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THE METAZOAN PARASITE COMMUNITY OF MIGRATING GREATER YELLOWLEGS, *TRINGA MELANOLEUCA*, FROM THE RIO GRANDE VALLEY, TEXAS AND NEW MEXICO

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ABSTRACT: Forty-eight migrant greater yellowlegs, *Tringa melanoleuca*, collected from southwestern Texas and southeastern New Mexico were examined for metazoan parasites. Nine helminth and 7 ectoparasite species were collected. Five new host records were recorded. The helminth fauna showed little diversity, little concentration for dominance, and no significant positive or negative associations between species were found. All species of helminths showed a contagious distribution. The component helminth community consisted of 2 core, 3 secondary, and 4 satellite species, and there was no host specialist. A checklist of metazoan parasites reported from greater yellowlegs in North America is included.

In the southwestern U.S.A. many shorebird species have been subjected to diminished and altered habitat. As environmental change continues, overcrowding and stress, factors known to alter host–parasite relationships (Esch et al., 1975; Friend, 1992), likely will increase. To detect changes in these relationships and their effect on disease and mortality, analyses of parasite community structure and composition are necessary to establish norms. Although 12 species of helminths, 2 of Mallophaga, and 3 of Acarina have been reported previously from *Tringa melanoleuca,* no investigation of the metazoan parasite community composition and structure has been done for this species.

The greater yellowlegs breeds from southern Alaska and south-central British Columbia eastward to Newfoundland, and it winters from British Columbia southward into Tierra del Fuego, South America (Johnsgard, 1981). In the southwestern U.S.A., small transient populations utilize the Rio Grande Valley in Texas and New Mexico during migration. The purpose of this study is to report on the community composition and structure of metazoan parasites harbored by *T. melanoleuca* from the middle Rio Grande valley. The variables of host sex, seasonal migration, and year of collection are considered, and findings are compared with those reported for other shorebirds from the region. A checklist of parasites reported from *T. melanoleuca* is given (Table I).

MATERIALS AND METHODS

Forty-eight greater yellowlegs were collected from Hudspeth County, Texas, and Dona Ana County, New Mexico, in the fall of 1984, 1986, and 1988 and the spring of 1985 and 1988. Birds were shot, placed in individual plastic bags, and frozen for later necropsy. Plumage was used to determine sex and plumage and the bursa of Fabricius were used to determine age. Cestodes and trematodes were fixed in alcohol–formalin–acetic acid, stained in Semichon's acid carmine, and mounted in Canada balsam. Ectoparasites were fixed in 70% ethanol and mounted in Hoyer's medium. Voucher specimens were deposited in the U.S. National Parasite Collection, Beltsville, Maryland (numbers 81245–81254). The following statistical procedures were used to define helminth community composition and structure: variance to mean ratio test for contagiousness for each species of helminth; Shannon's index for diversity in which H′ and J′ values were calculated for each host and these values were summed and total mean values for H′ and J′ then were derived, and Simpson's index for concentration of dominance (dominance was assumed when $c \geq 0.25$). The Mann–Whitney *U*-test was used to test for significant differences in mean intensities and abundances for all helminth species combined within the following subsamples: hosts collected from 1984 to 1987 ($n = 24$) vs. those collected in 1988 ($n = 24$), spring ($n = 13$) vs. fall migrants ($n = 35$), and male ($n = 21$) vs. female ($n = 27$). The chi-square test without an a priori hypothesis and utilizing the Yate's correction factor was used in testing for differences in helminth prevalences. Sorenson's index of similarity and the overlap index were used to detect similarities and overlap of helminth species within subsamples. The core–satellite species concept first utilized for helminth parasite communities by Bush and Holmes (1986) was applied, using the percentage of total helminths for each species of helminth, abundances, and graphical analysis by plotting helminth prevalence versus mean intensities for each species of helminth and observing the position and relationship of the individual helminth species to all others. Host specialists and generalists within the helminth community were examined following the methods of Edwards and Bush (1989). The χ^2 statistic with Cole's coefficient was used for interspecific association analysis. For all statistical tests, significance was assumed when $P \leq 0.05$.

RESULTS

A total of 1,246 helminths and 431 ectoparasites was collected from 48 greater yellowlegs

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TABLE I. Checklist of metazoan parasites of the greater yellowlegs, *Tringa melanoleuca*.

