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# Gastro-Intestinal Helminths of Illinois Bobwhites

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GASTRO-INT ESTINAL HELMINTHS

OF ILLINOIS BOBWHITES  
(TITLE)

BY

Michael Eugene Gordon

**THESIS**

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS  
FOR THE DEGREE OF

Master of Science

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY  
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1972  
YEAR

I HEREBY RECOMMEND THIS THESIS BE ACCEPTED AS FULFILLING  
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## Gastro-Intestinal Helminths of Illinois Bobwhites

Abstract: The viscera of 103 bobwhite quail (Colinus virginianus), from east central Illinois counties, were collected during November and December of 1971 and examined for helminth parasites. Two nematodes were identified: Dispharynx nasuta (9.7%) and Ascaridia sp. (7.8%). The rate of infection varied significantly between counties but there was no difference in parasitism of males and females.

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Parasites of man and most domestic animals have been studied more than those of wild animals. Although the bobwhite quail (Colinus virginianus) is one of the major game birds in Illinois, only one study of the parasites in this bird has been reported (Leigh, 1940). As a result, little is known about the parasites of Illinois bobwhites. This is a report of the gastro-intestinal helminths from bobwhites in five east central Illinois counties.

## METHODS

Bobwhites were collected by hunting from Clark, Cumberland, Lawrence, Marion and Wayne counties in Illinois during November and December of 1971. The entire digestive tract was removed from each bird and refrigerated. Visceras were transferred to formalin-acetic acid solution (Altman, 1956) within 12 hours. Each digestive tract was

divided into sections (trachea, esophagus, crop, proventriculus, ventriculus, intestine, ceca and cloaca), cut open and examined for parasites using a dissecting microscope. The horny lining was removed from the ventriculus and both surfaces examined. All parasites were identified with the aid of standard reference (Yamaguti, 1961).

## RESULTS

One hundred and three bobwhite quail were collected from five east central Illinois counties and examined for helminth parasites. Two species of nematodes were found, but no cestodes, trematodes and acanthocephalans were present (Table 1).

Dispharynx nasuta (D. spiralis) (Fig. 1) was present in the proventriculus of quail in Clark, Cumberland and Lawrence counties. The nematode was attached to the epithelial lining (often in clusters) and visible lacerations were present. The number of parasites per infected bird averaged 1.7 and ranged from 1 to 8. The range and mean of the greatest length and width of males was 7.91mm to 8.67mm (ave. - 8.24mm) and 0.48mm to 0.57mm (ave. - 0.52mm) respectively and for females 8.66mm to 9.75mm (ave. - 9.14mm) and 0.95mm to 1.02mm (ave. - 0.99mm) respectively.

Ascaridia sp. (Fig. 2) occurred in the small intestine of birds in Lawrence, Marion and Wayne counties. The parasite was not attached to the intestinal lining and no pathological change could be attributed to the species. The number of parasites per infected bird averaged 2.8

Table 1. Gastro-intestinal helminthes of bobwhite quail in five east central Illinois counties.  
No cestodes, trematodes or acanthocephalans were found.

COUNTY	No. of Birds Examined	<u>Dispharynx nasuta</u>				<u>Ascaridia sp.</u>			
		<u>Birds Infected</u>		<u>Parasites per Bird</u>		<u>Birds Infected</u>		<u>Parasites per Bird</u>	
		No.	%	mean	range	No.	%	mean	range
Clark	41	3	7.3	1.3	1-2	-	-	-	-
Cumberland	11	1	9.1	1.0	-	-	-	-	-
Lawrence	20	6	30.0	2.7	1-8	3	15.0	5.0	1-13
Wayne	15	-	-	-	-	1	6.7	1.0	-
Marion	<u>16</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>4</u>	<u>25.0</u>	<u>2.5</u>	<u>1-7</u>
TOTAL	103	10	9.7	1.7	1-8	8	7.8	2.8	1-13

