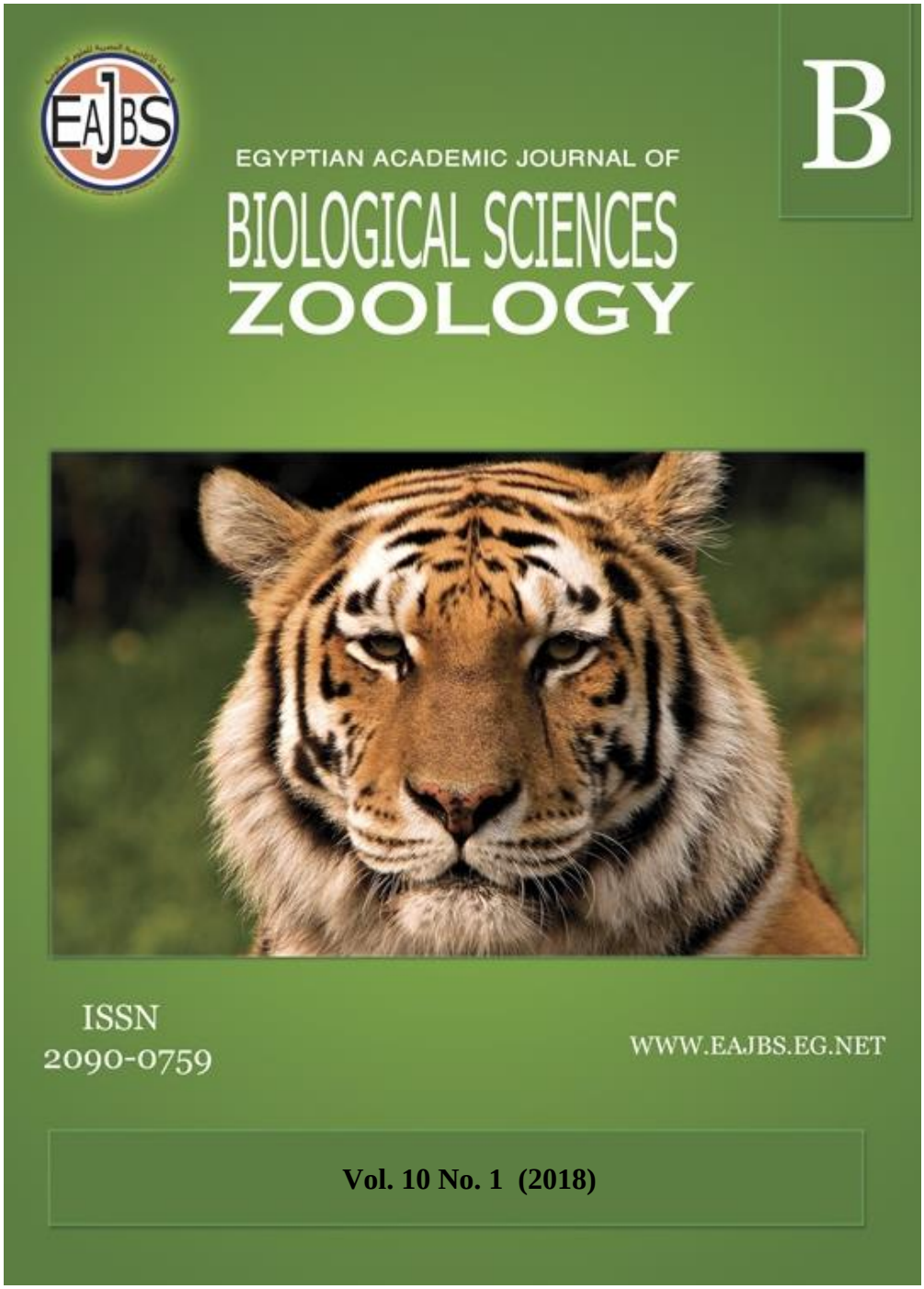

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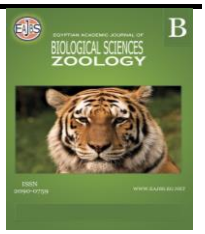

Prevalence of Cestode Parasites of Some freshwater Fishes Cultivated In EL-Abbasa Fish Farm, Egypt.

