Prevalence of Nematode Parasites in Cattle Egret (*Bubulcus Ibis*) in Egypt

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Abstract:

The present study was aimed to determine the nematode parasites infesting cattle egrets (*Bubulcus ibis*) and its role in maintenance of such parasites in nature or transmission of these parasites to other species of wild birds and domestic birds, mammals, fish and human being especially after dramatic increase of cattle egret's population inside the urban areas. During this study, a total of 106 cattle egrets *(Bubulcus ibis*) were examined and eight species of nematodes were detected. The detected species; *Desportesius invaginatus* (85.84%), *Microtetrameres spiralis* (67.92), *Porrocaecum* sp. (26.41%), *Microtetrameres helix* (23.58%), *Tetrameres* sp. (10.37%), *Microfilaria* (2.83%), *Gnathostoma* sp. larvae (1.88%) and *Anisakis* sp. larvae (0.94 %). Five factors (habitat, area of collection, sex, age and season) affecting the prevalence of nematodes in cattle egrets as well as the pathological effects of these parasites on cattle egrets were studied.

Introduction:

The cattle egret plays an important role in the biological control of agriculture enemies such as insects and mollusks. Moreover, they feed on the intermediate hosts of human, birds and animal's parasites ***(Mahdy, 1991; Abbas, 1997 and Tantawy, 1997).*** On the other hand, cattle egret can transmit many parasitic diseases to domestic birds ***(Torres et al, 1991*** *and* ***Mattucci et al, 2008).***

Cattle egret and other wild birds play an important role in the transmission of dangerous parasitic diseases to domesticated birds, mammals and man either by direct or indirect means. Many of zoonotic parasites of wild birds continues to represent important threats to the health and well being of humans in developing and industrialized countries ***(Abdel Aziz, 1997).***

The aim of this work is to study the prevalence and pathogenic effect of nematode parasites that can infest the cattle egret and also determine the effect of five factors; habitat, area of collection (locality), season, age and sex of the cattle egret in the prevalence of these parasites in

cattle egret in two localities in Egypt.

Material and Methods:

During the period extended from September 2013 to August 2014, one hundred and six cattle-egrets were hunted by net traps and divided into five groups according to: habitat (rubbish collecting areas in urban areas 24 and agriculture area 82), area of collection (Ismailia 44 and Sharkia 62), sex (male 68 and female 38), age (adult 46 and young 60) and season (autumn 18, winter 18, spring 40 and summer 30).

Cattle egrets were subjected to ante-mortem and post-mortem parasitological examination. Fecal examination was carried out by direct smear method and flotation technique according to ***Levine (1985).*** The visceral organs especially gastrointestinal tract were examined carefully for helminth parasites and any worms were collected, washed and counted according to ***Reid (1962)*** *and* ***Bisset et al (1996)***. The nematode parasites were fixed in alcohol glycerol (5% glycerol- alchol 70%), cleared in lactophenol and permanently mounted in glycerol-gelly according to ***Pence and Dowler (1979).***

Blood samples were colleted from the wing vein and thin blood smears were carried out according to ***Foreyt (1989),*** stained with Giemsa and examined under oil immersion lens for *Microfilaria.*

Result and discussion

Prevalence of nematode parasites in the examined cattle egrets:

As shown in Table (1), the prevalence of nematode parasites was (90.56%) in the present study; this result was fluctuated between ***Mahdy and EL-ghayish (1998)*** (85%) in Giza and ***Ahmed (1994)*** (95.20**%)** while a lower prevalence was recorded by**,** ***Hassan and Abde-Aal (1999)*** (70%), ***Aboel Hadid and Lofty, (2007)*** (46%) and ***El Sokkary (2013)*** (65%).

In our opinion, the higher infestation rate of parasites in the current study may be related to the wide area of investigation (two governorates: Ismalia and Sharkia and two different habitats; Agriculture and Rubbish collecting area) that may increase the availability of intermediate hosts and the possibility of infestation.

Regarding to the detected nematodes, *Desportesius (Synhimantus) invaginatus* (Fig. 1, 2&3) was recorded in (85.84%) of the examined cattle egrets, this result was in agreement with ***Mousa and Mahdy (1998)*** (80%) from Giza while a lower prevalence was recorded by ***El Sokkary (2013)*** from Behara Province (64%)**,** ***Aboel Hadid and lofty (2007)*** from Beni Suef (30%), ***Navarro et al (2005)*** (77.78%) and ***Stuart (1972)*** (47%). A higher prevalence was recorded by ***El-Seify et al (2005)*** from Kafr El Sheikh (95%), ***El Bakery (2011)*** in some areas in Alexandria and Behera Governorates (94.3) and

Ahmed (1994) in Zagazig province (95.20%).

The difference in the prevalence of *Desportesius (Synhimantus) invaginatus* may explained as reported by ***El Sokkary (2013)*** that related to the difference of locality and the abundance of intermediate hosts.

