

Parasitic Helminths and Arthropods of Fulvous Whistling-Ducks (*Dendrocygna bicolor*) in Southern Florida

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ABSTRACT: Thirty fulvous whistling-ducks (*Dendrocygna bicolor*) collected during 1984-1985 from the Everglades Agricultural Area of southern Florida were examined for parasites. Twenty-eight species were identified and included 8 trematodes, 6 cestodes, 1 nematode, 4 chewing lice, and 9 mites. All parasites except the 4 species of lice and 1 of the mites are new host records for fulvous whistling-ducks. None of the ducks were infected with blood parasites. Every duck was infected with at least 2 species of helminths (mean 4.2; range 2-8 species). The most common helminths were the trematodes *Echinostoma trivolvis* and *Typhlocoelum cucumerinum* and 2 undescribed cestodes of the genus *Diorchis*, which occurred in prevalences of 67, 63, 50, and 50%, respectively. Only 1 duck was free of parasitic arthropods; each of the other 29 ducks was infested with at least 3 species of arthropods (mean 5.3; range 3-9 species). The most common arthropods included an undescribed feather mite (*Ingrassia* sp.) and the chewing louse *Holomenopon leucoxanthum*, both of which occurred in 97% of the ducks.

KEY WORDS: fulvous whistling-duck, *Dendrocygna bicolor*, trematodes, cestodes, nematodes, chewing lice, mites, survey, prevalence, southern Florida.

Fulvous whistling-ducks, *Dendrocygna bicolor* (Vieillot), occur in much of the Western Hemisphere, but they have been documented as regular winter visitors in Florida only since 1955 (Jones, 1966). The first breeding record of this species in Florida was in 1965 at Lake Okeechobee in southern Florida (Ogden and Stevenson, 1965). Turnbull et al. (1989a) reported that it was nesting regularly in 1988 and increasing in numbers in the Everglades Agricultural Area (Palm Beach County). Other than one report on pesticide residues (Turnbull et al., 1989b), there is no published information on the diseases and parasites of this newly established resident anatid in Florida. Herein we report on the parasitic helminths and arthropods collected from a sample of fulvous whistling-ducks in southern Florida.

Materials and Methods

Fulvous whistling-ducks were obtained from the Everglades Agricultural Area in southern Florida south and east of Lake Okeechobee (Palm Beach County).

The primary crops in this area were sugarcane, row crops, sod, and, to a lesser extent, rice. Turnbull et al. (1989b) described the collection site in detail.

Nine ducklings (5 males and 4 females), which died during a banding operation, were obtained on 28 August 1984. An additional 21 ducks were collected by shotgun on 15 November 1985 and consisted of 7 hatch-year and 2 adult males, 7 hatch-year and 3 adult females, and 2 ducks of unknown age and gender. Carcasses were frozen within 4 hr of collection and later thawed and examined at necropsy. Techniques for recovering, fixing, staining, and examining parasites followed Forrester et al. (1974). Thin blood films were prepared from the 21 ducks collected in 1985, and these were fixed in absolute methanol, stained with Giemsa, and examined microscopically for blood parasites. Representative specimens have been deposited as follows: helminths in the U.S. National Parasite Collection (Beltsville, Maryland), mites in the Parasite Collection of the USDA, National Veterinary Services Laboratories (Ames, Iowa), and chewing lice in the Arthropod Collection of the University of Minnesota (St. Paul, Minnesota).

Results and Discussion

Fifteen species of helminths were collected from the 30 ducks, none of which were free of helminths. These included 8 species of trematodes, 6 cestodes, and 1 nematode. All are new host records for fulvous whistling-ducks. Sites, prev-

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alences, and intensities of each of the species are given in Table 1. Every duck was infected with at least 2 species of helminths (mean 4.2; range 2–8 species). In the 30-duck sample, multiple infections were as follows: 3 ducks had 2 species of helminths, 5 had 3 species, 9 had 4 species, 8 had 5 species, 2 had 6 species, 2 had 7 species, and 1 had 8 species. The overall mean intensity was 20.1 (range 3–83). A total of 604 helminth specimens was collected.

