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## GASTROINTESTINAL HELMINTHS OF THE MEXICAN DUCK, *ANAS PLATYRHYNCHOS DIAZI* RIDGWAY, FROM NORTH CENTRAL MEXICO AND SOUTHWESTERN UNITED STATES

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**ABSTRACT:** Twenty-five species of helminths, recovered from the gastrointestinal tracts of 129 Mexican ducks from Mexico and the United States, were all new host records. The species included: *Echinoparyphium recurvatum*, *Echinostoma revolutum*, *Hypoderaeum conoideum*, *Notocotylus attenuatus*, *Prosthogonimus cuneatus*, *Zygocotyle lunata*, *Anomotaenia ciliata*, *Cloacotaenia megalops*, *Diorchis bulbodes*, *Diorchis* sp., *Drepanidotaenia lanceolata*, *Echinocotyle rosseteri*, *Fimbriaria fasciolaris*, *Fimbriarioides* sp., *Hymenolepis* sp. 1, *Hymenolepis* sp. 2, *Sobolevicanthus gracilis*, *Corynosoma constrictum*, *Polymorphus minutus*, *Amidostomum acutum*, *Echinuria* sp., *Epomidiostomum crami*, *Hystrichis varispinosus*, *Rusguniella arctica*, and *Tetrameres* sp. *Fimbriarioides* sp. occurred predominantly in ducks from south-central Chihuahua, Mexico. The distributions for the other 24 species of the helminths were not significantly different among the four collecting areas. The helminth fauna for the 32 complete specimens and 97 intestinal tracts was distributed relatively evenly among the hosts with a calculated mean evenness of  $0.77 \pm 0.15$  and  $0.89 \pm 0.03$  respectively. The parasite fauna was more similar to those of the black duck *Anas rubripes* Brewster of eastern North America (53%), the mallard, *Anas platyrhynchos* (L.) (49%), and the mottled duck, *Anas fulvigula* Ridgway, from Florida (45%), than to the green-winged teal, *Anas crecca* (L.) (36%), the gadwall, *Anas strepera* (L.) (30%), and the American wigeon, *Anas americana* Gmelin (26%), collected in the Southwest.

### INTRODUCTION

The Mexican duck is nonmigratory, moves as local food and water vary with the seasons, and utilizes wetlands extending from grasslands to pine-oak forests. The range of the bird is from parts of southeastern Arizona, southern New Mexico, and southwestern Texas southward to Puebla, San Luis Potosi, and Nayarit, Mexico (Palmer, 1976; Hubbard, 1977). Some of the habitat is shared in winter with large populations of migratory ducks, particularly the dabblers (Anatinae).

Helminth parasites of the Mexican duck have not been studied. Knowledge about these helminth parasites and their distributions would also help elucidate the dynamics of parasite infection of wintering migratory waterfowl in these same areas.

The purpose of this paper is to report on the prevalence and intensities of gastrointestinal helminths harbored by Mexican ducks collected from Mexico and the United States. Comments about geographic distribution of these helminths and their relationships with those of related and wintering waterfowl are also included.

### MATERIALS AND METHODS

The United States Fish and Wildlife Service furnished 97 formalin-preserved intestines collected in May, June, and July, 1977. These samples were from three different areas in Mexico: the states of Jalisco-Aguascalientes (43 samples), Durango (14), and central Chihuahua (40). Hunters in Doña Ana County, New Mexico; southwestern Texas; and north-central Chihuahua, Mexico; solicited from November to January, 1977 through 1980, provided a fourth geographic sample of 32 complete specimens. These latter 32 specimens were placed in individual plastic bags, on ice, and returned to the laboratory where the complete gastrointes-

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tinal tract was examined for helminth parasites. Birds not examined within 6 hr were frozen and examined later.

Cestodes, trematodes, and acanthocephalans were fixed in alcohol-formalin-acetic acid (AFA), stained in Ehrlich's hematoxylin, celestine blue, or Semichon's acid carmine and mounted in Canada balsam or Permount. Nematodes were fixed in 70% ethanol, then cleared and examined in temporary lactophenol mounts.

Geographic differences in distribution of individual species of parasites were analyzed by applying the chi-square test without an a priori hypothesis. Significance was assumed for  $P \geq 0.05$ .

Mean evenness ( $J$ ) of the helminth parasite fauna was calculated separately for the 32 complete specimens and 97 intestines by using Shannon's index as modified by Pielou (Zar, 1974). The closer  $J$  values are to one, the more evenly the species of parasites are distributed among the hosts. The parasite fauna of the Mexican duck was compared using Sorensen's index of similarity to that of the black duck of eastern North America (Schiller, 1951; McLaughlin and Burt, 1973, 1979; Mahoney and Threlfall, 1978), the mallard (Crichton and Welch, 1972; Shaw and Kocan, 1980), and the mottled duck from Florida (Kinsella and Forrester, 1972). Parasite data from the literature were pooled for the black ducks and for the mallards prior to analysis. In addition, parasites were compared with those from the green-winged teal (Canaris et al., 1981), American wigeon (45 birds, 14 species of helminths), and gadwall (40 birds, 15 species of helminths) from southwestern U.S. (Canaris, unpubl. data).

## RESULTS AND DISCUSSION

Of 129 ducks examined, 102 (79%) were infected with at least one species of gastrointestinal helminth. The 25 species of helminths included six trematodes, 11 cestodes, two acanthocephalans, and six nematodes. All are new host records.