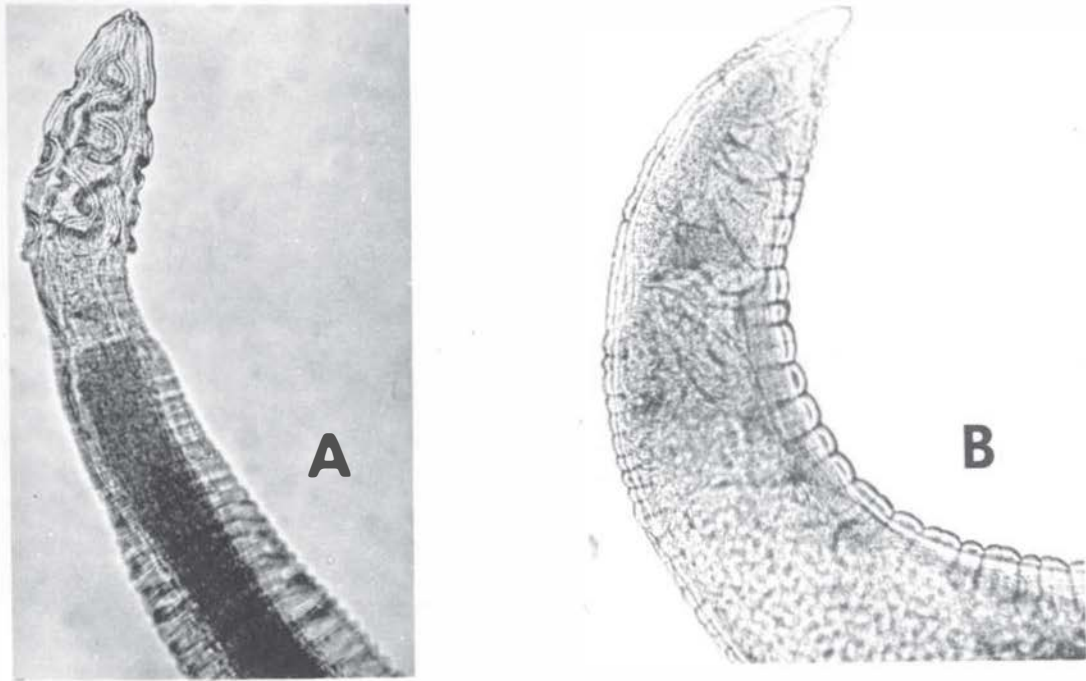


Fig. 1. Dispharynx nasuta from Colinus virginianus in east central Illinois. Anterior extremities (A) and posterior extremities (B) of mature female, lateral view.

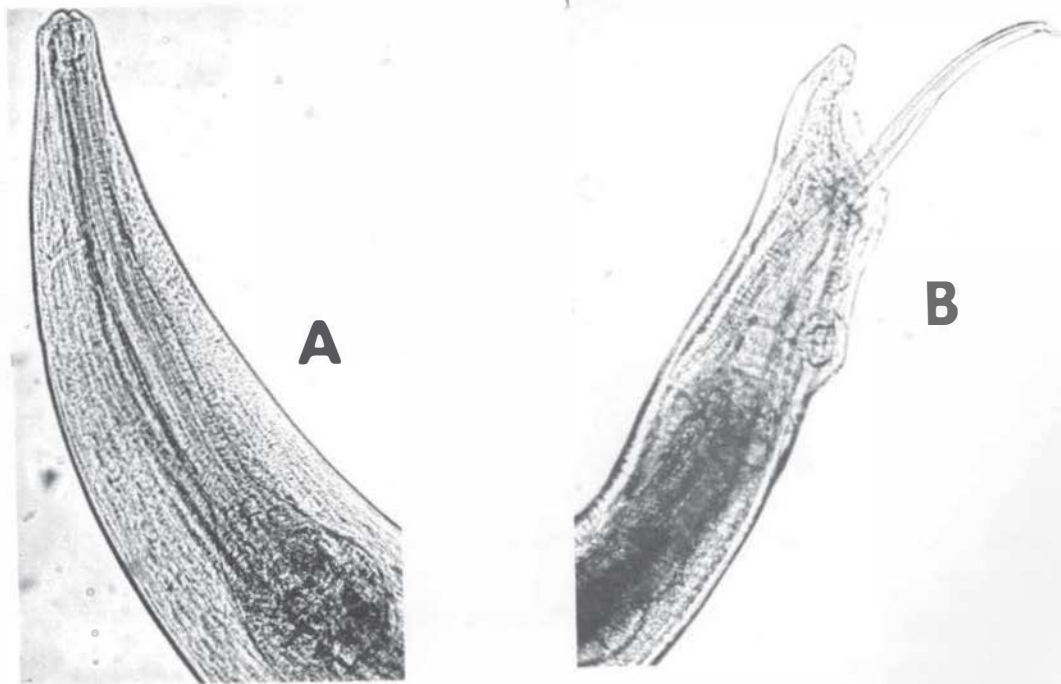


Fig. 2. Ascaridia sp. from Colinus virginianus in east central Illinois. Anterior extremities (A) and posterior extremities (B) of mature male, lateral view.



