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## **A Preliminary Survey of Blood Parasites of Oklahoma Birds<sup>1</sup>**

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Surveys for the purpose of determining the distribution and incidence of avian blood parasites have been made in many parts of the world; however, much is yet to be learned of the zoogeography and epidemiology of these parasites. In addition, many surveys have been concerned with particular groups of hosts; consequently, many large groups of hosts have

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been ignored. This paper contains information pertinent to both of the above problems: it is apparently the first such survey that has been conducted in Oklahoma and many of the birds examined belong to groups which have not been well represented in other surveys.

*Methods*

Blood smears were taken from birds trapped and netted for banding purposes, game birds collected during hunting season, and birds collected in connection with both ornithological and helminthological studies. Many nestlings are included in the survey and adults from every season of the year are represented; however, no attempt was made to relate infection rates to age or season. Blood smears were made by puncturing a leg vein, toe-clipping, or, in the case of collected birds, from the heart and lungs. Smears were air-dried, fixed in methanol, and stained with Giemsa stain. At least two smears were made from each bird and each slide was examined for a minimum of five minutes before the bird was declared uninfected.

Hosts were obtained from several different locations, the principal ones being the University of Oklahoma Biological Station at Lake Texoma, and an area around a pond on the unused portion of the airfield at the North Campus, University of Oklahoma, Norman, Oklahoma.

*Results*

Thirty-six species of birds were examined. The following species were not found to be infected with blood parasites (number of individuals examined is in parentheses): Green Heron (1), Little Blue Heron (3), Swainson's Hawk (1), Solitary Sandpiper (1), Lesser Yellowlegs (3), Willet (1), Pectoral Sandpiper (31), White-rumped Sandpiper (12), Baird's Sandpiper (2), Least Sandpiper (11), Long-billed Dowitcher (4), Stilt Sandpiper (1), Semipalmated Sandpiper (4), Western Sandpiper (3), Buff-breasted Sandpiper (3), Killdeer (51), Wilson's Phalarope (2), Least Tern (1), Yellow-billed Cuckoo (1), Common Nighthawk (1), Red-bellied Woodpecker (1), Downy Woodpecker (1), Scissortail Flycatcher (3), Horned Lark (1), Barn Swallow (17), Cliff Swallow (5), Purple Martin (1), Eastern Bluebird (1), English Sparrow (2), Savannah Sparrow (2), Field Sparrow (1).

Table I lists the species found to be parasitized, the number examined, number infected, and the parasites found.

TABLE I.

Species of birds found to be infected with blood parasites

Host	Number examined	Number parasitized	
		<i>Plasmodium</i>	<i>Haemoproteus</i>
Red-shouldered Hawk	2	1	—
Mourning Dove	25-35	—	over one-half
Common Crow	2	—	1
Eastern Meadowlark	19	2	—
Redwinged Blackbird	47	3	—

*Discussion*

The overall incidence of blood parasites in the birds examined is quite low. This low incidence is probably due to a combination of factors, the principal one being that the diagnostic methods used were not those which

disclose the largest number of infections. Although peripheral smears were supplemented when possible with smears of internal organs, a method said to reveal a larger number of infections than the use of peripheral smears alone (Hewitt, 1940), in none of the parasitized birds were parasites found in the internal smears and not in the peripheral ones.

The Mourning Doves were collected and their blood smears made by hunters during the 1963 season. Accurate records were not kept by these hunters and so it is impossible to determine exactly how many birds are represented in the sample. Some idea of the infection rate can be obtained from the sample, however, because the collecting hunters made four to six smears per bird of 25-35 birds and well over half the slides examined showed *Haemoproteus* infections. Apparently two species of *Haemoproteus* are represented: *H. maccallumi* Novy and MacNeal and *H. sacharovi* Novy and MacNeal; however, no mixed infections were observed. High infection rates and mixed infections in Mourning Doves are not unusual (e.g., Couch, 1952 reported both mixed infections and infection rates as high as 94 per cent in Texas doves).

The *Haemoproteus* from the Crow resembles *H. danilewskyi*, as re-described by Coatney and West (1938), in general shape and number of pigment granules.

Specific identification of avian plasmodia from a single smear is often impossible, therefore positive species identification of these parasites is not indicated in Table I. Tentative species identifications were made, however, using the key and character listings of Hewitt (1940) and Manwell (1935). One Redwing was infected with a *Plasmodium* resembling *P. cathemerium* Hartman, one with what appeared to be *P. circumflexum* Kikuth, and one carried a mixed infection with both types of parasite. The Red-shouldered Hawk was probably infected with *P. elongatum* Huff, the identification being based primarily on the elongate shape of the gametocytes and the paucity of asexual stages in the peripheral smear. The Eastern Meadowlarks were infected with what appeared to be *P. vaughani* Novy and MacNeal because of the small size of the parasite and the small number of merozoites.

Results of this survey indicate that the overall incidence of avian blood Protozoa (about two per cent, excluding Mourning Doves) is comparable to that observed in other areas of the Great Plains. Coatney and Roudabush (1937) and Coatney and West (1938) reported incidences of 4.4 per cent and 4.7 per cent respectively for *Plasmodium* in Nebraska birds. In addition, the general pattern of parasitism is similar to that observed by Couch (1952) in Texas in that all birds except the Mourning Doves showed a rather low infection rate while the doves were heavily infected with *Haemoproteus*. The large number of shore-inhabiting birds examined is an important part of this survey. Shorebirds and Herons are rarely found to be infected with blood Protozoa (Herman *et al.*, 1954; Coatney, 1938; Coatney and Roudabush, 1937), an amazing situation considering the usual proximity of their habitats to potential mosquito breeding grounds.

#### Summary

1. Thirty-six species of birds were examined for blood parasites.
2. Five species of birds were found to be infected with blood Protozoa: one of two Red-shouldered Hawks was infected with what appeared to be *Plasmodium elongatum*, two of 19 E. Meadowlarks were infected with what appeared to be *P. vaughani*, and three of 47 Redwings were infected with what appeared to be *P. cathemerium* and *P. circumflexum* in both pure and mixed infections. One of two Crows was infected with

*Haemoproteus danilewsky* and over half of 25-35 Mourning Doves were infected with either *H. maccallumi* or *H. sacharovi* but no doves showed mixed infections.

3. This survey is apparently the first of its kind conducted in Oklahoma and indicates that the pattern of parasitism is apparently similar to that observed in other areas of the Great Plains.

## LITERATURE CITED

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