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ABSTRACT

This study was carried out on 694 *Clarias gariepinus* and 846 *Oreochromis niloticus* fish specimens. The fish were randomly collected seasonally, from different fish farms of El-Abbassa, Abu-Hammad, Sharkia Governorate, Egypt. They were used to investigate the prevalence of cestode parasites in *C. gariepinus* and *O. niloticus.* Parasitological examination of these fishes revealed that the, highest prevalence rates of Cestoda in the fish were recorded in small fishes during summer and the lowest values were observed in the samples of the large size during winter. The study concluded that, the *C. gariepinus* are more attacked by internal cestode parasites compared *O. niloticus*. Parasites included *Proteocephalus glanduligerus, Polyonchobothrium clarias and Monobothrium* sp. The morphology of each species was compared with earlier descriptions, and a diagnostic character of intestinal Cestode species in this geographic region was developed.

INTRODUCTION

Freshwater fish parasitology is an important and rapidly advancing field of aquatic science. Over the past few decades, it has contributed to various scientific aspects viz., the taxonomy, classification, morphology, ecology and phylogeny of fish parasites (Poulin, 2001)

Fish parasites constitute the main cause of economic losses in aquaculture, including various types of pathogens (protozoa, trematodes, cestodes, nematodes, acanthocephalan and crustacean parasites), those causing, deformity, weight loss mortality etc (Eissa, 2002).

Fish parasites, specifically Cestodes are known to inhibit nutrient absorption and is more pronounced in cultured species due to overstocking coupled with poor water quality management (El-seify *et al.*, 2011). Parasites are important components of any ecosystem and play key roles in fish population dynamics, community structure, and also provide important information on environmental stress, food web structure, function and biodiversity (Waeschenbach, *et al.*, 2012). Parasites take a

significant proportion of list of fish diseases (80%) and are among the major causes of economic losses in the fish industry and in aquaculture (Edema, *et al.*,2008)

Parasites affect the fish host through destroying tissue, removing blood and cellular fluids, diverting part of its nutrient supply and allowing secondary infections to develop easily .Factors that enhance parasitic infection include nature of ponds ,quality of feed, culture systems, and low oxygen levels resulting from poor pond management (Abowei *et al.*,2011 and Lugo,2014).

The objective of study to assess the prevalence of Cestode parasites infected *O. niloticus* and *C. gariepinusunder* in El-abbasa fish farm.

MATERIALS AND METHODS

Study Area:

This study was conducted at the Central Laboratory for Aquaculture Research at, El-Abbassa, Abu-Hammad, Sharkia Governorate, Egypt, on the fish farm of culture intensive system

Fish Analysis:

Collection of Fish Samples:

A total of 1540 cultured fish species were represented as 694 *Clarias gariepinus* and 846 *Oreochromis niloticus* were collected seasonally from October 2015 to September 2017.

Fish were transferred alive to the laboratory. In the laboratory, the species were selected carefully to cover feeding habits the individuals of the two species were selected seasonally to cover two categories; firstly sized groups. One of these was the small sized group (25-39.9 Cm) for *C. gariepinus*, (12-21.9 Cm) for *O. niloticus*, while, the large-sized group; being 40 -55 Cm for *C. gariepinus*, 22 -33 Cm for *C. Carpio* and from 22-30 Cm for *O. niloticus*. The second category as according to sex.

Finally, the clinical, postmortem, parasitological, were conducted.

Clinical Examination:

First, weight and the total length of the examined fish species were recorded and then clinical examination was done on the live fishes or freshly dead ones. Fish specimens under investigation were grossly examined for determination of any clinical abnormalities and any external parasites or visible cysts according to the methods described by Amlacker (1970).

Postmortem Examination:

For recording the internal abnormalities, the postmortem examination was performed on all fishes according to Amlacker (1970).

Stomach and intestines were stretched over the glass plate and examined for the external side for the change in the size, the color of contents, Presence of nodules or any external parasite attaching to it. The intestinal contents were also transformed to a large Petri dish, diluted with several drops of water. They were examined under the microscope in which helminths were collected by pasture pipette or dissecting needle into Petri dishes containing worm saline solution for obtaining fully relaxed and extended parasites.

The collected Cestodes were left in the refrigerator at 4 °C till complete relaxation. Then, they were fixed in 5% formalin for permanent preparation and stained with Acetic acid alum carmine stain then cleared and mounted in Canada balsam (Meyer and Olsen, 1992). Cestode identified according to Paperna, (1996).

