbed by light, netting or handling. Specimens may be collected from bats, cave walls, ceilings and guano deposits.

The flea, *Sternopsylla texana* (C. Fox), may be obtained directly from this host or from substrates. Immature and adult forms are quite abundant in guano samples. Collections were made at Alabaster Caverns, Conner's, Merrihew, Reed No. 1, Selman's and Vickery No. 1 Caves.

Trichobius major was taken only from cave walls and ceilings in Alabaster Caverns, Conner's, Merrihew, Reed No. 1, Selman's and Vickery No. 1 Caves. *Trichobius sphaeronotus* Jobling was taken exclusively from cave walls and ceilings in Conner's, Merrihew, Reed No. 1, Selman's and Vickery No. 1 Caves. This fly was seldom taken during the interval in which bats occupied the caves. Upon examination of Selman's Cave in early October, 1959, it was found that large numbers of pupae and adults were present. Over five hundred newly emerged adults were collected in two and one half hours. Numerous pupae were collected and reared in the laboratory. It was estimated that the cave had been free of bats for approximately three weeks. Periodic examinations of this cave during the winter months reveal that pupae and adults of this species, and to a lesser extent *T. major*, may be taken after the southern migration of their host.

SUMMARY

Data on the distribution of ectoparasitic insects on bats of the families Ischnopsyllidae, Nycteribiidae and Streblidae are presented. Four species of bats: *Antrozous pallidus, Myotus velifer incautus, Plecotus townsendii pallescens* and *Tadarida brasiliensis mexicana* were found to be parasitized by eight species of ectoparasites. Notes on the biology of some parasites, host-parasite relationships and their distribution in western Oklahoma are presented.

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