and ranged from 1 to 13. The range and mean of the greatest length, width and length of the esophagus of the males was 9.86mm to 10.37mm (ave. - 10.06), 0.68mm to 0.75mm (ave. - 0.71mm) and 1.86mm to 1.95mm (ave. - 1.92mm) respectively and for females 10.51mm to 13.87mm (ave. - 11.76mm), 0.81mm to 0.94mm (ave. - 0.89mm) and 1.92mm to 2.27mm (ave. - 2.09mm) respectively.

There was no difference in the incidence of parasitism in males or females with either parasite. The rate of infection did vary significantly between the counties studied. On the basis of birds infected per county, Marion and Lawrence counties had a significantly higher rate of infection ( $P = 95\%$ ) than the other counties tested.

## DISCUSSION

Bobwhite quail in the east central Illinois counties studied are not heavily infested with gastro-intestinal helminth parasites. Lawrence county had the highest incidence of infection. Although 45% of the quail were infected, 67% of these birds harbored only one parasite. Clark, Cumberland, Marion and Wayne counties had a very low incidence of infection. Similar low levels of infection were reported in the only other study of helminth parasites in Illinois quail (Leigh, 1940). In that survey bobwhites harbored the nematodes Heterakis bonasae (12.8%), H. gallinae (21.9%) and Subulura strongylina (7.9%). Cestodes, Rhabdometra odiosa and Hymenopsepis sp., were taken from the bobwhite in only two instances. The limited number of species found in Illinois



may reflect several factors. Other parasites species may have been present but they were not contacted by the coveys sampled. The density of quail may also have been so low that the chance of transmission of the parasite from one area to another was reduced. Or parasites may not be present due to environmental conditions, such as soil type, temperature and pH, that are unfavorable for the parasites life outside of the host.

In contrast to the relative low number of helminths in Illinois, Stoddard (1932) reported 16 species of nematodes and 5 species of cestodes from quail in the southeastern United States. Similar high infections have been reported from the same area by Cram et al. (1931), Ward (1945) and Kellogg and Prestwood (1968). The incidences of infection from these two areas also differ radically. Leigh (1940) reported the incidence from Illinois quail to range from 0.71% to 22.0% while Kellogg and Prestwood (1968) found the quail in Florida and Georgia to range in incidence from 8.0% to 100%.

The spiral stomach worm, Dispharynx nasuta, is an important helminth parasite in game birds. Dispharynxiasis has no known treatment or control. Bump (1935) reported that this parasite was the most serious species found in wild game birds in New York. Goble and Kutz (1945) have reported this nematode to have a high incidence in ruffed grouse. Heavy infestations have caused the death of many pigeons in southern United States (Cram, 1927). D. nasuta infected birds of three counties in this study (Table 1) with an average of 1.7 parasites per

bird. This incidence was below a lethal or dangerous level. This parasite has been reported from quail in New Jersey (Beaudette and Hudson, 1930; Cram, 1931), Ohio (Venard, 1933), North Carolina and New York (Goble and Kutz, 1945) and Georgia and Florida (Kellogg and Prestwood, 1968).

The intestinal roundworm, Ascaridia sp., is a parasite of several species of birds, but the bobwhite quail has been reported to harbor only two species of this nematode. Ascaridia compar was reported in Florida by Walton (1927) and A. lineata was found by Cram et al. (1931) in Georgia. This nematode from Illinois quail was not identified to species.

Large numbers of Ascaridia can lead to obstruction and even rupture of the intestine which results in the death of the host (Wehr, 1971). Wehr and Shaldop (1963) observed lesions on the liver of experimentally infected birds. Since heavy infections are potentially lethal, frequent inspections for this helminth should be made. Drug therapy has provided successful deterrence although treatment of wild populations may be impractical (Wehr, 1971).