Microtetrameres spiralis (Fig. 4&5) was recovered from (67.92%) of examined cattle egrets *(Bubulcus ibis*), nearly a similar result was recorded by ***Stuart (1972)*** (73%). A higher prevalence was recorded by ***Navarro (2005)*** (77.78%) while a lower one was recorded by ***Ahmed (1994)*** (4.70%).

In the present study, *Microtetrameres helix* (Fig. 6&7) was recovered from (23.58%) of the examined cattle egrets *(Bubulcus ibis*). According to the available literature, the present study considers the first one that recorded the infestation of cattle egret with *Microtetrameres helix.*

Microtetrameres helix was firstly described by ***Cram (1927)*** in crow and recorded by ***Oschmarin (1956)*** in black crow and magpie. Also recorded by ***Ellis (1972)*** in Australian birds as corvids and hornbill.

Porrocaecum sp. (Fig. 8, 9&10)) was recovered from **(**26.41%) of the examined cattle egret *(Bubulcus ibis*) in the current study. A lower rate was recorded by ***El Bakery (2011)*** in some areas in Alexandria and Behera Governorates (14.2%) and ***El Sokkary (2013)*** in Behara Province (2%).

Tetrameres sp. (Fig. 11, 12& 13) was detected in (10.37%) of the examined cattle egret *(Bubulcus ibis*) in the present study. A higher prevalence was detected by ***Mousa and Mahdy (1998)*** (40%) while a lower one was recorded by ***Ahmed (1994)*** (4.7%) and ***El Sokkary (2013)*** (4%).

Regarding to *Anisakis* species larvae (Fig 14&15), it was detected in one bird only from a total of 106 examined cattle egret with a prevalence of 0.94%. According to the available literatures, the current study is considered to be the first one recorded the infestation of cattle egret with *Anisakis* species larvae.

.In our opinion, this larvae may be taken in the fish food of cattle egret and not reaching the maturity as the cattle egret is not a suitable final host.

Nemeth et al (2012) reported that the sever infestation with *Anisakis* sp. was recorded in young and immunocompromised birds and cause dehydratation and emaciatation of the infested birds.

Anisakis sp. consider as zoonotic nematode parasites where Anisakids pose a risk to human health through intestinal infestation with worms from the eating of undercooked fish ***(Amato et al, 2007)*** so in our opinion the cattle egret *(Bubulcus ibis*) may act as a paratenic host that preserve the *Anisakis* larvae in nature till found a favorable

condition to infest the fish, marine mammals or the human.

Regarding *Gnathostoma* larvae (Fig 16&17), it was recovered from only two birds of total 106 examined cattle egret *(Bubulcus ibis*), in the present study. According to the available literature, the current study is considered to be the first one recorded the infestation of cattle egret with *Gnathostoma* larvae.

*Gnathostom*a sp. can affect the human through ingestion of contaminated food with third larval stage and it is highly recorded in Japan and Southeast Asia ***Herman and Chiodini (2009)***. It causes nonspecific signs and symptoms in the patient such as malaise, fever, urticaria, anorexia, nausea, vomiting and diarrhea.

In our opinion, the cattle egret *(Bubulcus ibis*) may plays a role in preserve such nematode in the nature by acting as a paratenic host till the third larval stage found the best condition to infest the definitive host (dog) or infest the human.

In the current study, unidentified *Microfilaria* (Fig. 18) was found in (2.83 %) from the examined cattle egret *(Bubulcus ibis*). ***Galindo and Sousa (1966)*** examined 23 blood smears from green herons and only one smear recorded *Microfilaria*. ***Abdel Aziz (1997)*** found that the prevalence of *Microfilaria* in different wild birds was (2.66%). ***Savag et al (2004)*** examined different wild birds from Madagascar and found that the prevalence of *Microfilaria* was (11%). ***Valkiunas et al (2005)*** found the prevalence *Microfilaria* was (3.9%) in wild birds from Uganda. ***Silveria et al (2010)*** recorded that the prevalence of *Microfilaria* was (6.6%) in passerine birds from Brazil.

According to the available literature, the current study is considered to be the first one recorded the infestation of cattle egret with *Microfilaria* and further studies were needed to detect and identify the adult filorioid nematode.

Concerning to the pathological alterations (Fig 19&20) of nematode parasites isolated from gizzard of cattle egret, the characteristic lesions consist of ulceration and inflammation. The mucosa was partially or completely destroyed, and the parasites were found buried in a mass of degenerated and necrotic tissue. The gravid females caused pressure atrophy and necrosis of the proventricular gland mucosa, with complete loss of acini, but little or no inflammatory response around the parasites or in the compacted mucosa or submucosa. Occasional lesions were observed in the submucosa surrounded by a thin layer of fibrous material forming a cyst as shown in Fig (1&2). This result was in agreement with ***Schulman et al (1992)*** *and* ***Bergan et al (1994).***

In the present study, five factors (habitat, area of collection, sex, age and season) affecting the prevalence of parasites in cattle egrets were studied.

