# Helminths of the Florida Duck, *Anas platyrhynchos fulvigula*[1]

JOHN M. KINSELLA AND DONALD J. FORRESTER
Department of Veterinary Science, University of Florida, Gainesville, Florida 32601

ABSTRACT: Thirty-four species of helminths were found in 78 Florida ducks (*Anas platyrhynchos fulvigula*) from Alachua and Glades counties, Florida. These included 12 species of trematodes, seven species of cestodes, 14 species of nematodes, and one species of acanthocephalan. Thirty-three of these are new host records. *Porrocaecum crassum* is recorded for the first time from North America and *Strongyloides* is reported for the second time from wild ducks. Seasonal peaks in the incidence of some trematodes and cestodes appeared to be correlated with rainfall and the food habits of the host.

The Florida duck, *Anas platyrhynchos fulvigula*, is a nonmigratory race of the mallard which occurs only in peninsular Florida from the latitude of Gainesville (Alachua County) southward, reaching its greatest abundance in the vicinity of Lake Okeechobee. Until recently the Florida duck has been considered either as a full species, *Anas fulvigula*, or as a race of the mottled duck of southern Texas and Louisiana. The mottled duck is now considered a separate subspecies, *Anas platyrhynchos maculosa* (Johnsgaard, 1961).

Because of the above-mentioned taxonomic changes and because the Florida duck has been introduced into several parts of Europe, it is difficult to evaluate the early literature reports of helminths from the Florida duck. The following appear to be valid: *Cotylurus flabelliformis* (Faust, 1917) by Dubois (1953); *Dicranotaenia coronula* (Dujardin, 1845) and *Drepanidotaenia lanceolata* (Bloch, 1782) by Fuhrmann (1932); *Retinometra longicirrosa* (Fuhrmann, 1906) by Fuhrmann (1908); *Diploposthe laevis* (Bloch, 1782) by Fuhrmann (1908) and Bezubik (1956); and *Avioserpens taiwana* (Sugimoto, 1919) by Wehr (1934).

This report deals with helminths collected from Florida ducks from north-central and south Florida.

## Materials and Methods

Seventy-eight ducks were collected by shotgun from July 1970 through June 1971 from freshwater marshes in Alachua County (Paynes Prairie) and Glades County (Fisheating Creek Refuge and Game Management Area and Lake Okeechobee) located in north-central and south Florida, respectively. Some birds were examined within a few hours after death, but most were frozen and examined at a later date.

The gastrointestinal tract, heart, and trachea were opened and the contents washed through a 100-mesh sieve. The intestinal mucosa was either scraped or sprayed with water to remove *Strongyloides*. In 60 of the 78 ducks, the esophagus was teased apart under a dissecting microscope to detect *Capillaria*. Lungs, liver, and kidneys were teased and washed into the sieve before examination. Helminths were fixed and preserved for study by standard techniques. Nematodes were cleared and studied in lactophenol. Cestodes and small trematodes were stained with Harris' hematoxylin. Large trematodes were stained with Ehrlich's hematoxylin in acetic acid (Chubb, 1962).

## Results and Discussion

Thirty-four species of helminths were recovered from the 78 ducks, none of which were free of helminths. These included 12 species of trematodes, seven species of cestodes, 14 species of nematodes, and one species of acanthocephalan. All except *Dicranotaenia coronula* are new host records for the Florida duck (Table 1).

### Trematoda

Two species of blood flukes were found. *Trichobilharzia* sp. was found most often in

[1] Supported in part by a grant from the Florida Game and Fresh Water Fish Commission and by NIH Training Grant No. T01–AI–00383–02 from the NIAID. Florida Agricultural Experiment Station Journal Series No. 4106.

