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THE PATHOLOGY OF CAPILLARIASIS IN THE BLUE JAY*

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Abstract: Capillaria contorta (Creplin, 1839) caused a diphtheritic membrane to form in the oral cavity and esophagus of blue jays *(Cyanocitta cristata).*

INTRODUCTION

Capillaria spp. have been recorded in the upper digestive tract of a wide variety of birds. Boyd et al.[1] reported *Capillaria contorta* in 19 of 94 blue jays taken from Massachusetts, New Hampshire, and Vermont.

Descriptions of the pathologic effects of this genus of worm on the digestive tract of other birds noted extensive to violent reaction in the esophagus, crop, and mouth. Cram[2] reported marked necrosis and sloughing of the epithelium of the esophagus and crop in bobwhite *(Colinus virginianus)* infected with *C. contorta.* A thin connective tissue capsule surrounded adult worms and everywhere there were infiltrates of lymphocytes and mononuclears.

Hung[3] noted similar lesions in domestic turkeys infected with *Capillaria annulata* and described the pathogenesis as hyperemia of the mucosa followed by the nematode threading into the mucosa. Necrosis and a pseudomembrane resulted with eggs distributed throughout the membrane. Lesions extended deep into the mulscularis. Lymphocytes infiltrated the involved areas.

Wehr[7] saw a similar lesion in domestic turkeys but felt that the worm was *C. contorta.* Madsen[5] saw Wehr's material and confirmed this and pointed out that *C. contorta* and *C. annulata* are synonomous.

Trainer et al.[6] saw sections from a gyrfalcon *(Falco rusticolus)* which suffered from "frounce," a condition apparently common in this bird and caused by *Trichomonas gallinae.* What they actually found was a capillarid and their pathologic description is essentially similar to capillariasis in other birds.

This paper reports on the lesions in the blue jay.

MATERIALS AND METHODS

A local bird bander submitted a blue jay in January, 1967 which appeared to have difficulty in swallowing. A thick, white membranous structure was observed in the oral and pharyngeal cavities. Examination for oral trichomonads was fruitless but numerous capillarid ova were seen. Since then an additional 71 blue jays from September, 1967 to June, 1969 have been examined. Of these, 70 were found infected with a capillarid but no trichomonads were seen. Intensity of infection ranged from 1 to 50 worms with the mean at 7. The majority of parasites were in the mouth at the base of the tongue. Nineteen were studied for behavioral abnormalities. Gaping, swallowing difficulties, wrenching of the neck, weak flight, and apathy were noted. Three of these were simply taken by hand from low trees and these were the subject of this histopathologic study.

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The oral cavity, esophagus, and crop were opened and representative sections were fixed in 10% buffered formalin. The brain and viscera were similarly treated. Tissues were embedded in paraffin and sections were stained with hematoxylin and eosin.

RESULTS

Gross pathology

The birds were emaciated and dehydrated. The oral and pharyngeal cavities, and the esophagus down to the proventriculus were covered by a whitish diphtheritic membrane. Pieces of cracked corn (baby chick size) found in the esophagus seemed adhered to the membrane. No other alterations were noted.

Microscopic pathology

The diphtheritic membrane was scraped lightly and then examined under the microscope. Numerous double operculated eggs, typical of capillarids were seen along with a few nematode fragments only from that portion of the membrane taken from the tongue.

Tongue

Both surfaces were involved. The outermost layer or diphtheritic membrane was about 1.0 mm. thick and consisted for fibrin, coagulated serum, and ghost cells, presumably from the squamous epithelium. There were numerous capillarid ova and bacterial colonies (Fig. 1). This membrane was tightly adhered to the squamous epithelium which often was without its outermost layers. There were lacunae in the epithelium which contained the nematode and often free eggs (Fig. 2). Occasionally an ulcer of the squamous epithelium which seemed limited by the muscularis was encountered. Lymphocytes were prevalent directly under the epidermis and usually the infiltration was diffuse.

FIGURE 1. Rear portion of the tongue. The dark line at the right is the dorsal squamous epithelium. To the left the light area is diphtheritic membrane. The parasites are seen in the squamous epithelium of the ventral surface. H. and E. X 30.

FIGURE 2. Ventral surface of the tongue. The parasite and ova are seen in a cyst surrounded by compressed squamous epithelium. H. and E. X 180.

FIGURE 3. Cross section of the esophagus which contains a piece of corn in the lumen. The diphtheritic membrane varies in thickness, is mostly darker than the underlying muscle. H. and E. X 18.