Regarding the habitat, the normal habitats of cattle egret were irrigated grasslands (with ponds, small impoundments, wells, canals, small rivers and streams), livestock pastures, shallow marshes ***(Kushlan and Hancock, 2005)***, freshwater swamps, rice-fields, wet pastures ***(Del Hoyo et al, 1992).*** In the urban area, the rubbish collecting areas are the most attractor sites for the presence of cattle egrets as it provide with a plenty of food and abundance of flies and insects.

In the current study, as shown in Table (2) there is no significant difference between the rubbish collecting area (in urban area) and the agriculture ($P > 0.05$) in the general infestation of nematodes that may explained as the cattle egrets are highly mobile birds with large home range and high dispersal ability **(Arendt, 1988)** so the cattle egrets may collect between the two habitat and hence between the intermediate host of the two habitat, but when dealing with each parasite independently, *Microfilaria* (12.5%) showed a higher significant difference in rubbish collecting area ($P \leq 0.01$) and that may explained as *Microfilaria* needs arthropod vectors (flies) as intermediate host **(Bartlett, 2009)** and the rubbish collecting area is the best attractor for flies.

Regarding the area of collection (locality) as shown in Table (3), the general infestation of trematodes, nematodes and Protozoa was not showed any significance differences between Ismalia and Sharkia ($P > 0.05$) but when dealing with each parasite independently, *Porrocaecum* sp. (35.48%) was showed a significant difference in Sharkia ($P \leq 0.05$) and that may return to Sharikia governorate considered as Agricultural province so the aquatic intermediate hosts were available to complete the life cycle of such parasites while *Microtetrameres helix* (43.18%) showed a higher significance difference ($P \leq 0.01$) in Ismalia and explained in our opinion as Ismailia governorate considered as a coastal province with high rubbish contents so the terrestrial intermediate hosts were available to complete the life cycle of such parasite.

Regarding the sex of cattle egrets as shown in Table (4), no significant difference between the male and female cattle egrets in the infestation with nematodes ($P > 0.05$) that may explained as both the male and female cattle egrets make the same activity from foraging for food, building the nest, incubation of eggs and even rearing the young ***(Telfair, 2006)*** so the possibility of getting infestation was similar in the both sexes.

Concerning the age of cattle egrets as shown in Table (5), the infestation with nematodes showed no significant differences between

adult and young cattle egret (P> 0.05) and that may explained as the Parents fed their young biparentally, through mouth to mouth, regurgitation of food boluses onto nest floor, from which chicks would peck and through bill grabbling and jerking pull on the parent bill, to receive food boluses obtained from foraging sites **(Sharah *et al,* 2008**) that means there is no milky secretion used by the parents to feed the young birds and the food of the young birds is the same one of the adult so the infestation with parasites in young is similar to that of the adult. But when dealing with each parasite independently, *Porrocaecum* sp. (36.66%) showed a significant difference in the young age (P≤0.05) while a higher significant difference in the adult (P ≤ 0.01) was showed in *Microtetrameres helix* (41.3%).Concerning the effect of season on the prevalence of infestation in cattle egrets in the current study as shown in Table (6), the prevalence of general infestation with nematodes was (Autumn 77.77%, Winter 88.88%, Spring 90% and Summer 100%). A lower prevalence was recorded by ***Ahmed (1994)*** in nematodes (Autumn 23.70%, Winter 33.30%, Spring 21.70% and Summer 22.70%).

In the present study, the prevalence of general infestation with nematodes did not show a significant difference with change of seasons (P> 0.05) and that may explained as the cattle egret has a wide range of prey ***(Seedikkoya et al, 2007)*** and did not depend on a specific food item. In addition to cattle egret catch any available prey, which came across their ways during the course of foraging activities. ***(Sharah et al, 2008)*** so it was considered as opportunistic predator feeding on any abundant and accessible prey ***(kushlan and Hafner, 2000).***

In our opinion, the cattle egret can accommodate on its feeding nature with the seasonal changes as it can find an alternative preys (intermediate hosts) regardless the season.But when dealing with each parasite independently, a significant difference (P ≤0.05) was recorded in *Desportesius invaginatus* (100%) and a higher significant difference was (P ≤ 0.01) in *Microtetrameres spiralis* (93.33%) and *Porrocaecum* sp. (53.33%) in Summer.

While *Gnathostoma* sp. larvae (11.11%) showed a significant difference and *Microfilaria* (16.66%) and *Microtetrameres helix* (50%) showed a higher significant difference (P ≤ 0.01) in Winter.

Conclusion:

Although the cattle egret has many benefits as a biological control for insects, agriculture and animals pests, the caution must be considered when dealing with it especially after the dramatic increase of its numbers in urban areas and fish farms.