RESULTS

Clinical Signs and Post-Mortem Lesions of Infected Fish:

The clinical signs in the naturally infected fishes, *C.gariepinus,* and *O. niloticus*. Revealed no pathgnomic clinical abnormalities on the external body surface except some infected fish showed ulcer and skin darkness while there was enlargement in internal organs Figs. (1-4).

Diagnostic Morphological Characters of Isolated Parasites From The Examined Fishes:

In this study, three species of adult and larval cestodes were found. The adult cestodes **(***Proteocephalus glanduligerus* , *Polyonchobothrium clarias* and *Monobothrium* sp) were found .

Family: Proteocephalidea.

Genus*: Proteocephalus glanduligerus* .

The most typical characteristic of *P. glanduligerus* Figs. (5-7), is the presence of an extremely large glandular, spherical to widely oval apical organ, the size of which is 1.6–3.5 times larger than that of the suckers. There are a very low number of mature proglottids and the presence of testes in gravid proglottids. In addition, the position of osmoregulatory canals (situated close to each other, with the dorsal canal latero-ventral to testes) is unusual. There is also the presence of a vaginal sphincter, several (usually 3–5) uterine pores, and eggs with paired lateral auricular swellings (extensions) of the outer envelope. However, a large glandular organ and four suckers on the scolex while the reproductive system in the proglottids showed alternating genital pores. Based on the morphological and parasitological examinations such parasite has belonged to *P. glanduligerus* (Mashego 2001; Barson & Avenant-Oldewage, 2006a & Scholz *et al.* 2009).

Family: Ptychobothriidae:

Genus*: Polyonchobothrium clarias* Woodland, 1925.

The morphology of *P. clarias* as follows: cestode parasites of the proximal intestine and main bile duct of *C. gariepinus*; Scolex triangular, bearing a marginal crown of hooks of different sizes. The main crown subdivided into two circles by dorsal and ventral indentations of the disc margin. The hooks adjacent to the indentations are smaller than those in the middle of the circles. The ovary is large, compact and bilobed. Testes in lateral fields of proglottid. Genital atrium in mid-dorsal line, uterine pore on the ventral surface. Uterus anterior to the ovary, occupies the greater portion of the gravid proglottid. Strobilum acrespedote. According to this description, the specimen is *P. clarias.* Mashego *et al*, (1991). Figs. (8-14).

Family: Caryophyllidea.

Genus*: Monobothrium* sp.

Monobothrioides sp, was characterized by the presence of scolex devoid of bothria, but bearing numerous longitudinal furrows and possessing terminal introvert. Uterus never passes anterior to cirrus sac and is long, regularly wound tube. Post-ovarian vitelleriae were absent. The ovary is "H" shaped; coils of uterus extend anteriorly to wings of the ovary. By contrast, the scolex of tetracampos ciliotheca was nearly triangular with a flat to slightly raised rostellum armed with a crown of 26–30 hooks. No neck detected. The gravid segment was squarish; the uterus appeared as a round or oval sac occupying the whole segments and filled with eggs. According to the key given by Nybelin, (1922), this specimen is considered to be *Monobothrium* sp Fig. (15)

Seasonal Prevalence in Cestoda Parasitic of Examined Fish Species According to Sex and Size Groups:

The highest prevalence of Cestoda in the fish male *C. gariepinus*, was recorded in the small fish during summer and the lowest value was determined in the large one during winter; being 29.58 % in the former and 5.88 % in the latter. In the female, however, the lowest prevalence of Cestoda was determined in the large fish (8.33%) during winter and highest value (29.70 %) in the small size during summer (Table 1 and Fig., 16).

According to the annual percentage (Figure, 17) the highest peak of prevalence Cestoda in the small sized of females fish and the lowest one in the males large one; being 25.51 % & 19.67, respectively. Results suggested that, the prevalence Cestoda were decreased with increasing sized group. Also, it's higher in female than in the male.

Results indicated that, the highest prevalence of Cestoda in the male and female of *O. niloticus*,were recorded in small fishes (6.67 % and 7.69 % , respectively) during summer and the lowest values were observed in the samples of the large size (0 % and 0 %, respectively) during autumn and winter (Table, 2 and Figure, 18) . On the other hand, the highest average prevalence of Cestoda (5.19 %) was observed in the small size of males and the lowest value (2.47 %) was recorded in the large sized of the same sex (Figure, 19).