There was not a significant difference between the parasitism by either parasite of the male and female birds examined. Parmalee (1952) suggested that significant differences in parasitism should not be noted between sexes of quail since they feed and travel as a covey and become parasitized as a unit by contact with a source of contamination.

Variances in the incidence could have resulted since a small number of quail were examined from a total population of unknown density and the bobwhites were collected by hunting and not randomly selected. This survey included birds from only five Illinois counties and does not represent parasitism of all Illinois quail. Regional differences may occur due to differences in habitat, density and pressure of man and predators.

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Table 2. Helminths reported from the bobwhite quail in the United States, 1927-1971.

Helminths	Location*	Inci- dence (%)	Type of report and geographical location*	Author
TREMATODES				
<u>Harmostomum</u> sp.	sm. int.	-	case rept. -Md., N.C.	Cram <u>et al.</u> , 1931
CESTODES				
<u>Davainea</u> sp.	sm. int.	-	case rept. -Texas	Lehmann, 1953
<u>Hymenolepis cantaniana</u>	sm. int.	-	case rept. -Md. exp. inf.	Jones, 1930 Jones and Alicata, 1935
		0.71	case rept. -Ill.	Leigh, 1940
<u>Hymenolepis carioca</u>	sm. int.	-	sp. rev., case rept. - Fla., Ga., Va.	Cram <u>et al.</u> , 1931
		-	case rept. -Miss.	Ward, 1945a
		-	case rept. -Ga.	Kellogg and Prestwood, 1968
		2.98	case rept. -Ohio	Venard, 1933

\*Abbreviations used: case rept. - case report or survey; exp. inf. - experimental infection; sp. rev. - review of that specific disease or a specific parasite description; gen. rev. - mentioned in a general review of diseases; sm. int. - small intestine; provent. - proventriculus.

Table 2. (Cont'd.)

Helminths	Location	Incidence (%)	Type of report and geographical location	Author
<u>Paricterotaenia</u> <u>sp.</u>	sm. int.	0.35 -	case rept. -Texas case rept. -Texas	Webster, 1947 Lehmann, 1953
<u>Raillietina</u> <u>cesticillus</u>	sm. int.	- - 0.35 - 8-54	case rept. -Fla. sp. rev., case rept. -Fla. case rept. -Texas case rept. -Miss. case rept. -Fla., Ga.	Thomas, 1930 Cram <u>et al.</u> , 1931 Webster, 1944 Ward, 1945b Kellogg and Prestwood, 1968
<u>Raillietina</u> <u>colini</u>	sm. int.	0.35 - 1.4 8-58	sp. rev., case rept. -Texas case rept. -Texas case rept. -Tenn. case rept. -Fla., Ga.	Webster, 1944 Webster, 1947 Blakeney and Dimmick, 1971 Kellogg and Prestwood, 1968
<u>Raillietina</u> <u>klebergi</u>	sm. int.	15.4 - -	sp. rev., case rept. -Texas case rept. -Texas case rept. -Texas	Webster, 1947 Webster, 1951 Lehmann, 1953

Table 2. (Cont'd.)

Helminths	Location	Inci- dence (%)	Type of report and geographical location	Author
<u>Raillietina minuta</u>	sm. int.	1.33	sp. rev., case rept. -Texas	Webster, 1947
		-	case rept. -Texas	Webster, 1951
		-	case rept. -Texas	Lehmann, 1953
		2.9	case rept. -Ill.	Leigh, 1940
<u>Raillietina tetragona</u>	sm. int.	-	sp. rev., case rept. - Fla., Ga., S.C., Va.	Cram <u>et al.</u> , 1931
		0.34	case rept. -Texas	Webster, 1947
		0.14	case rept. -Texas	Parmalee, 1952
		-	case rept. -Texas	Lehmann, 1953
<u>Rhabdometra odiosa</u>	sm. int.	2-9	sp. rev., case rept. - Fla., Ga.	Jones, 1929
		-	sp. rev., case rept. -Fla., Ga.	Cram <u>et al.</u> , 1931
		-	case rept. -Miss.	Ward, 1945a
		-	case rept. -Texas	Webster and Addis, 1945
		0.1	case rept. -Texas	Webster, 1947
		-	case rept. -Texas	Lehmann, 1953
		-	case rept. -N.C.	Neylans, 1952
		0.71	case rept. -Ill	Leigh, 1940
		33.0	case rept. -Ga.	Kellogg and Prestwood, 1968
		4.3	case rept. -Tenn.	Blakeney (personal communication)

Table 2. (Cont'd.)