Tabel (1): *Prevalence of different species of nematode parasites in cattle egrets.*

Nematode	No. of infested / No. of examined	Prevalence %
Desportesius invaginatus	91/106	85.84
Microtetrameres spiralis	72/106	67.92
Microtetrameres helix	25/106	23.58
Porrocaecum sp.	28/106	26.41
Tetrameres sp.	11/106	10.37
Anisakis larvae	1/106	0.94
Gnathostoma larvae	2/106	1.88
Microfilaria	3/106	2.83

Table (2): *The prevalence of different nematodes in cattle egrets in relation to the habitat*

Nematode	Habitat	No. of infested/ No. of examined	Prevalence%	X^2	P value
Nematode	Rubbish	22/24	91.66	0.03	0.851
	Agriculture	74/82	90.24		
Desportesius invaginatus	Rubbish	21/24	87.5	0.004	0.94
	Agriculture	70/82	85.36		
Microtetrameres spiralis	Rubbish	18/24	75	0.35	0.55
	Agriculture	54/82	65.85		
Microtetrameres helix	Rubbish	9/24	37.5	2.409	0.12
	Agriculture	16/82	19.51		
Porrocaecum sp.	Rubbish	0/24	0	1.32	0.24
	Agriculture	28/82	34.14		
Tetramere sp.	Rubbish	3/24	12.5	5.15	0.99
	Agriculture	8/82	9.75		
Anisakis larvae	Rubbish	0/24	0	0.43	0.511
	Agriculture	1/82	1.21		
Gnathostoma larvae	Rubbish	2/24	8.33	3.19	0.074
	Agriculture	0/82	0		
Microfilaria	Rubbish	3/24	12.5	6.49	0.01*
	Agriculture	0/82	0		

***(Significant difference P ≤ 0.05) ** (highly significant P≤ 0.01)**

Table (3): *The prevalence of different nematodes in cattle egrets in relation to the area of collection.*

Nematode	area of collection	No. of infested/ No. of examined	Prevalence %	X^2	P value
Total nematode	Ismailia	38/44	86.36	0.82	0.36
	Sharkia	58/62	93.54		
Desportesius invaginatus	Ismailia	37/44	84.09	0.023	0.87
	Sharkia	54/62	87.09		
Microtetrameres spiralis	Ismailia	32/44	72.72	0.46	0.49
	Sharkia	40/62	64.51		
Microtetrameres helix	Ismailia	19/44	43.18	14.22	0.0002**
	Sharkia	6/62	9.67		
Porrocaecum sp.	Ismailia	6/44	13.63	5.24	0.022*
	Sharkia	22/62	35.48		
Tetramere sp.	Ismailia	7/44	15.9	1.56	0.21
	Sharkia	4/62	6.45		
Anisakis larvae	Ismailia	1/44	12.27	0.02	0.86
	Sharkia	0/62	0		
Gnathostoma larvae	Ismailia	2/44	4.54	0.94	0.331
	Sharkia	0/62	0		
Microfilaria	Ismailia	3/44	6.81	2.2	0.13
	Sharkia	0/62	0		

***(Significant difference P ≤ 0.05) ** (highly significant P≤ 0.01)**

Table (4): *The prevalence of different nematodes in cattle egrets in relation to the sex of cattle egrets.*

Nematodes	Sex	No. of infested/ No. of examined	Prevalence%	X^2	P value
Total nematodes	Male	64/68	94.11	1.76	0.18
	Female	32/38	84.21		
Desportesius invaginatus	Male	61/68	89.7	1.52	0.217
	Female	30/38	78.94		
Microtetrameres spiralis	Male	46/68	67.64	0.018	0.892
	Female	26/38	68.42		
Microtetrameres helix	Male	17/68	25	0.04	0.825
	Female	8/38	21.05		
Porrocaecum sp.	Male	20/68	29.41	0.49	0.47
	Female	8/38	21.05		
Tetramere sp.	Male	7/68	10.29	0.08	0.76
	Female	4/38	10.52		
Anisakis larvae	Male	1/68	1.47	0.08	0.76
	Female	0/38	0		
Gnathostoma larvae	Male	0/68	0	1.35	0.24
	Female	2/38	5.26		
Microfilaria	Male	1/68	1.47	0.26	0.60
	Female	2/38	5.26		

***(Significant difference P ≤ 0.05) ** (highly significant P ≤ 0.01)**

Table (5): *The prevalence of different nematodes in cattle egrets in relation to the age of cattle egrets.*

Nematodes	Age	No. of infested/ No. of examined	Prevalence %	X^2	P value
Total nematode	Adult	40/46	86.95	0.6	0.436
	Young	56/60	93.33		
Desportesius invaginatus	Adult	39/46	84.78	2.81	0.99
	Young	52/60	86.66		
Microtetrameres spiralis	Adult	32/46	69.56	0.011	0.914
	Young	40/60	66.66		
Microtetrameres helix	Adult	19/46	41.3	12.47	0.0004**
	Young	6/60	10		
Porrocaecum sp.	Adult	6/46	13.04	6.3	0.012*
	Young	22/60	36.66		
Tetramere sp.	Adult	7/46	15.21	1.23	0.26
	Young	4/60	6.66		
Anisakis larvae	Adult	1/46	2.17	0.017	0.89
	Young	0/60	0		
Gnathostoma larvae	Adult	2/46	4.34	0.82	0.36
	Young	0/60	0		
Microfilaria	Adult	3/46	6.52	2	0.15
	Young	0/60	0		

