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PREVALENCE AND INTENSITY OF *Typhlocoelum cucumerinum* (DIGENEA) IN WILD ANATIDS OF QUEBEC, CANADA

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Abstract: The upper respiratory tracts of 534 wild anatids representing 20 species, shot during the 1976, 1977 and 1978 hunting seasons, were examined for *Typhlocoelum cucumerinum* (Rudolphi, 1809). *Typhlocoelum cucumerinum cymbium* (Diesing, 1850) were recovered from *Anas platyrhynchos, Anas rubripes, Anas acuta, Anas discors* and *Anas crecca.* The maximum prevalence (16.7%) and intensity of infection (1.6) occurred in mallards *(A. platyrhynchos). Aythya valisineria* and *Aythya marila* harboured *Typhlocoelum cucumerinum cucumerinum* (Rudolphi, 1809). The maximum prevalence (14.3%) and intensity of infection (8.0) occurred in canvasbacks *(A. valisineria).* Of the 13 other species of ducks examined, none were infected with *T. cucumerinum.*

INTRODUCTION

Typhlocoelum cucumerinum (Rudolphi, 1809) (Cyclocoelidae) is a digenean which as an adult is parasitic in the trachea of ducks. The adult trematodes have been associated with duck mortality only in cases of high intensity of infection.[13] There have been two additional reports of mortality of ducklings involving infections of 19 trematodes[8] and 20 trematodes,[1] but generally infections are light with less than four trematodes per infected trachea.[2]

There is considerable controversy in the literature with regard to the taxonomy of *Typhlocoelum cucumerinum.* This stems from differing views on the importance of the shape of the testes in classification of the parasites. Skrjabin[16] believed that round-testes and lobed-testes trematodes represented two genera, *Tracheophilus* Skrjabin, 1913 and *Typhlocoelum* Stossich, 1902, respectively. Joyeux and Baer,[9] Gower[7] and Dubois[6] considered the shape of the testes a specific characteristic rather than a generic characteristic and recognized two species, *Typhlocoelum cymbium* (Diesing, 1850) (syn. *Tracheophilus sisowi* Skrjabin, 1913 and *Typhlocoelum sisowi* (Skrjabin, 1913)) and *Typhlocoelum cucumerinum* (Rudolphi, 1809). Macko and Busa[11] have suggested that the shape of the testes is highly variable and useful only as a subspecific diagnostic characteristic. They recognized three subspecies: *Typhlocoelum cucumerinum cucumerinum* (Rud., 1809), *Typhlocoelum cucumerinum americanum* (Manter and Williams, 1928) and *Typhlocoelum cucumerinum cymbium* (Diesing, 1850) (syn. *Typhlocoelum cymbium).* Based on our observations to date and on the large number of specimens used by Macko and Busa[11] in their study, the present authors have followed the 1960 classification of Macko and Busa.[11]

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TABLE 1. Prevalence and intensity of *Typhlocoelum cucumerinum* in wild anatids shot in southern Quebec, Canada.*

		T. c. cymbium		
		Prevalence	Intensity	
	n	(%)	Mean	Range
Anas platyrhynchos	90	16.7	1.6	1-3
Anas rubripes	52	15.4	1.4	1-3
Anas acuta	16	12.5	1.5	1-2
Anas discors	170	9.4	1.2	1-3
Anas crecca	21	4.8	1.0	1
		T. c. cucumerinum		
		Prevalence	Intensity	
	n	(%)	Mean	Range
Aythya valisineria	7	14.3	8.0	8
Aythya marila	53	3.8	2.0	1-3

*Uninfected duck species are listed in the text.

Typhlocoelum cucumerinum has been reported from canvasbacks in Manitoba, Canada[4] and from black ducks in eastern Canada.[12] This report presents the results of a survey undertaken to determine the prevalence and intensity of *T. cucumerinum* in ducks shot in southern Quebec, Canada during three hunting seasons.

MATERIALS AND METHODS

The 534 ducks representing 20 species examined in this survey were shot by duck hunters on Lake Saint-Louis (75°25'N, 73°45'W), Lake Saint-Francis (45°00'N, 74°38'W) and at Thurso (45°35'N, 75°13'W) during September and October, 1976, 1977 and 1978. The trachea and larynx of each duck were removed in the field, then opened and examined macroscopically for *T. cucumerinum* in the laboratory. Specimens were fixed in 10% buffered formalin phosphate, stained in Aceto-Carmine and mounted in Permount. Statistical analyses involved the Chi-square test of independence, the Fisher exact test, the Mann-Whitney U test, and the Kruskal-Wallis one-way analysis of variance.[15] In all cases, the level of significance was set at 0.05.

