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THE HELMINTH FAUNA OF THE PECTORAL SANDPIPER (EROLIA MELANOTOS) WITH SPECIAL REFERENCE TO THE EFFECTS OF MIGRATION

A THESIS

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APPROVED FOR THE DEPARTMENT OF ZOOLOGY

BY

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INTRODUCTION

Little is known about the role migratory birds play in the distribution of animal parasites. The small amount of research on this subject has been done by Russian workers (Spasskaya, 1954). Spasskaya theorizes that the migrants are infected with different parasites in different geographical areas. My study was designed to test this hypothesis using a single species of migratory bird, the Pectoral Sandpiper, *Erolia melanotos*. If a migratory bird "acquires" and "loses" species of parasites along its migratory route due to ecological changes (thus transmitting species from one region to another), then it will have a constantly changing parasite fauna throughout its migration. A comparison of the parasite faunas of *E. melanotos* at two different points of its migratory route should reveal differences if the above is true. For the study, two collections of the host were made in the same geographical area (but different points of the migratory route), once as it migrated through Oklahoma in the spring (going north) and again in the fall (going south). The specific goal was to determine if quantitative and qualitative differences between the spring and fall helminth faunas of this sandpiper could be demonstrated.

THE HOST

Several factors are considered in the selection of the Pectoral Sandpiper as the host. A primary consideration is its common occurrence in Oklahoma during both spring and fall migratory periods. Furthermore, during these periods it concentrates in a specific habitat, especially fish hatchery ponds. Its very long migrations range from central South America to northern Canada, Alaska and Siberia (Sutton, 1960) making it an excellent host for studying migration effects on parasite fauna. It exhibits an excellent combination of these and other factors important to a study of this kind.

MATERIALS AND METHODS

One hundred twenty-four hosts were taken in central and southern Oklahoma during two collection periods in 1961. Eighty-one were taken during spring migration, March 25-June 2, forty-three during fall migration, August 8-October 26. All birds were shot, most of them at fish hatcheries where the newly-drained ponds attracted large numbers of shorebirds. They were refrigerated immediately after being shot and when possible, autopsied within 12 hours. Otherwise, they were frozen and autopsied later. Platyhelminths and the acanthocephalan were fixed in FAA and stained with Mayer's Paracarmine, Ranvier's Picro-carmine or Harris' Hematoxylin. The single nematode was fixed in FAA and stored in 70% ethanol.

RESULTS

The following seven species of helminths in as many genera were recovered.

TREMATODA

Echinoparyphium flexum (Linton, 1892)
Prosthogonimus cuneatus (Rudolphi, 1809)
Cyclocoelum tringae Stossich, 1902

CESTOIDEA

Trichocephaloides birostrata (Clerc, 1906)
Kowalewskiella cingulifera (Krabbe, 1869)
Hymenolepis charadrii Yamaguti, 1935

NEMATODA

Syngamus anterogonimus Ryzhikov, 1949

In addition, undetermined species of cestodes belonging to the genera *Aploparaksis* Clerc, 1903 (=*Haploparaxis* Fuhrmann, 1908) and *Hymenolepis* Weinland, 1858 were collected. Identification of species of *Aploparaksis* is extremely difficult and at least two were recovered. Five specimens of an undetermined species of *Hymenolepis* were taken. These are believed to be new to science.

The single acanthocephalan recovered was an immature female and unidentifiable. Two cestodes and one trematode could not be identified because of poor preparation.

Following, with the names of the workers reporting them, is a list of the helminths previously reported from the Pectoral Sandpiper.

TREMATODA

Cyclocoelum triangularum, Harrah, 1922
Cyclocoelum taxorchis, Joyeux and Baer, 1927
Strigea erolinae, Fisher and Webster, 1954
Unidentified schistosome, McLeod and Little, 1942

CESTOIDEA

Taenia sp., Stiles and Hassall, 1894

NEMATODA

Tetrameres gushanskyi, Gubanov, 1954

All helminths I report are new host records except C. tringae which, according to Dubois, 1959, is synonymous with C. triangularum and C. taxorchis.