***(Significant difference P ≤ 0.05) ** (highly significant P ≤ 0.01)**

Table (6): *The prevalence of different nematodes in cattle egrets relation to the season.*

Parasites	Season	No. of infested/ No. of examined	Prevalence %	X^2	P value
Total nematodes	Autumn	14/18	77.77	6.64	0.08
	Winter	16/18	88.88		
	Spring	36/40	90		
	Summer	30/30	100		
Desportesius invaginatus	Autumn	14/18	77.77	7.21	0.06*
	Winter	14/18	77.77		
	Spring	33/40	82.5		
	Summer	30/30	100		
Microtetramere s spiralis	Autumn	14/18	77.77	16.85	0.0008**
	Winter	10/18	55.55		
	Spring	20/40	50		
	Summer	28/30	93.33		
Microtetramere s helix	Autumn	6/18	33.33	12.22	0.0066**
	Winter	9/18	50		
	Spring	4/40	10		
	Summer	6/30	20		

Porrocaecum sp.	Autumn	0/18	0	19.85	0.0002**
	Winter	2/18	11.11		
	Spring	10/40	25		
	Summer	16/30	53.33		
Tetramere sp.	Autumn	0/18	0	2.57	0.46
	Winter	2/18	11.11		
	Spring	5/40	12.5		
	Summer	4/30	13.33		
Anisakis larvae	Autumn	1/18	5.55	4.93	0.17
	Winter	0/18	0		
	Spring	0/40	0		
	Summer	0/30	0		
Gnathostoma larvae	Autumn	0/18	0	9.96	0.018*
	Winter	2/18	11.11		
	Spring	0/40	0		
	Summer	0/30	0		
Microfilaria	Autumn	0/18	0	15.09	0.001**
	Winter	3/18	16.66		
	Spring	0/40	0		
	Summer	0/30	0		

***(Significant difference P ≤ 0.05) ** (highly significant P ≤ 0.01)**

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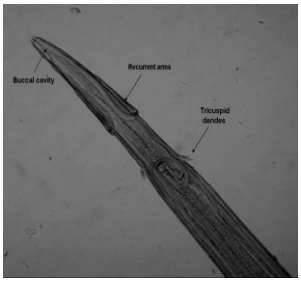


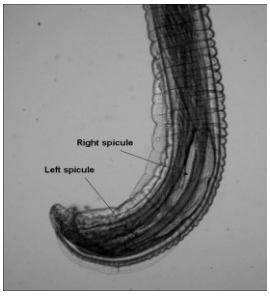
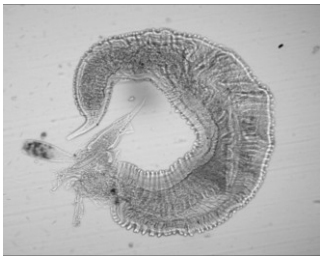


Fig. (1): *Desportesius invagenatus* (Anterior end)
Fig. (2): Desportesius invagenatus (Right and left spicule)



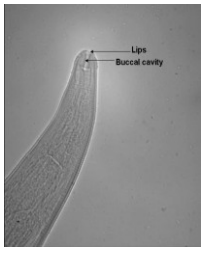
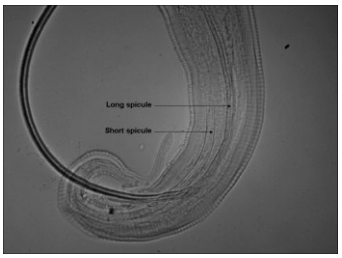


Fig. (3): *Desportesius invagenatus* (Vulva & Knob- shaped structure)
Fig. (4): *Microtetrameres spiralis* (Anterior end & Lips and Buccal cavity)



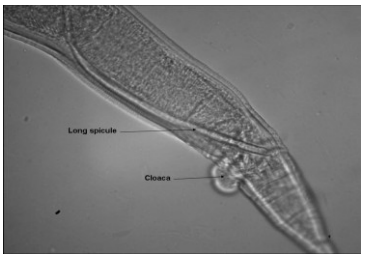
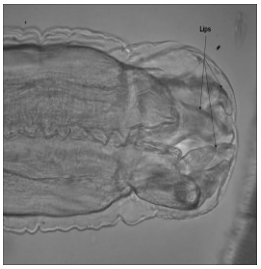


Fig. (5): *Microtetrameres spiralis* (Posterior end of male with spicules)
Fig. (6): *Microtetrameres helix* (Adult male)