RESULTS

The results for infected species of ducks are presented in Table 1. Two subspecies of *T. cucumerinum* were identified: *Typhlocoelum cucumerinum cymbium* from mallards *(Anas platyrhynchos),* black ducks *(Anas rubripes),* pintails *(Anas acuta),* blue-winged teal *(Anas discors)* and green-winged teal *(Anas crecca),* and *Typhlocoelum cucumerinum cucumerinum* from canvasbacks *(Aythya valisineria)* and greater scaup *(Aythya marila).*

The following species were not infected with *T. cucumerinum:* gadwall *(Anas strepera)* (n=14), wigeon *(Anas americana)* (12), shovelers *(Anas clypeata)* (4), mallard-black hybrids (2), redheads *(Aythya americana)* (20), lesser scaup *(Aythya affinis)* (18), ring-necked ducks *(Aythya collaris)* (7), wood ducks *(Aix sponsa)* (23), goldeneyes *(Bucephala clangula)* (15), bufflehead *(Bucephala albeola)* (3), white-winged scoter *(Melanitta deglandi)* (5), surf scoter *(Melanitta perspicillata)* (2), oldsquaw

(Clangula hyemalis) (1) and ruddy ducks *(Oxyura jamaicensis)* (1).

Among the dabbling ducks *(Anas* spp.), mallards had the highest prevalence (16.7%) and intensity of infection (1.6). There were no significant differences in the prevalence or intensity of infection among the various species of dabbling ducks.

Among the diving ducks *(Aythya* spp.), canvasbacks had a higher prevalence (14.3%) and intensity of infection (8.0) than greater scaup, but the differences were not significant. In two cases, however, there were significant differences in prevalence between dabbling and diving ducks. Both mallards and black ducks had a significantly higher prevalence of *T. cucumerinum* than greater scaup ($\chi^2 = 5.29$, df = 1, $p < 0.05$ and $\chi^2 = 4.11$, df = 1, $p < 0.05$ respectively).

DISCUSSION

Data presented in Table 1 show a complete host separation for the two subspecies of *T. cucumerinum; T. c. cymbium* occurred exclusively in dabbling ducks *(Anas* spp.) and *T. c. cucumerinum* in diving ducks *(Aythya* spp.). This supports, in part, the work of Macko and Busa.[11] They recovered *T. c. cucumerinum* from diving ducks and *T. c. cymbium* from two species of dabbling ducks, *A. platyrhynchos* and *A. acuta,* but they also recovered a third subspecies, *T. c. americanum,* from *Anas querquedula* and *A. crecca.* In our study, *A. crecca* was infected with *T. c. cymbium,* not *T. c. americanum.* This separation of *T. c. cymbium* (syn. *T. sisowi)* into dabbling ducks supports Dubois'[6] observation that *T. sisowi* occurs most commonly in the genus *Anas.*

Several of the duck species found to be uninfected in this study have been recorded as hosts for *T. cucumerinum.* These include gadwall,[14] shovelers in Texas,[3] lesser scaup and goldeneyes in Michigan[19] and redheads in Maryland.[5] Beverley-Burton[2] reported *T. c. cymbium* (syn. *Typhlocoelum sisowi)* from the European wigeon *(Anas penelope)* in Great Britain, but there are no records of *Typhlocoelum* from the American wigeon *(Anas americanum).* Also, there are no records of *T. cucumerinum* infections in ring-necked ducks, wood ducks, bufflehead, white-winged scoter, surf scoter or ruddy ducks. This may be due, in part, to the limited number of parasitological surveys of these ducks, and does not imply that they are not hosts for *T. cucumerinum.*

A comparison with other North American studies revealed that the prevalences reported for eastern Canadian black ducks[12] and blue-winged teal in Iowa[18] were not significantly different from the prevalences in these hosts in the present study. However, Florida ducks *(Anas platyrhynchos fulvigula),* a race of mallard resident in Florida, had a significantly higher prevalence of *T. cucumerinum* (38.5%)[10] than the mallards in this study ($\chi^2 = 10.12$, df = 1, $p < 0.001$). This may be related to the nonmigratory habits of Florida ducks. The life cycle of *T. cucumerinum* involves a single intermediate host, a snail, which is ingested by the duck.[17] In a situation where a local population of ducks exists for a prolonged period of time, a pool of metacercariae could be built up and maintained in the snails resulting, ultimately, in a higher prevalence of infection in the local ducks.

The prevalence of *T. cucumerinum* in canvasbacks from Manitoba[4] and from Michigan[19] did not differ significantly from that in the current study. However, the prevalences in greater scaup (40%) and lesser scaup (21%) were significantly higher in Michigan[19] than in the present study ($\chi^2 = 11.78$, df = 1, $p < 0.001$ and $p = 0.027$, respectively). All ducks examined by Town[19] were found sick or dead on the Lower Detroit River and this might partially account for the higher prevalence of *T. cucumerinum* in the greater scaup and lesser scaup from Michigan.

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