The helminth fauna for the 32 complete specimens and 97 intestinal tracts were relatively evenly distributed among the hosts with a calculated mean evenness of  $0.77 \pm 0.15$  and  $0.89 \pm 0.03$  respectively.

The similarity of the gastrointestinal helminth parasite fauna of the Mexican

duck to those of other ducks were: black duck, 53%; mallard, 49%; mottled duck, 45%; green-winged teal, 36%; gadwall, 30%; and American wigeon, 26%. The Mexican duck's helminth species were more similar to those of the mallard and mallard-like birds than to those of the other three species of ducks even though the latter three were collected in part of, or near to, the geographic range of the Mexican duck. The closeness in similarities for the helminth fauna of the Mexican duck and the mallard-like ducks is probably another expression of the close relationship among these birds.

The helminth parasites recovered from the Mexican duck are common parasites of waterfowl (McDonald, 1969). Many of these same areas used by the Mexican duck are also utilized in winter by migratory dabbling ducks. Observations on the ranges of the helminths are given for the Mexican duck to aid in our eventual understanding of helminth parasite population dynamics in these important wintering areas. There were no significant differences in geographic distributions among the species of trematodes. Only one cestode, *Fimbriarioides* sp., showed significant geographic variation, occurring mostly in Mexican ducks collected in south-central Chihuahua, Mexico.

The known ranges for trematodes and cestodes (Table 1) are extended into the states of Jalisco and Aguascalientes, Mexico, except for *Prosthogonimus cuneatus*, which was recovered only from north-central Chihuahua, Mexico.

Two species of acanthocephalans, *Corynosoma constrictum* and *Polymorphus minutus*, were recovered from both summer and winter samples of the Mexican duck throughout its range. Canaris et al. (1981) reported these two species from fall-migrating green-winged teal in southwest Texas, and *C. constrictum* was reported from ducks on the wintering grounds in Texas (Buscher, 1965). Our

TABLE 1. Gastrointestinal helminths of 129 Mexican ducks from the United States and Mexico.

Helminth	USNM no. <sup>a</sup>	Prevalence		Intensity	
		No. inf.	(%)	$\bar{x}$	Range
Trematoda (6)					
<i>Echinoparyphium recurvatum</i>	77550	6	4.6	2.0	1-5
<i>Echinostoma revolutum</i>	77551	14	10.8	4.1	1-25
<i>Hypoderaeum conoideum</i>	77552	19	14.7	4.6	1-18
<i>Notocotylus attenuatus</i>	77553	2	1.6	1.0	1
<i>Prosthogonimus cuneatus</i>	78854	1	0.8	4.0	4
<i>Zygocotyle lunata</i>	77554	46	35.7	1.7	1-5
Cestoidea (11)					
<i>Anomotaenia ciliata</i>	77555	7	5.4	2.0	1-4
<i>Cloacotaenia megalops</i>	78853	6	4.6	2.2	1-3
<i>Diorchis bulbodes</i>	77556	8	6.2	4.5	1-10
<i>Diorchis</i> sp.	77557	5	3.9	3.8	1-10
<i>Drepanidotaenia lanceolata</i>	78865	3	2.3	2.3	1-5
<i>Echinocotyle rosseteri</i>	77559	7	5.4	4.6	1-22
<i>Fimbriaria fasciolaris</i>	77561	33	25.6	5.4	1-20
<i>Fimbriarioides</i> sp.	77560	19	17.4	7.4	1-38
<i>Hymenolepis</i> sp. 1	77562	21	16.3	4.5	1-16
<i>Hymenolepis</i> sp. 2	77563	4	3.1	4.3	1-17
<i>Sobolevicanthus gracilis</i>	77564	14	10.8	8.4	1-22
Acanthocephala (2)					
<i>Corynosoma constrictum</i>	78852	4	3.1	2.0	1-5
<i>Polymorphus minutus</i>	77569	5	3.9	1.4	1-2
Nematoda <sup>b</sup> (6) (32 birds)					
<i>Amidostomum acutum</i>	77565	3	9.4	5.3	1-9
<i>Echinuria</i> sp.	78856	2	6.3	10.0	1-19
<i>Epomidiostomum crami</i>	77566	4	12.5	5.8	1-12
<i>Hystrix varispinosus</i>	77567	2	6.3	3.0	3
<i>Rusguniella arctica</i>	77568	5	15.6	1.0	1
<i>Tetrameres</i> sp.	78855	1	3.1	1.0	1

<sup>a</sup> Accession numbers of voucher specimens deposited in the U.S. National Parasite Collection, Beltsville, Maryland 20705, USA.

<sup>b</sup> Data from northernmost area only.

findings extend the known ranges of these two species of acanthocephalans southward into the states of Jalisco and Aguascalientes, Mexico.

Most species of nematodes were recovered from the proventriculus and ventriculus; however, these two organs were present only in the 32 ducks from the northernmost geographic sample. Thus, the known ranges of five of the six species of nematodes were extended only into north-central Chihuahua, Mexico. The gizzard nematode *Amidostomum acutum* was collected from birds in the northern-

most area, but one specimen was also recovered from the intestine of a bird from Jalisco, Mexico; therefore the range of this helminth may extend throughout the range of the Mexican duck.

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