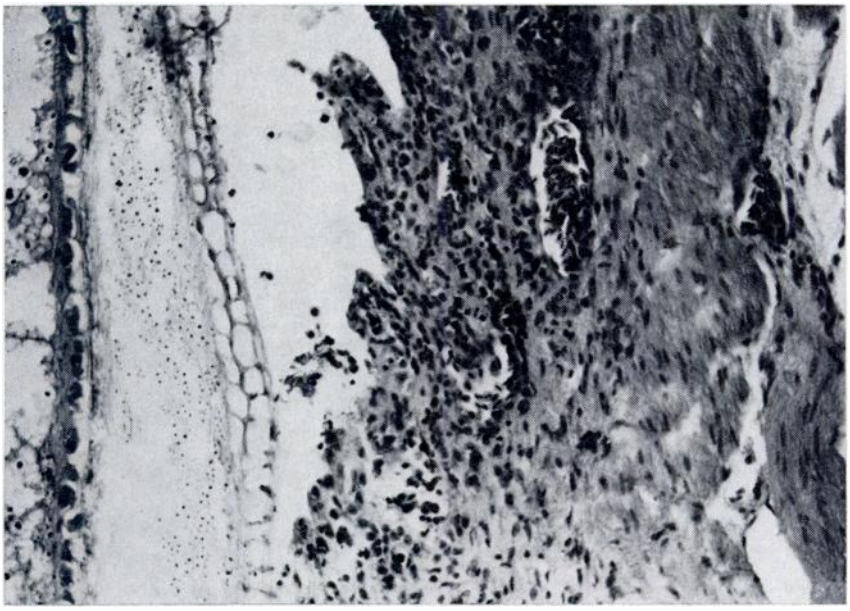

FIGURE 4. High power view of Fig. 3. The grain of corn is to the left. The solid tissue is denuded esophageal mucosa with diffuse lymphocytic infiltration. H. and E. X 180.

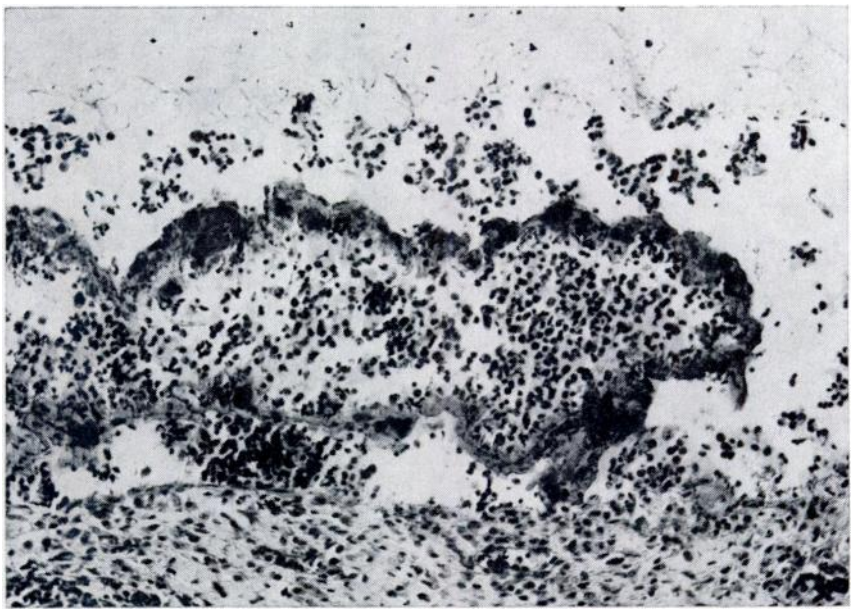

FIGURE 5. High power view of an esophagus to show the bacterial colonies which appear as dark smudges. Many heterophils are shown in this field. H. anl E. X 180.

Esophagus

A diphtheritic membrane about 2.0 mm. thick was the most striking feature. The epithelium was completely obliterated and the membrane seemed adhered to the muscular coats (Fig. 3). Lymphocytes were everywhere (Fig. 4) and frequently formed nodules. Bacterial colonies were numerous as in the oral cavity. Food material was trapped in the lumen, but never were we able to find either eggs or worms. Bacterial colonies (Fig. 5) were commonplace. The lesions halted at the juncture of the esophagus and the proventriculus. The other organs examined were considered normal.

DISCUSSION

The significant lesion was the diphtheritic membrane. Its effects were mechanical as it prevented normal esophageal activity both by its size and apparently sticky surface. The birds were hungry enough or well enough to eat but obviously could not and thus starved.

The formation of the diphtheritic membrane was not exactly expected. In the intestine of the chicken *Capillaria obsignata*[4] caused no such change, yet this organ will form such a membrane if infected with *Eimeria brunetti*. Apparently some factor exists in *C. contorta* which elicits the violent destructive forces; one is more attracted to this thesis since marked lesions occurred in the esophagus yet worms or eggs were not always seen in this area. The oral fluids drained directly into the esophagus and probably caused the lesion. Worms were found in both trachea and esophagus of 24 of the 71 birds examined while 45 had worms in the mouth only, and 1 in the esophagus only. This suggests that the reaction is more than just a mechanical one.

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LITERATURE CITED

1. BOYD, E. M., R. L. DIMINNO, and C. NESSLINGER. 1956. Metazoan parasites of the blue jay, *Cyanocitta cristata* L. J. Parasitol. 42: 332-346.
2. CRAM, E. B. 1936. Species of *Capillaria* parasitic in the upper digestive tract of birds. U.S.D.A. Bull. No. 516, Washington, D.C.
3. HUNG, S. L. 1926. Pathological lesions caused by *Capillaria annulata*. North Am. Vet. 7: 49-50.
4. JORTNER, B. S., C. F. HELMBOLDT, and R. P. PIROZOK. 1967. Small intestinal histopathology of spontaneous capillariasis in the domestic fowl. Avian Diseases 11: 154-169.
5. MADSEN, H. 1951. Notes on the species of *Capillaria* Zeder 1800 known for gallinaceous birds. J. Parasitol. 37: 257-265.
6. TRAINER, D. O., S. D. FOLZ, and W. H. SAMUEL. 1968. Capillariasis in the gyrfalcon. The Condor 70: 276-277.
7. WEHR, E. 1948. A cropworm, *Capillaria contorta*, the cause of death in turkeys. Proc. Helminth. Soc. Wash. 15: 80.

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