Helminths	Location	Inci- dence (%)	Type of report and geographical location	Author
ACANTHOCEPHALANS				
<u>Disteganius colini</u>	not given	-	case rept. -Texas	Lehmann, 1953
<u>Onicola canis</u>	immature worms encyst- ed outside crop and esophagus	-	case rept. -N.C., Mexico	Cram, 1931
<u>Mediorhynchus colini</u>	sm. int.	0.67	sp. rev., case rept. -Texas	Webster, 1948
		1.54	case rept. -Texas	Parmalee, 1952
NEMATODES				
<u>Aproctella stoddardi</u>	free in body cavity	-	sp. rev., case rept. -Fla., Ga.	Cram <u>et al.</u> , 1931
		-	sp. rev., case rept. - Fla., Ga., S.C.	Cram, 1939
<u>Ascaridia compar</u>	sm. int.	-	case rept. -Fla	Walton, 1927
<u>Ascaridia lineata</u>	sm. int.	-	case rept. -Ga.	Cram <u>et al.</u> , 1931

Table 2. (Cont'd.)

Helminths	Location	Incidence (%)	Type of report and geographical location	Author
<u>Aulonocephalus lindquisti</u>	ceca	92.0	case rept. -Texas	Webster and Addis, 1945
		88.5	case rept. -Texas	Webster, 1947
		-	case rept. -Texas	Lehmann, 1953
<u>Capillaria annulata</u>	crop	-	case rept. -Fla.	Thomas, 1930
		-	case rept. -Va.	Cram <u>et al.</u> , 1931
		-	gen. rev., sp. rev.	Cram, 1936
<u>Capillaria contorta</u>	crop	-	gen. rev., case rept. -N. J.	Cram, 1930a
		-	exp. inf.	Cram <u>et al.</u> , 1931
		-	gen. rev., sp. rev., -N. C.	Cram, 1936
		-	case rept. (drug study) -N. Y.	Colglazier <u>et al.</u> , 1967
		8-10	case rept. -Ga., S. C.	Kellogg and Prestwood, 1968
<u>Capillaria obsignata</u>	sm. int.	-	gen. rev., sp. rev.	Read, 1949
<u>Capillaria retusa</u>	sm. int. and ceca	-	exp. inf.	Cram <u>et al.</u> , 1931

Table 2. (Cont'd.)

Helminths	Location	Inci- dence (%)	Type of report and geographical location	Author
<u>Cheilospirura spinosa</u>	under gizzard lining	-	exp. inf.	Cram, 1929a
		-	sp. rev., case rept. -Tenn., Va.	Cram <u>et al.</u> , 1931
		25.0	case rept. -Fla.	Kellogg and Prestwood, 1968
		19.3	sp. rev., case rept. -Tenn.	Blakeney and Dimmick, 1971
<u>Diplotriaenoides minutus</u>	body cavity	-	case rept. -Fla.	Walton, 1927
<u>Dispharynx nasuta</u> ( <u>Dispharynx spiralis</u> )	provent.	-	case rept. -N. J.	Beaudette and Hudson, 1930
		-	exp. inf.	Cram, 1930b
		-	gen. rev., case rept. -N. J.	Cram, 1931
		10.44	case rept. -Ohio	Venard, 1933
		-	gen. rev., case rept. -N. C.	Moore, 1933
		-	gen. rev.	Shillinger and Morley, 1937
		-	gen. rev., case rept. -N. Y.	Goble and Kutz, 1945
		8.0	case rept. -Ga., Fla.	Kellogg and Prestwood, 1968

Table 2. (Cont'd.)