Two unidentified species of *Diorchis* were found in the small intestine, including a small form with hooks 20–22 μm long and strobila up to 36 mm in length and a larger form with hooks 38–40 μm long and strobila up to 75 mm in length. No scoleces were found for an unidentified species of *Sobolevicanthus*, which had a cirrus sac up to 240 μm long and a prominent accessory sac. All 3 of these species are probably undescribed (J. D. McLaughlin, pers. comm.). An undescribed species of *Sobolevicanthus* was reported from the black-bellied whistling-duck, *Dendrocygna autumnalis* (Linnaeus), in Texas by George and Bolen (1975), but no specimens could be obtained for comparison in our study.

Four of the helminths (*Apatemon gracilis*, *Typhlocoelum cucumerinum*, *Echinostoma trivolvis*, and *Cloacotaenia megalops*) were considered to be characteristic species of waterfowl by McDonald (1969) and, except for *C. megalops*, have been found in 2 other anatids that breed in Florida, the wood duck, *Aix sponsa* (Linnaeus), and the mottled duck, *Anas fulvigula* Ridgway (Kinsella and Forrester, 1972; Thul et al., 1985). In comparison to the mottled duck and the wood duck in Florida, the fulvous whistling-duck has less species richness and lower overall prevalences and intensities of infection. The most striking difference is in the nematode fauna, in which there is only 1 species in the whistling-duck versus 10 in the wood duck and 14 in the mottled duck. The explanation may be found in the habitat and diet of the whistling-duck in the rice fields of southern Florida (Turnbull et al., 1989a). Forrester et al. (1987) found that the helminth communities of round-tailed muskrats (*Neofiber alleni* True) in monocultural sugarcane fields in southern Florida were reduced significantly in comparison to muskrats from natural habitats. Similarly, the rice field monoculture may have resulted in the elimination of intermediate hosts of the heteroxenous nematodes that are common in ducks. George and Bolen (1975) reported 14 species of helminths from the black-bellied whis-

ting-duck, the only other species of the subfamily found in North America. Surprisingly, the 2 hosts have only 2 trematodes and 2 cestodes in common, assuming that the unidentified species of *Sobolevicanthus* is the same.

A study of the helminth fauna of fulvous whistling-ducks in Florida might provide an opportunity to test the hypothesis of Brown (1984) concerning the relationship of species abundance and distribution. Fedynich et al. (1986) and Radomski et al. (1991) have applied Brown's concept to helminth communities in beaver (*Castor canadensis* Kuhl) and long-nosed armadillos (*Dasyurus novemcinctus* Linnaeus), respectively, and proposed that the helminths of hosts at the periphery of their range are less diverse and abundant than those at the epicenter of the host's origin. At the present time, this hypothesis cannot be tested for fulvous whistling-ducks because there are no comparative data on the helminth fauna of this species of duck in other parts of its range. However, the almost total lack of nematodes in the fauna of fulvous whistling-ducks examined in the present study may be an indication that such a phenomenon has occurred in this duck since it invaded southern Florida in the early 1950s, but proof of this idea is not currently available.

Thirteen species of parasitic arthropods were collected, including 7 species of feather mites, 1 skin mite, 1 quill mite, and 4 chewing lice. All are new host records except 1 of the feather mites and the 4 chewing lice. Prevalences and total numbers of each species collected are presented in Table 2. Only 1 duck was free of parasitic arthropods. Each of the other 29 ducks was infested by at least 3 species of arthropod parasites (mean 5.3; range 3–9 species). In the 29-duck sample, multiple infestations were as follows: 5 ducks had 3 species of arthropods, 7 had 4 species, 6 had 5 species, 3 had 6 species, 3 had 7 species, 3 had 8 species, and 2 had 9 species. A total of 1,832 specimens of arthropods was collected and identified, but intensities could not be calculated because quantitative techniques were not used to obtain every parasitic arthropod from each host as they were for the parasitic helminths.