Results revealed that, prevalence of Cestoda in *O. niloticus* were nearly similar in two sized groups.

Table (1): Seasonal prevalence on Cestoda parasitic of *C. gariepinus*, collected from Abbasa Fish Farm, Sharkia, according to sex and size groups.

Size	sex	no	Spring	Summer	Autumn	Winter	Total
Small fish	Male	No. of examined	50	71	38	18	177
		No. of Infected	12	21	7	2	42
		Percentage of infection	24.00	29.58	18.42	11.11	23.73
	Female	No. of examined	61	101	54	27	243
		No. of Infected	17	30	11	4	62
		Percentage of infection	27.87	29.70	20.37	14.81	25.51
Large fish	Male	No. of examined	34	41	30	17	122
		No. of Infected	8	11	4	1	24
		Percentage of infection	23.53	26.83	13.33	5.88	19.67
	Female	No. of examined	41	58	29	24	152
		No. of Infected	10	16	5	2	33
		Percentage of infection	24.39	27.59	17.24	8.33	21.71

Table (2): Seasonal prevalence on Cestoda parasitic of *O. niloticus*, collected from Abbasa Fish Farm, Sharkia, according to sex and size groups.

size	sex	Number	Spring	Summer	Autumn	Winter	Total
Small	Male	No. of examined	56	75	52	29	212
		No. of Infected	3	5	2	1	11
		Percentage of infection %	5.36	6.67	3.85	3.45	5.19
	Female	No. of examined	87	117	69	38	311
		No. of Infected	4	9	2	0	15
		Percentage of infection%	4.60	7.69	2.90	0.00	4.82
Large	Male	No. of examined	35	68	39	20	162
		No. of Infected	1	3	0	0	4
		Percentage of infection%	2.86	4.41	0.00	0.00	2.47
	Female	No. of examined	36	61	37	27	161
		No. of Infected	1	2	1	0	4
		Percentage of infection%	2.78	3.28	2.70	0.00	2.48

DISCUSSION

Results revealed that, the maximum prevalence of Cestoda parasitic in *C. gariepinus* and *O. niloticus* was recorded during summer and the minimum during winter; this could be related to the availability of intermediate hosts of these parasites at these seasons and increase the feeding activity in warm temperature. These results nearly agreement with the findings recorded by Negm El- Din *et al*. (1988) who found the peak of infestation in spring followed by summer then autumn and winter. Also, Negm Eldin (1988) recorded the highest prevalence of Cestode infestation was during spring and summer. Also, was nearly similar to (Eissa *et al*, 2011) who recorded the highest prevalence in spring and the lowest prevalence occur in winter and (Akinsanya *et al*, 2008) who recorded increase prevalence of cestodes in spring and summer.

The presence of fewer internal cestodes parasites in *O. niloticus* could be attributed to its resistance to parasitic infections. This may be explained by the fact that *O. niloticus* species rarely succumb to disease epidemics and have a remarkable power of recovery from infections (Ayanda, 2009). The larval stage of internal parasites gains entry into copepods through ingestion as the copepod seeks food within its habitat. Copepods carrying the larval stage of cestodes are thereafter fed on by fish which act as second or final host that complete the lifecycle of different parasites (Gumpinger, 2016).

The possible reasons for the recovery of these fish tapeworms in Africa of recent is that most small fish farmers use rivers water in their ponds, this water may carry first intermediate host copepods hence circulate from country to country. Another possible reason is distribution through the intermediate host (definitive or final host) of cestode e.g. piscivorous bird, mammals or reptiles, this in agree with Gumpinger, (2016).

Conclusion and Recommendation.

The results of this study recorded high prevalence infections of the cestode parasites in both species sampled but more in *C. gariepinus*, than *O .niloticus* and therefore, stakeholders should train the farmers effect of these parasites before starting keeping fish. The researcher of this study suggests biocontrol and good disposal of snails, drying of fertilizer, examined migratory birds, Fish farmers and sellers should be enlightened on the potential risk of parasitic infestation in fishes in order to avoid economic loss and more studies on internal parasites to be conducted.