**Table 1. Helminths of 78 Florida ducks from Alachua and Glades counties, Florida.**

| Helminth | No. ducks infected | No. worms/duck Mean | (Range) |
|---|---|---|---|
| Trematoda | | | |
| *Apatemon gracilis* (4, 5)* | 49 | 13 | (1–61) |
| *Echinoparyphium recurvatum* (4, 5, 7) | 44 | 35 | (1–575) |
| *Zygocotyle lunata* (6) | 36 | 3 | (1–21) |
| *Trichobilharzia* sp. (12) | 33 | — | — |
| *Typhlocoelum cucumerinum* (9, 10, 11) | 30 | 4 | (1–20) |
| *Echinostoma revolutum* (5) | 26 | 9 | (1–53) |
| *Dendritobilharzia pulverulenta* (12) | 17 | 2 | (1–5) |
| *Hypoderaeum conoideum* (8) | 6 | 14 | (1–62) |
| *Prosthogonimus ovatus* (8) | 5 | 2 | (1–5) |
| *Psilochasmus oxyurus* (4) | 5 | 11 | (5–25) |
| *Eucotyle wehri* (13) | 1 | 2 | — |
| *Levinseniella* sp. (6) | 1 | 1 | — |
| Cestoda | | | |
| *Cloacotaenia megalops* (8) | 38 | 3 | (1–16) |
| *Hymenolepis* sp. (5) | 21 | 4 | (1–15) |
| *Hymenolepis hopkinsi* (5, 6) | 13 | 20 | (1–123) |
| *Dicranotaenia coronula* (5)† | 10 | 23 | (4–100) |
| *Fimbriaria fasciolaris* (5) | 8 | 6 | (1–30) |
| *Diorchis bulbodes* (5) | 7 | 29 | (2–100) |
| *Sobolevicanthus filumferens* (5) | 4 | 17 | (1–30) |
| Nematoda | | | |
| *Epomidiostomum uncinatum* (3) | 47 | 4 | (1–19) |
| *Capillaria* sp. (6) | 47 | 3 | (1–9) |
| *Amidostomum acutum* (3) | 46 | 3 | (1–16) |
| *Porrocaecum crassum* (3, 5) | 40 | 4 | (1–30) |
| *Strongyloides* sp. (4, 5, 6, 7, 8) | 35 | 4 | (1–19) |
| *Tetrameres crami* (2) | 32 | 4 | (1–13) |
| *Tetrameres* spp. (2) | 25 | 3 | (1–19) |
| *Capillaria contorta* (1) | 23 | 3 | (1–10) |
| *Echinuria uncinata* (2) | 11 | 13 | (1–106) |
| Spirurid larvae (1, 2) | 9 | 2 | (1–5) |
| *Streptocara crassicauda* (3) | 4 | 1 | (1) |
| *Sciadiocara rugosa* (3) | 3 | 1 | (1–2) |
| Unidentified filariids (10) | 2 | 1 | (1) |
| *Hadjelia neglecta* (3) | 1 | 1 | — |
| Acanthocephala | | | |
| *Corynosoma* sp. (5) | 2 | 1 | (1–2) |

* Numbers in parentheses indicate location in the host: (1) esophagus, (2) proventriculus, (3) gizzard lining, (4) duodenum, (5) lower small intestine, (6) ceca, (7) large intestine, (8) cloaca, (9) trachea, (10) lungs, (11) air sacs, (12) blood vessels, (13) kidneys.
† Previously recorded from *A. p. fulvigula*.

association with the liver. These fragile flukes were fragmented by the screening technique, making accurate counts and species identification impossible. *Dendritobilharzia pulverulenta* (Braun, 1901) was usually found in small numbers in association with the kidneys.

Macko and Busa (1960) state that all cyclocoelid trematodes of the Anatidae belong to one morphologically variable species, *Typhlocoelum cucumerinum* (Rudolphi, 1809). Gravid worms of this species occurred in the trachea of the hosts and immature forms were found in the lungs and air sacs.

*Psilochasmus oxyurus* (Creplin, 1825) and *Levinseniella* sp. are trematodes associated with brackish water marshes. Infections of these species were found only in a sample of eight ducks from Lake Okeechobee, which has a higher salinity than other marshes in the area, but is not considered brackish. The salinity is high enough apparently to support the mollusks needed for the life cycles of these flukes.

## Cestoda

*Cloacotaenia megalops* (Nitzch, 1829) was the most common cestode encountered and was found only in the cloaca. This species is a common and cosmopolitan parasite of ducks (McDonald, 1969).

An undescribed species of *Hymenolepis* characterized by a strobila 2 to 5 mm in length and a scolex bearing 10 hooks (length 81 $\mu$) occurred commonly in the duodenum of the ducks.

## Nematoda

Although McDonald (1969) states that *Strongyloides* species are rare or accidental in wild ducks, this may not actually be the case since these minute nematodes can be easily overlooked unless they are searched for specifically (Little, 1966). In this study a species of *Strongyloides* occurred in 35 ducks in all parts of the lower digestive tract. Although measurements of these worms fall within the range of *S. avium* Cram, 1929, species identification cannot be positive without culturing and examining the free-living adult forms.

*Capillaria contorta* (Creplin, 1839) was found in the esophageal mucosa of 23 ducks. The actual incidence of this nematode may have been somewhat higher since the tissue was not teased in the first 18 ducks examined. A second species of *Capillaria* occurred in the ceca and is characterized by the absence of caudal alae, a spiny spicule sheath, and a spicule length of 550 to 675 $\mu$ in the male, and a simple vulva in the female. This species does not appear to be any of the described capillarids of waterfowl and may be new.