Taxon	Locality	Citation
Cestoidea		
Anomotaenia arionis	Newfoundland; Texas	Threlfall, 1968; this study
Anomotaenia microrhyncha	Alaska; Texas	Schmidt and Neiland, 1968; this study
Aploparaksis filum	Newfoundland; Texas, New Mexico	Threlfall, 1968; this study
Kowalewskiella totani	Texas	This study
Trematoda		
Apharyngostrigea papillistomum	Venezuela	Fischthal and Nasir, 1974
Caiquiria anterouteria	Venezuela	Fischthal and Nasir, 1974
Cyclocoelum brasilianum	Wisconsin, Iowa; Texas	Taft, 1975; this study
Haematotrephus brasilianum	Cuba	Macko and Mauri, 1971
Himasthla alincia	Texas	This study
Parorchis acanthus	Great Britain	Rees, 1939
Plagiorchis muris	Texas	This study
Stephanoprora paradenticulata	Venezuela	Nasir and Rodriguez, 1969
Tanaisia dubia	Brazil	Freitas, 1951
Tanaisia fedtschenkoi	Texas	This study
Nematoda		
Sciadiocara umbellifera	Brazil	Cram, 1927
Yseria quadripartita	Antiqua	Clapham, 1945
Mallophaga		
Actornithophilus paludosus	North America; Texas	Clay, 1962; this study
Austromenopon sp.	Texas, New Mexico	This study
Quadraceps similis	New Hampshire; Texas, New Mexico	Keirans, 1967; this study
Acarina		
Avenzoaria tringa	Texas, New Mexico	This study
Neoboydaia philomachi	Louisiana; Texas	Pence, 1973; this study
Rhinonyssus coniventris	Louisiana; Texas	Pence, 1973; this study
Sternostoma boydi	Louisiana; Texas, New Mexico	Pence, 1973; this study

collected in the Rio Grande Valley. Nine species of helminths and 7 species of ectoparasites were recorded. Ninety percent of the hosts were infected with at least 1 species of helminth, and 83% were infected with at least 1 species of ectoparasite. After host number 23, no species of helminth was observed that had not been found in previous hosts. Among the helminths, 4 species of cestode and 5 of trematode were represented (Table II). The cestode *Kowalewskiella totani* and the trematodes *Himasthla alincia, Plagiorchis muris,* and *Tanasia fedtschenkoi* represent new host records. No species of nematode or acanthacephala were observed (Table II). The ectoparasite community consisted of 3 species of Mallophaga and 4 species of Acarina (Table II).

The helminth fauna was not very diverse ($H' = 0.16 \pm 0.02$), was unevenly distributed ($J' = 0.39 \pm 0.05$), and showed some concentration for dominance (0.30 ± 0.04). All helminth species were highly aggregated, with variance/mean ratios ranging from 6.17 to 256.60 (Table II). No significant association, positive or negative, between pairings of helminths was found.

High similarity (87.5%) and overlap (77.8%) among species of helminth were observed for the variable of year of collection, and all species from the 1984–1987 sample were represented in the 1988 sample. The helminth faunas of spring and fall migrants were also similar, with a similarity of 93.3% and species overlap of 77.8%. No significant difference in helminth mean intensities, abundances, or prevalences was found between years or seasons. High similarity (80%) and overlap (66.7%) were observed for the variable of host sex; however, the cestode *Anomotaenia arionis* was found to be significantly more prevalent in female greater yellowlegs ($\chi^2 = 8.27$, df = 1, $P < 0.001$).

The helminth community consisted of 2 core,

TABLE II. Metazoan parasites of the greater yellowlegs, *Tringa melanoleuca*, from El Paso and Hudspeth counties, Texas, and Dona Ana County, New Mexico (n = 48).

Parasite	Prevalence (%)	Abundance $\bar{x}$	Abundance SE	Range	Total	$S^2/\bar{x}$
Cestoidea						
Anomotaenia arionis	46	14.90	8.92	1–424	715	256.60
Anomotaenia microrhyncha	52	4.56	1.39	1–35	219	20.39
Aploparaksis filum	27	1.35	0.51	1–18	65	9.16
Kowalewskiella totani	8	0.48	0.26	1–8	23	6.84
Trematoda						
Tanaisia fedtschenkoi	19	2.50	1.28	2–58	120	31.46
Himasthla alincia	2	1.02	1.02	49	49	48.99
Cyclocoelum brasilianum	17	0.63	0.38	1–18	30	11.21
Stephanoprora paradenticulata	6	0.23	0.17	1–8	11	6.17
Plagiorchis muris	2	0.21	0.21	10	10	10.01
Mallophaga						
Quadraceps similis	50	2.23	0.48	1–14	107	4.93
Austromenopon sp.	35	0.75	0.21	1–7	36	2.75
Actornithophilus paludosus	19	0.40	0.16	1–6	19	2.98
Acarina						
Avenzoaria tringa	50	5.44	1.57	1–50	261	21.82
Neoboydaia philomachi	8	0.08	0.04	1	4	0.94
Sternostoma boydi	4	0.06	0.05	1–2	3	1.62
Rhinonyssus coniventris	2	0.02	0.02	1	1	1.00