A quantitative comparison of the helminths I recovered from spring and fall hosts is given in Table 1.

TABLE 1

Parasitism in Spring and Fall Collections of *Erolia melanotos*
Spring Collection = 81 Hosts; Fall Collection = 43 Hosts

Parasites	Percentage Host Infection		Percentage of infected hosts with 1-3 specimens		Number of specimens per infected host	
	Spring	Fall	Spring	Fall	Spring	Fall
TREMATODA						
Echinoparyphium flexum	11.1	7.0	44	33	1-ca. 750	1-60
Prosthogonimus cuneatus	A single specimen from a spring host.					
Cyclocoelum tringae	24.6	0.0	80	0	1-33	0
CESTOIDEA						
Trichocephaloides birostrata	0.0	4.7	0	100	0	2
Kowalewskiella cingulifera	21.0	9.3	82	50	1-10	1-65
Aploparaksis spp.	21.0	44.2	77	68	1-17	1-39
Hymenolepis charadrii	2.5	0.0	50	0	1-ca. 250	0
Hymenolepis sp.	2.5	0.0	100	0	1-3	0
NEMATODA						
Syngamus anterogonimus	A single specimen from a fall host.					
ACANTHOCEPHALA	A single unidentifiable immature female from a spring host.					
UNIDENTIFIABLE	Two cestodes and one trematode from spring hosts.					

DISCUSSION

Since the spring and fall collections differ in size (Table 1), direct comparisons cannot be made. This problem is overcome by testing the spring collection data for each helminth against those of the fall by the Chi-square method. The results of this analysis are given in Table 2. One species, C. tringae, and the genus Aploparaksis show a significant difference between occurrence in spring and fall collections, the other helminths do not.

The absence of C. tringae in the fall has two explanations. One possibility is that the adults which migrated north in the spring lost this parasite during the summer in the arctic breeding ground and were migrating south free of it when collected. Another possibility is that the southward migrants were immature birds which hatched in the arctic breeding grounds during the summer and were migrating south for the first time. The extent of skull ossification indicates that the fall collection consists predominantly or entirely of immature birds. In either case, the absence of C. tringae in the fall hosts indicates that the birds are infected south of Oklahoma.

The infection of immature hosts with Aploparaksis is evidence that the host is infected with this parasite north of Oklahoma. The higher percentage infection by this parasite in the fall migrants could be due to a relatively high susceptibility of juvenile hosts to infection

TABLE 2

Chi-square Test of Differences in Spring and Fall Collections

Parasites	Chi-Square	Probability (p value)	Significant difference between spring and fall collections?
TREMATODA			
Echinoparyphium flexum	0.19	0.71	no
Prosthogonimus cuneatus	-	-	no
Cyclocoelum tringae	11.24	0.01	yes
CESTOIDEA			
Trichocephaloides birostrata	1.36	0.53	no
Kowalewskiella cingulifera	2.01	0.18	no
Aploparaksis spp.	6.19	0.02	yes
Hymenolepis charadrii	0.22	0.68	no
Hymenolepis sp.	0.22	0.68	no
NEMATODA			
Syngamus anterogonimus	-	-	no
ACANTHOCEPHALA			
Unidentified	-	-	no

by it. However, the fact that both spring and fall migrants are infected indicates that either the birds are infected both north and south of Oklahoma or that some infections obtained in northern territories survive the migration to southern areas and back to Oklahoma. It would indeed be enlightening to examine birds from the northern and southern extremes of their range.

The lack of a significant difference between spring and fall occurrences of E. flexum and K. cingulifera suggests that either the birds are infected in several areas along the migratory route or that the infections are long-lived. Larger collections must be made to determine the significance of those helminth infections which occurred only once or twice (less than 5% infection).

SUMMARY

Six helminths representing both genus and species records for the Pectoral Sandpiper are reported. In addition, two cestode genera are reported without species designations and are host records. The acanthocephalan is the first reported from this host.

The percentage infection by C. tringae and Aploparaksis spp. differs significantly between spring and fall migrants of the host. The hypothesis that the hosts are infected with these parasites only in certain areas of the migratory route could account for these differences.

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