Helminths	Location	Inci- dence (%)	Type of report and geographical location	Author
<u>Gongylonema ingluvicola</u>	crop and esophagus	-	sp. rev., case rept. -Ga.	Cram <u>et al.</u> , 1931
<u>Habronema bialatum</u> ( <u>Spirotere bialata</u> ) ( <u>S. tenuis</u> )	provent.	-	case rept. -Fla.	Walton, 1927
<u>Habronema pilaeta</u>	provent.	-	sp. rev., case rept. -Ga.	Cram <u>et al.</u> , 1931
		-	case rept. -Miss.	Ward, 1945a
<u>Heterakis bonasae</u>	ceca	-	sp. rev., case rept. - Ala., Ga., Mass., Miss., N.C., S.C.	Cram <u>et al.</u> , 1931
		13.41	case rept. -Ohio	Venard, 1933
		-	case rept. -Miss.	Ward, 1945b
		92-100	case rept. -Fla., Ga.	Kellogg and Prestwood, 1968
		12.8	case rept. -Ill.	Leith, 1940
		92.9	sp. rev., case rept. -Tenn.	Blakeney and Dimmick, 1971



Table 2. (Cont'd.)

Helminths	Location	Inci- dence (%)	Type of report and geographical location	Author
<u>Heterakis gallinarum</u>	ceca	-	case rept. -Pa.	Canavan, 1929
		-	sp. rev., case rept. -Va.	Cram <u>et al.</u> , 1931
		37.31	case rept. -Ohio	Venard, 1933
		4.75	case rept. -Texas	Paramalee, 1952
		25.0	case rept. -Ga., S.C.	Kellogg and Prestwood, 1968
		22.0	case rept. -Ill.	Leigh, 1940
<u>Physaloptera</u> sp.	immature worms encyst- ed in breast muscle	-	case rept. -Wis.	Cram, 1931
		-	case rept. -La.	Dixon and Robertson, 1967
<u>Seurocyrnea colini</u>	provent.	-	sp. rev., case rept. -Ga.	Cram, 1927a
		-	case rept. -Pa.	Canavan, 1927
		-	case rept. -N.J.	Beaudette and Hudson, 1930
		-	sp. rev., case rept. - Ala., Fla., Ga., Miss., N.C., S.C.	Cram <u>et al.</u> , 1931
		2.98	case rept. -Ohio	Venard, 1933
		-	case rept. -Miss.	Ward, 1945b
		14.9	case rept. -Ill.	Leigh, 1940

Table 2. (Cont'd.)

Helminths	Location	Incidence (%)	Type of report and geographical location	Author
<u>Strongyloides avium</u>	ceca and sm. int.	- -	sp. rev., exp. inf. sp. rev.	Cram, 1929b Cram <u>et al.</u> , 1931
<u>Subulura brumpti</u>	ceca	- - 0.84	case rept. -Pa. case rept. -Miss. case rept. -Texas	Canavan, 1929 Ward, 1945a Parmalee, 1952
<u>Subulura strongylina</u>	ceca	- 11.94 7.8	sp. rev., case rept. -Ga., N.C. case rept. -Ohio case rept. -Ill.	Cram <u>et al.</u> , 1931 Venard, 1933 Leigh, 1940
<u>Syngamus americana</u>	trachea	-	checklist	Yamaguti, 1961
<u>Syngamus trachea</u>	trachea	- - - - - -	gen. rev. sp. rev., case rept. -Va. gen. rev. case rept. -Miss. case rept. -Texas case rept. -Texas	Cram, 1930a Cram <u>et al.</u> , 1931 Shillinger and Morley, 1937 Ward, 1945a Webster and Addis, 1945 Lehmann, 1953

Table 2. (Cont'd.)

Helminths	Location	Inci- dence (%)	Type of report and geographical location	Author
<u>Tetrameres americana</u>	glands of provent.	-	sp. rev., case rept. -Ga., Va.	Cram <u>et al.</u> , 1931
		50.0	case rept. -Fla.	Kellogg and Prestwood, 1968
<u>Tetrameres pattersoni</u>	glands of provent.	-	gen. rev., case rept. -N.C.	Cram, 1931
		-	sp. rev., case rept. -Md., N.C.	Cram and Jones, 1933
<u>Trichostrongylus tenuis</u>	ceca	-	case rept. -Ga.	Cram, 1925
		-	sp. rev., case rept. -Ga.	Cram, 1927a
		-	gen. rev.	Cram, 1927b
		-	sp. rev., case rept. -Ala., Fla., Ga., Miss., S.C., Tenn.	Cram <u>et al.</u> , 1931
		-	sp. rev.	Cram and Wehr, 1934
		-	gen. rev.	Shillinger and Morley, 1937
		-	case rept. -Miss.	Ward, 1945b
		8-92	case rept. -Fla., Ga., S.C.	Kellogg and Prestwood, 1968

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