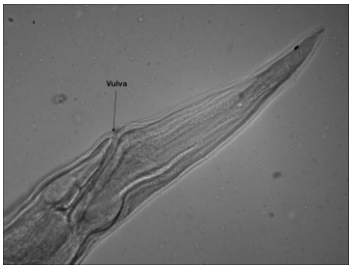
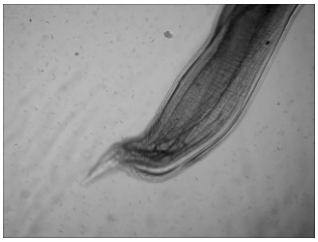


Fig. (7): *Microtetrameres helix* (posterior end of male showing cloaca and spicules)
Fig. (8): *Porrocaecum* sp. (The anterior end with three lips)



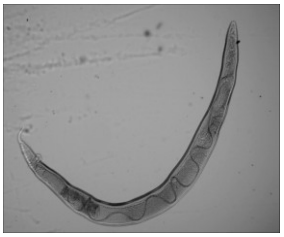
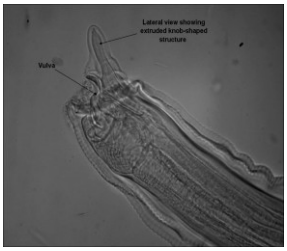


Fig. (9): *Porrocaecum* sp. (Posterior end of male)
Fig. (10): *Porrocaecum* sp. (Posterior end of female)



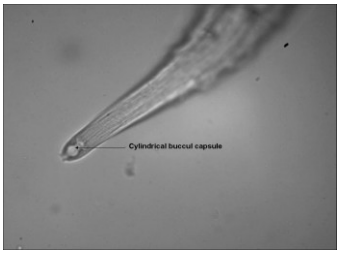
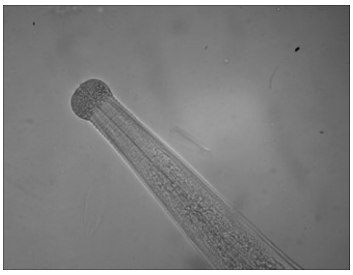


Fig. (11): *Tetramere* sp.(Adult female
Fig. (12): *Tetramere* sp.(Anterior end showing buccal capsule)

Fig. (13): *Tetramere* sp.(Posterior end of female showing larvated egg)
Fig. (14): *Gnathostoma* larva



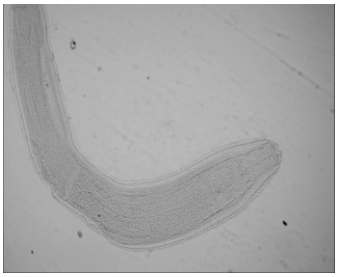
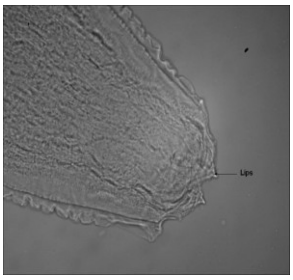


Fig. (15): *Gnathostoma* larva (Anterior end showing the head)
Fig. (16): *Anisakis* larva



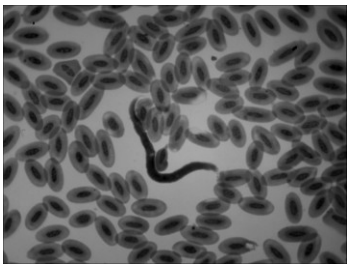
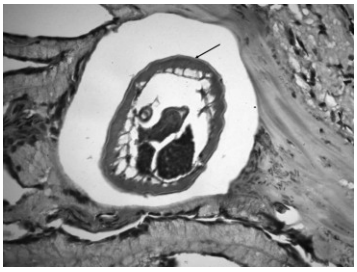


Fig. (17): *Anisakis* larva (Anterior end showing lips)
Fig. (18): *Microfilaria* sp.



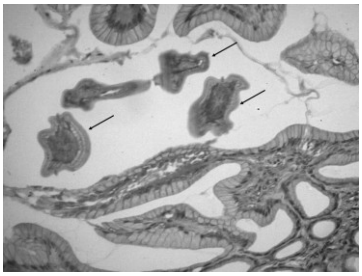


Fig. (19): Gizzard of cattle egret showing cross section of the parasitic nematodes (arrows) in the gizzard lumen. H&E. X 200.

Fig. (20): Gizzard of cattle egret showed diffusely hypertrophic proventricular mucosa and cross section of the parasitic nematode (arrow). H&E. X 400.

References:

Abbas Amany, A.R. (1997): Birds disease due to infestation of fish metacercaria. Ph.D poultry diseases. Zagazig Univ., Benha branch, Fac. Vet. med. Egypt.

Abdel Aziz, A. Y. (1997): Further studies on some blood parasites of wild birds. PhD. Thesis, Fac. Vet. Med. Zagazig Univ., Egypt.