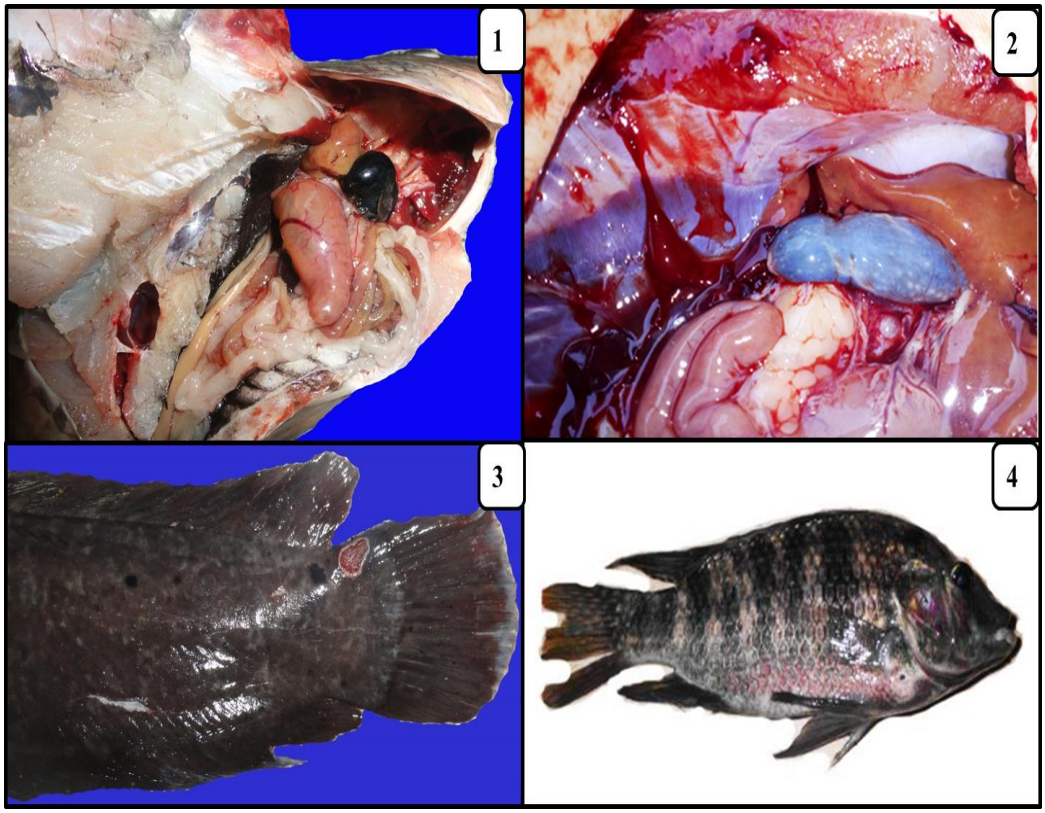

Fig. (1): Photomicrographs of congestion of internal organs in *O. niloticus*, collected from Abbasa Fish Farm, Sharkia.
Fig. (2): Photomicrographs of congestion of internal organs in *C. gariepinus*, collected from Abbasa Fish Farm, Sharkia.
Fig. (3): Photomicrographs of ulcer in the skin of *C. gariepinus*, collected from Abbasa Fish Farm, Sharkia.
Fig. (4): Photomicrographs of darkness in the skin of *O. niloticus*, collected from Abbasa Fish Farm, Sharkia.