*Epomidiostomum uncinatum* (Lundahl,

1848) and *Amidostomum acutum* (Lundahl, 1848), occurring under the Koilon lining of the gizzard, were the most comon nematodes encountered.

*Porrocaecum crassum* (Deslongchamps, 1824) is a common Eurasian parasite of ducks, but to our knowledge has not been previously reported from North America. Larval stages of this species were found under the Koilon lining and adults in the small intestine. In several cases, the worms had apparently perforated the intestine after death and migrated into other organs such as the lungs. Representative specimens of *P. crassum* have been deposited in the USDA Para. Coll. No. 66313.

Three species of *Tetrameres* appear to be represented in our sample. The first, with spicule lengths of 295 to 325 $\mu$ and 130 to 162 $\mu$, compares closely with *Tetrameres crami* Swales, 1933, a common parasite of ducks. The second, with spicule lengths of 575 to 800 $\mu$ and 105 to 140 $\mu$, appears to be an undescribed species. The third, with spicule lengths of 210 to 240 $\mu$ and 55 to 70 $\mu$, is closest to *T. ryjikovi* Chuan, 1961, but differs from that species in the absence of a well-chitinized cloaca.

Spirurid larvae found in the esophagus and proventriculus resemble third-stage larvae of *T. crami* as figured by Swales (1936), but could possibly be larvae of the other four spirurids encountered in this study.

In three of 11 ducks infected with *Echinuria uncinata* (Rudolphi, 1819), the characteristic nodules caused by this species were large enough to nearly block the lumen of the proventriculus. The literature on mortality in waterfowl due to this pathogenic nematode was summarized by Cornwell (1963).

A new species of *Sciadiocara* found under the Koilon lining of three ducks has been described elsewhere (Schmidt and Kinsella, 1972). A single specimen of *Hadjelia neglecta*, originally described from a domestic duck in Brazil by Lent and Frietas (1939), was found in a duck from Glades County. This is the first record of this nematode since the original description.

### Acanthocephala

Two ducks were infected with immature forms of *Corynosoma* sp. Further identification was impossible since the proboscis was retracted on all specimens.

### Host–parasite relationships

Since much of the literature on the fauna of the mallard in North America is scattered in numerous taxonomic papers, it is difficult to make a direct comparison with the Florida duck. Twenty-six of the 34 helminths found in this study are listed by McDonald (1969) as previously reported from *Anas platyhrynchos*. A comparison of the intestinal helminths of *A. p. fulvigula* with surveys of *A. platyrhynchos* in Poland (Bezubik, 1956) and England (Avery, 1966) reveals that while the nematode and trematode fauna is similar, only three cestodes are shared (*Dicranotaenia coronula*, *Cloacotaenia megalops*, and *Fimbriaria fasciolaris*). In addition, the number of cestode species in the Florida duck is reduced in comparison to these areas.

Although the sample size was not large, some patterns of seasonal dynamics in the helminth fauna could be seen. The incidence of cestodes and trematodes which require a second intermediate host in their cycles (e.g., *Echinoparyphium*, *Echinostoma*, *Typhlocoelum*, and *Cloacotaenia*) increased through the summer months to reach a peak in November and then fell to their lowest point in February and March. This pattern may be correlated with the annual rainfall in the collection areas, which are characterized by cool, dry winters and warm, wet summers. Beckwith and Hosford (1957) studied the food habits of the Florida duck in Glades County and found that the amount of animal matter in the diet reached a peak in summer and declined to a trace in fall and winter. This would explain the low incidence (in late winter) of helminths whose life cycle depends upon the ingestion of an intermediate host.

Blood flukes and nematodes with a direct cycle (*Strongyloides*, *Epomidiostomum*, and *Amidostomum*) also reached a peak in fall and winter, but did not show a sharp decline in spring.

Buscher (1965) found that the cestode and trematode faunas of three migratory ducks in Manitoba increased through the summer months to a peak in August and then declined sharply

during the migration to Texas in the fall. Buscher speculated that this decrease in infection rate was due to the unfavorable conditions of migration and the absence or limitation of new infection during migration. The continued increase of trematode and cestode infections in the fall in the nonmigratory Florida duck supports this theory. The Florida duck may act as a reservoir host for winter infections of such ducks as the mallard and black duck, which migrate to this area.

## Acknowledgments

Our thanks to Lovett E. Williams, Jr., David H. Austin, T. E. Peoples, Larry H. Barwick, Jerry A. Brown, and Richard McClellon of the Florida Game and Fresh Water Fish Commission for their invaluable assistance in the collection of the ducks. Dr. Gerald D. Schmidt identified the acanthocephalans. The technical assistance of Miss Carolyn R. Beal is gratefully acknowledged.

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