All of the mites collected from fulvous whistling-ducks were sarcoptiform mites and have been found previously on ducks in general, with 2 exceptions (Gaud, 1982). The 2 exceptions are 1 specimen each of *Scutomegninia* sp. and *Paralges* sp. These are probably stray contaminants

Table 1. Parasitic helminths of 30 fulvous whistling-ducks from southern Florida, 1984-1985.

Species of helminth	USNM Accession No.	No. ducks		No. worms/infected duck	
		Infected	%	Mean	Range
Trematodes					
<i>Echinostoma trivolvis</i> (Cort, 1914) (4)*	82888	20	67	4.8	1-31
<i>Typhlocoelum cucumerinum</i> (Rudolphi, 1809) (1)	82887	19	63	9.8	1-31
<i>Cotylurus gallinulae</i> (Lutz, 1928) (3)	82885	12	40	3.1	1-7
<i>Echinoparyphium</i> sp. (3)	82889	11	37	2.5	1-10
<i>Prosthogonimus ovatus</i> (Rudolphi, 1803) (6)	82892	7	23	3.4	1-10
<i>Tanaisia fedtschenkoi</i> Skrjabin, 1924 (7)	82891	3	10	8.3	1-22
<i>Philophthalmus gralli</i> Mathis and Leger, 1910 (2)	82890	3	10	2.7	1-5
<i>Apatemon gracilis</i> (Rudolphi, 1819) (3)	82886	1	3	1.0	1
Cestodes					
<i>Diorchis</i> sp. I (3)	82896	15	50	3.4	1-20
<i>Diorchis</i> sp. II (3)	82897	15	50	5.3	1-20
<i>Hymenolepis teresoides</i> Fuhrmann, 1906 (3)	82893	10	33	3.3	1-15
<i>Cloacotaenia megalops</i> (Nitzsch, 1829) (6)	82895	9	30	1.9	1-4
<i>Sobolevicanthus</i> sp. (3)	82898	7	23	4.4	1-15
<i>Hymenolepis hopkinsi</i> Schiller, 1951 (5)	82894	4	13	3.5	1-6
Nematodes					
<i>Strongyloides</i> sp. (3)	82899	3	10	2.3	1-4

* Numbers in parentheses indicate locations in host: (1) trachea/air sacs, (2) eye, (3) small intestine, (4) large intestine, (5) caeca, (6) cloaca, and (7) kidney.

from some sympatric aquatic birds. *Scutomegninia* spp. (family Avenzoariidae) usually occur on cormorants, gannets, ibises, or petrels. *Paralges* spp. (family Dermoglyphidae) have been reported from ostriches and godwits, but information on quill mites is so meager that this could be a true but unknown mite of ducks. Dermoglyphid mites live inside the quills of their hosts. One other unusual feature of the mite assemblage taken from the fulvous whistling-ducks in Florida is the absence of any representatives of the genus *Bdellorhynchus* (family Avenzoariidae), all of which are duck parasites, or of the family Freyanidae, 7 genera of which occur on ducks (Gaud, 1982); the fulvous whistling-duck has been documented by Dubinin (1950) as a host for *Freyana dendrocygni* Dubinin, 1950.

Very little taxonomic work has been done on the sarcoptiform mite fauna of North American birds; therefore, comments on the mites found in the present survey can be made only in relation

to knowledge of extralimital taxa. The most common mite on fulvous whistling-ducks was *Ingrassia* sp. (family Xolalgidae). About 24 species in this genus are described from shorebirds, sea birds, grebes, and ducks (Gaud and Atyeo, 1981). Of the 2 duck mites, the present specimens most closely resemble *I. (Vingrassia) velata* (Megnin, 1877), found on domestic ducks, mallards, and many other species, but not previously on any species of *Dendrocygna*. Species of *Brephosceles* (family Alloptidae) are typically feather mites of aquatic birds, including some from ducks (Peterson, 1971); the 2 species on fulvous whistling-ducks have not been described. Members of the mite family Dermationidae are found on the skin of birds in at least 8 avian orders, but only species of *Dermation* (*Neodermation*) occur on ducks (Fain, 1965). The species *Dermation* (*N.*) *anatum* Fain is known from many species of ducks, including the white-faced tree-duck, *Dendrocygna viduata* (Linnaeus), of Central Africa, but the