Aboel Hadid, S.M. and Lotfy, H. S. (2007): Some studies on helminthes parasites of Buff Backed Heron (*Ardeola ibis ibis)* with special reference to the role in transmission of *Clinostomum complentum* in Benisuef Governorate. Benisuef Vet. Med. J., 17(1): 11-18.

Ahmed, N. M. (1994): Helminthes parasites of some wild birds. MVSc. Thesis, Fac. Vet. Med. Zagazig Univ., Egypt.

Amato, N.V.; Amato, J.G. and Amato, V.S. (2007): Probable recognition of human anisakiasis in Brazil. Rev. Inst. Med. Trop. Sao Paulo, 49(4): 261-262.

Arendt, W. J. (1988): Range Expansion of the Cattle Egret (*Bubulcus ibis*) in the Greater Caribbean Basin. Colonial Water birds.Water bird Society, 11(2): 252–262.

Bergan, J. F.; Radomski, A. A.; Pence, D. B. and Rhodes, O. E. (1994): *Tetrameres (Petrowimeres) striata* in ducks. Journal of Wildlife Diseases 30: 351–358.

Bisset, S.A.; Vlassoff, A.; Doch, P.G.C.; Jonas, W.E.; West, C.J. and Green, R.S. (1996): Nematode burdens and immunological responses following natural challenge in Romney lambs selectively bred for low or high fecal worm egg count. Vet. Parasitol., 61: 249- 263.

Cram, E. B. (1927): Bird parasites of Nematode suborder Strongylata, Ascaridata, and Spirurata. Bull. U.S.Nat. Mus., 140: 1-465.

del Hoyo, J.; Elliot, A. and Sargatal, J. (1992): Handbook of the bird of the world. Vol 1. ostrich to duck. Lynx Edition, Barcelona, Spain.

El-Bakery, K.M. and Al-Tyar, A.A.H. (2011): Studies on internal parasites of cattle egret and its role in the environmental pollution in some areas in Alexandria and Behera Governorates. Alexandria Journal of Veterinary Sciences, 33(1): 165-174.

Ellis, C.J. (1972): Comparative measurements and host and geographical distribution of species of *Microtetramere* (Nematoda : Tetrameridae). J. Parasitol., 55: 713- 719.

El-Seify, M. A.; Desouky, A.Y. and Pastawesy, R.I. (2005): The role of migratory birds in environmental pollution with

parasites in Kafr EL Sheikh Governorate. Final report of a project. Fac. Vet.Med. Kafr El Sheikh.

El Sokkary, D. M. Y. (2013): Internal parasites infecting the buff backed heron (*Ardeola ibis*) at Behera Province, Egypt. Ph.D. Parasitology. Alexandria Univ. Fac. Vet. Med. Egypt.

Foreyt, W.J. (1989): Diagnostic Parasitology. Veterinary Clinics of North America: Small Animal Practice, 19: 979-1000.

Galindo, P. and Sousa, O. (1966): Blood parasites of birds from Almirante, Panama with ecological notes on the host. Rev. Biol., 14(1): 27-46.

Hassan, M. A. and Abdel –Aal, A. A. (1999): Studies on helminth parasites infested some wild birds in Suez Canal area and Sinai Peninsula. Assiut Vet. Med. J., 40(80): 103- 118.

Herman, J. S. and Chiodini, P. L. (2009): Gnathostomiasis, Another Emerging Imported Disease. Clin Microbiol Rev., 22(3): 484–492.

Kushlan, J A. and Hancock, J. (2005): Herons. Oxford University Press.

Kushlan, J. A. and Hafner, H. (2000): Heron conservation. Academic press. London.

Levine, N. D. (1985): Veterinary Protozoology, First (Ed.), the Iowa State University Press, Ames Iowa, USA.

Mahdy, A. O. (1991): Morphological studies on the role of some fresh water fishes in transmitting parasitic helminthes to some avian hosts. Ph.D. Thesis. Parasite. Fac. Vet. Med. Cairo Univ., Egypt.

Mahdy, A. O. and EL-Ghayish, A. (1998): *Spiruroid* parasites of buff backed heron (*Ardeola ibis ibis)* with a new species of *Cordonema* and *Microtetrameres* together with a key to the genera of *Aquaridae*. J. Egypt. Gwe. Soc. Zol., 27(D): 73-89.

Mattiucci, S.; Paolletti, M.; Olivero-Verbel, J.; Baldiris, R.; Arrayo- Sagado, b.; Garbin, L. Navone, G. and Nascetti, G. (2008): *Contracaecum bioccai n.sp.* from the brown pelican in Colombia; morphology, molecular evidence and its genetic relationship with congeners from fish- eating birds. Syst. Parasitol., 69(2): 101-121.

Mousa, W. M. and Mahdy Olfat, A. (1998): Morphological studies on *Synhimantus invaginatus* and *Microtetrameres spiralis* with the first description of their third larval stage in the intermediate host. 8th sci. con. 15-17 Nov. 1998, Fac. Vet. Med. Assiut Univ., Egypt.