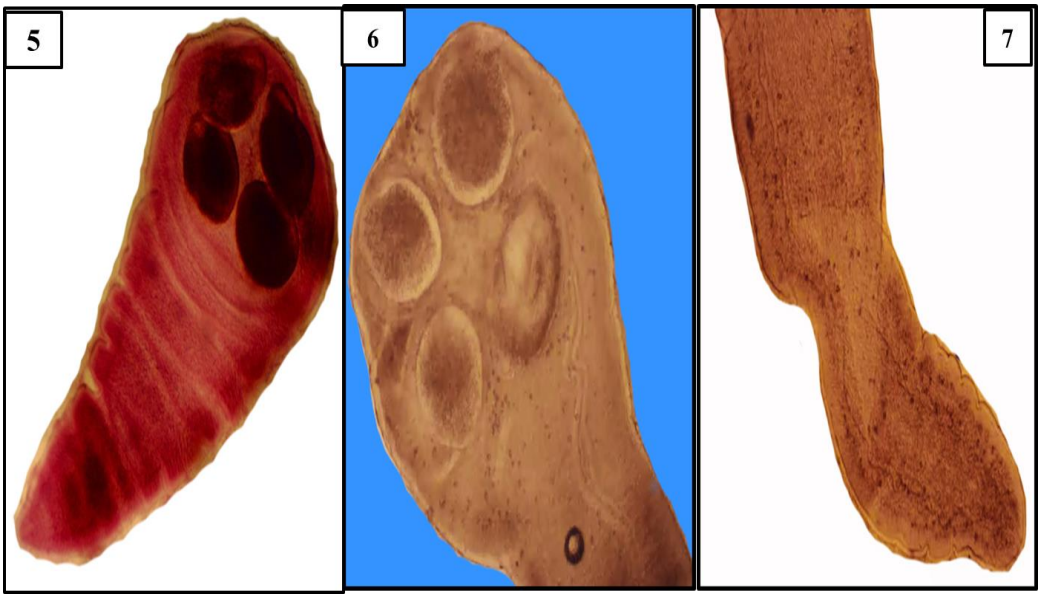

Fig. (5): Photomicrographs of Larve *Proteocephalus glanduligerus*, stained with acetic acid alum carmine (X40).
Fig. (6): Photomicrographs of anterior part in *Proteocephalus glanduligerus* (X40).
Fig. (7): Photomicrographs of posterior part in *Proteocephalus glanduligerus* (X40).

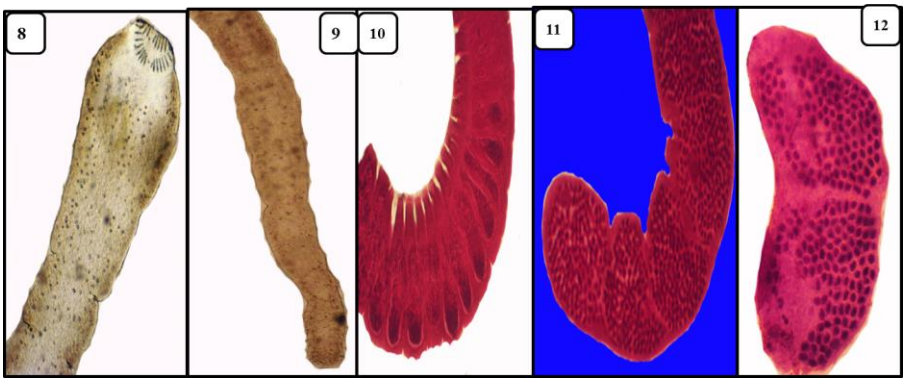

Fig. (8): Photomicrographs of anterior part in *Polyonchobothrium clarias* , (X40).
Fig. (9): Photomicrographs of posterior part in *Polyonchobothrium clarias*, (X40).
Fig. (10): Photomicrographs of mature proglottid in *Polyonchobothrium clarias*, stained with acetic acid alum carmine(X40).
Fig. (11): Photomicrographs of uterine sac with eggs mature in *Polyonchobothrium clarias*, stained with acetic acid alum carmine(X40).
Fig. (12): Photomicrographs of gravid proglottid in *Polyonchobothrium clarias*, stained with acetic acid alum carmine(X40).

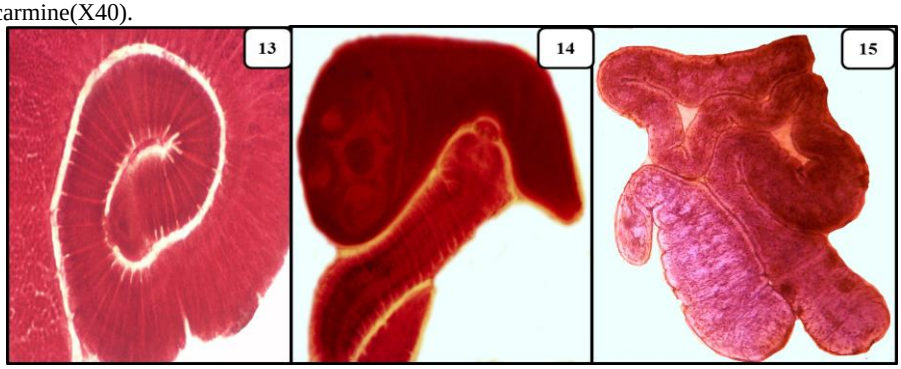

Fig. (13): Photomicrographs of *Polyonchobothrium clarias*, stained with acetic acid alum carmine(X40).
Fig. (14): Photomicrographs of *Polyonchobothrium clarias* and *Proteocephalus glanduligerus* stained with acetic acid alum carmine(X40).
Fig. (15): Photomicrographs of Monobothrium sp, stained with acetic acid alum carmine(X40).