Table 2. Parasitic arthropods of 30 fulvous whistling-ducks from southern Florida, 1984–1985.

Species of arthropod	No. ducks		Total number collected
	Infected	%	
Feather mites			
<i>Ingrassia (Vingrassia)</i> sp. near <i>velata</i> *	29	97	1,288
<i>Brephosceles</i> sp. I*	12	40	74
<i>Zygochelifer edentulus</i> *			
Atyeo, 1984	11	37	31
<i>Brephosceles</i> sp. II*	6	20	11
<i>Alloptoides</i> sp.*	5	17	8
<i>Rectijanua striata</i>			
Atyeo and Peterson, 1976	4	13	8
<i>Scutomegnina</i> sp.*	1	3	1
Skin mites			
<i>Dermation (Neodermaton)</i> sp.*	13	43	43
Quill mites			
<i>Paralges</i> sp.*	1	3	1
Chewing lice			
<i>Holomenopon leucoxanthum</i> (Burmeister, 1938)	29	97	248
<i>Acidoproctus rostratus</i> (Rudow, 1866)	23	77	54
<i>Anatoecus icterodes</i> (Nitzsch, 1818)	19	63	64
<i>Trinoton aculeatum</i> Piaget, 1885	1	3	1

* New host records.

mites from *D. bicolor* are different and not described. All known species of *Zygochelifer* (family Avenzoariidae) come from ducks (Atyeo, 1984). *Zygochelifer edentulus* has been found previously on only 2 species of ducks in Central Africa, including *D. viduata* in Burundi. The known species of *Alloptoides* (family Alloptidae) have been collected from ducks, but this genus is poorly understood, and species cannot be identified without male specimens; no males were found on *D. bicolor*, and no species of *Alloptoides* have been recorded previously from any of the species of *Dendrocygna*. *Rectijanua striata* (family Rectijanuidae) is the only mite found in the present study that has been taken previously from *D. bicolor*, and all known members of this mite family are duck parasites (Atyeo and Peterson, 1976).

Two of the 4 species of chewing lice taken from the fulvous whistling-ducks appear to be restricted in their host distribution, and 2 have a very broad distribution. *Acidoproctus rostratus* is known only from *Dendrocygna bicolor* and *D. viduata*, whereas *Trinoton aculeatum* has been

recorded from only *D. bicolor*, *D. arborea* (Linnaeus) (the West Indian tree-duck), *D. autumnalis*, and *D. viduata*. Contrasted to these, *Holomenopon leucoxanthum* has been identified from over 35 species of Anatidae, including 11 species of *Anas*, 8 of *Aythya*, and 5 of *Dendrocygna*, whereas *Anatoecus icterodes* has been recorded from even more hosts, having been identified from over 60 species of Anatidae. Price (1971) provided the majority of the records for the former and Kéler (1960) reviewed many of the records for the latter; undoubtedly both of these lice will prove to have a much broader distribution among the Anatidae than known to date.

None of the blood films were positive for hematozoan parasites. This is in keeping with previous studies on waterfowl that breed in Florida, that is, Canada geese (*Branta canadensis* Linnaeus), mottled ducks, and wood ducks (Thul et al., 1980). The appropriate vectors necessary for transmission of some of the hematozoans of waterfowl may be absent from Florida; in addition, the peak populations of vectors that are present in Florida may not occur at the same time of

year (i.e., winter) when infected migratory waterfowl are present and have parasitemias high enough to allow transmission to occur.

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