3 secondary, and 4 satellite species. The 2 core species were the cestodes *Anomotaenia arionis* and *Anomotaenia microrhyncha*. Both species revealed high prevalences and abundances (Table II), were present in all subsamples, and in combination constituted 75% of the total helminth fauna. The trematodes *Cyclocoelum brasilianum* and *Tanasia fedtschenkoi* and the cestode *Aploparaksis filum* were secondary species. These helminths were intermediate in prevalence and abundance and constituted 17% of the total helminth community. The remaining 4 helminth species (*Himasthla alincia, Kowalewskiella totani, Stephanoprora paradenticulata, Plagiorchis muris*) were satellite species. These helminths were less abundant across subsamples and were highly aggregated. All satellite species displayed low prevalences (Table II) and in combination accounted for 8% of the total helminth community. No host specialist was observed.

DISCUSSION

Contagious and overdispersed distributions of helminths are characteristic of shorebirds previously studied in the Rio Grande Valley (Leyva et al., 1980; Hinojos and Canaris, 1988; Canaris and Munir, 1991). These contagious populations appear to be a common phenomenon in avian

TABLE III. Comparisons of helminth species richness and mean abundance for shorebirds from the Rio Grande Valley.

Host	Species richness	Mean abundance	Reference
Western sandpiper (*Calidris mauri*)	5	1.06	Canaris and Munir, 1991
Greater yellowlegs (*Tringa melanoleuca*)	9	23.36	This study
Wilson's phalarope (*Steganopus tricolor*)	12	8.3	Yanez and Canaris, 1988
Common snipe (*Capella gallinago*)	14	14.9	Leyva et al., 1980
American avocet (*Recurvirostra americana*)	19	126.2	Garcia and Canaris, 1987
Black-necked stilt (*Himantopus mexicanus*)	19	162.0	Hinojos and Canaris, 1988

hosts and have been attributed to genetic variability within the host population, host susceptibility, and spacial location of helminths and intermediate hosts (Anderson, 1982; Pence and Windberg, 1984; Edwards and Bush, 1989). Wallace and Pence (1986) further suggested that factors such as behavioral and social traits, individual feeding habits, and chance distributions of infective stages were involved.

In evaluating the helminth community of *T. melanoleuca,* comparisons were made to the parasite communities of 5 other shorebird species collected from the same habitats in the Rio Grande Valley. The ubiquitous trematode *T. fedtschenkoi* was the only helminth *T. melanoleuca* shared with the other shorebirds examined from this area. This trematode species occurred in the common snipe (*Capella gallinago*), Wilson's phalarope (*Steganopus tricolor*), and black-necked stilt (*Himantopus mexicanus*). The cestode *A. filum* and the core cestode *A. arionis* have been reported previously from greater yellowlegs and other charadriids in Newfoundland (Threlfall, 1968), and Schmidt and Neiland (1968) collected the core cestode *A. microrhyncha* from *T. melanoleuca* in Alaska. Many of the other parasites collected from the greater yellowlegs have been reported from charadriids from other localities, including the cestode *K. totani* collected from lesser yellowlegs (*Tringa flavipes*) in Kansas (Self and Janovy, 1965).

The greater yellowlegs is more comparable in species richness and mean abundance to *C. gallinago, S. tricolor,* and the western sandpiper (*Calidris mauri*) than it is to *H. mexicanus* and the American avocet (*Recurvirostra americana*) (Table III). Both *R. americana* and *H. mexicanus* displayed a much greater species richness and mean abundance than the 4 other species. Both of these recurvirostrids nest in the Rio Grande Valley and linger in the region during migration. This disparity in species richness and mean abundance is believed to be the result of the increased exposure of *R. americana* and *H. mexicanus* to infective pools of helminths (Garcia and Canaris, 1987; Yanez and Canaris, 1988).

Low diversity, low concentration for dominance, and contagiousness are typical of helminth communities infecting waders from the El Paso, Texas, area. However, helminth species richness (seasonal, sex, and age differences) and the presence or absence of core and helminth specialists is more eclectic among the 5 species of waders reported from this area (Table III). Whether the absence of helminth specialists and infections with helminths reported from other waders are characteristic of *T. melanoleuca* from other geographic areas is not known. The helminth parasite community composition and structure for *T. melanoleuca* on its breeding grounds, particularly before fall migration, need to be examined.

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