Navarro P.; Lluch J. and Font E. (2005): The component helminth community in six sympatric species of Ardeidae. J. Parasitol., 91: 775–779.

Nemeth, N. M.; Yabsley, M. and Keel, M. K. (2012): Anisakiasis with proventricular perforation in a greater shearwater (*Puffinus gravis*) off coast of Georgia,

United States. J. Zoo Wildl. Med., 43(2): 412- 415.

Oshmarin, P. G. (1956): Tetrameridae (Nematoda : Tetrameridae) of domestic and wild birds of coastal areas. Trudy. Akad. Nauk U.S.S. R. Far East Branch. Zoological series, 3: 281-314**.**

Pence, D.B. and Dowler R.C. (1979): Helminth parasitism in the badger, *(Taxidea taxus)* Schreber (1778), from the western Great Plains. Proceedings of Helminthologialc Society of Washington, 46(**2**): 245-253.

Reid, W.M. (1962): Chicken and turkey tape worms, Georgia. Agr. Expier. Sta. Athens. Georgia.

Savag, A. F.; Robert, V.; Goodman, S. M.; Raharimanqa, V.; Raherilalao, M. J.; Andrianarimisia, A.; Ariey, F. and Greiner, E. C. (2004): Blood parasites in birds from Madagascar. J. Wild Dis. 45(4): 907-920.

Schulman, F. Y.; Montali, R. J. and Citino, S. B. (1992): Pathology, diagnosis, and treatment of *Synhimantus nasuta* infection in African jacanas (*Actophilornis Africana).* Journal of Zoo and **Seedikkoya, K.; Azeez, P.A. and Abdul Shukkur, E.A. (2007):** Cattle egret as a bioconrol agent. Zoos print journals, 22(10): 2864-2866. Wildlife Medicine 23(3): 313-317.

Sharah, H.A.; Ali, E.A. and Mohammed, I.D. (2008): The feeding behavior of the cattle egrets, *(Bubulcus ibis*) in northeastern arid zone of Nigeria. J. Agri. Soc. Sci., 4: 6–12.

Silveira, P.; No, B.; Rodello, D.; Pinneiro, R. T. and Baraqa E. M. (2010): Microfilaria infection in wild birds from barazilian Cerrado. J. Wild Dis., 46(4): 1305-1309.

Stuart, J. J.; Dismukes, J. F. and Dixon, C. F. (1972): Endoparasites of the Cattle Egret *(Bubulcus ibis)* in Alabama. J. Parasitol., 58(3): 518.

Tantawy, A.E. (1997): Safety and quality of fishes infected with parasites. Ph.D. Thesis. Hygiene and control of meat, fish and their products and animals biproducts. Fac. Vet. Med. Cairo Univ. Egypt.

Telfair, R. C. (2006): Cattle Egret (*Bubulcus ibis*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornitholog.

Torres, P.; Rtuz, E.; Gesche, W. and Montefusco, A. (1991): Gastrointestinal helminthes of fish eating birds from Chiloe island, Chile. J. Wild. Dis., 27(1): 178-179.

Valkiunas, G.; Sehgal R. N.; Lezhova, T. A. and Smith, T. B. (2005): Further observation on the blood parasites of birds in Uganda. J Wild Dis., 41(3): 580-587.

الملخص العربي

مدى تواجد الديدان الأسطوانية في طائر أبو قردان في مصر

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تهدف هذه الدراسة إلى تحديد الإصابة بالديدان الأسطوانية في طائر أبو قردان والدور الذي يلعبه في استمرارية هذه الطفيليات في الطبيعة أو نقلها إلى الأنواع الأخرى من الطيور البرية و المستأنسة، الثدييات، الأسماك والأنسان خاصة بعد الزيادة الملحوظة في أعداد أبو قردان داخل المناطق الحضرية.
خلال هذه الدراسة ، تم فحص عدد ١٠٦ من طيور أبو قردان وتم تصنيف عدد ثمانية أنواع من الديدان الأسطوانية. وهي ديسبورتيس أنفاجينيتس (٨٥,٨٤ ٪)، ميكروتيترامرس أسبيرالس (٦٧,٩٢)، نوع من بروسيكم (٢٦,٤١ ٪)، ميكروتيترامرس هيلكس (٢٣,٥٨ ٪)، نوع من تيترامرس (١٠,٣٧ ٪)، نوع من ميكروفيلاريا (٢,٨٣ ٪)، يرقة من نوع جناثوستوما (١,٨٨) و يرقة من نوع أنساكس (٠,٩٤ ٪).
وقد تم دراسة تأثير خمسة عوامل (المأوى ،مكان التجميع، الجنس، العمر وفصول السنة) على مدى تواجد هذه الديدان بطائر أبو قردان بالأضافة الي التأثير المرضي لبعض هذه الديدان على حويصلة الطائر.