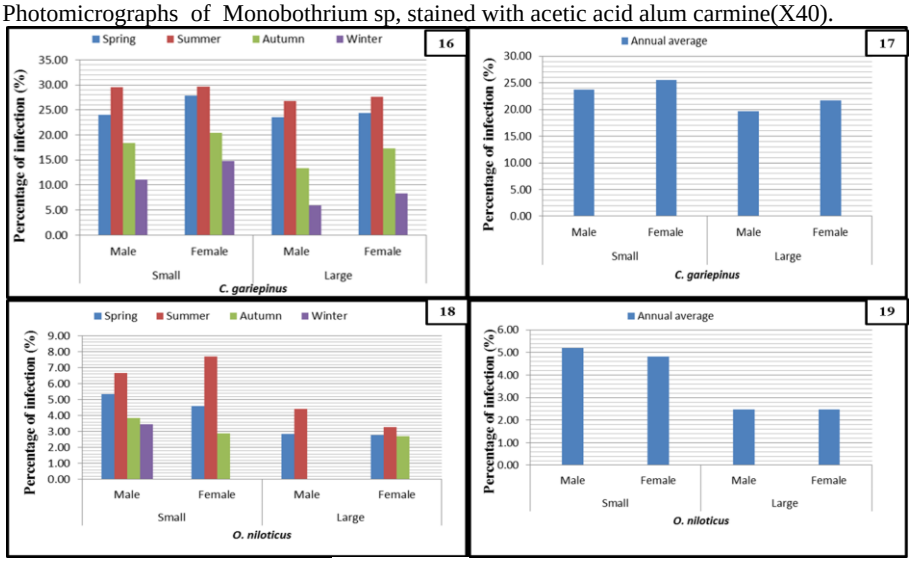

Fig. (16): prevalence of cestoda infection in *C. gariepinus*, collected from Abbasa Fish Farm, Sharkia.
Fig. (17): Annual average of cestoda infection in *C. gariepinus*, collected from Abbasa Fish Farm, Sharkia.
Fig. (18): prevalence of cestoda infection in *O. niloticus*, collected from Abbasa Fish Farm, Sharkia.
Fig. (19): Annual average of cestoda infection in *O. niloticus*, collected from Abbasa Fish Farm, Sharkia.

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ARABIC SUMMERY

انتشار الديدان الشريطية في بعض أسماك المياه العذبة المستزرعه بمزارع العباسة – مصر

رمضان أنور محمد [١]– صبري محمد علي شحاتة[٢] – محمد حامد غانم[٢] – ياسر محمد عبد الهادى[١] محمود خيرى رضوان[٢]

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٢- قسم علم الحيوان – كلية العلوم – جامعة الازهر – القاهرة – مصر.

أجريت هذه الدراسة على عدد ٦٩٤ عينة من أسماك القرامبط (الجاربينس) و ٨٤٦ عينة من أسماك البلطى النيلى التى تم جمعها عشوائيًا خلال مواسم السنة الاربعة من مزارع العباسة - أبوحماد بمحافظة الشرقية -مصر وذلك للتعرف على معدل انتشار الاصابة بطفيليات الديدان الشريطية فى أسماك القرامبط و البلطى النيلى ، حيث سجل الفحص الطفيلي لهذة الاسماك ان أعلى معدل اصابة بالديدان الشريطية كان في الأسماك الصغيرة وذلك خلال موسم الصيف بينما سجلت أقل قيمة فى الحجم الأكبر خلال موسم الشتاء، وقد أوضحت نتائج الدراسة ان معدل الاصابة الاكبر تم تسجيله فى اسماك القرامبط مقارنة باسماك البلطى ،وتضمنت الطفيليات المعزولة: بروتيوسيفالوس، غلاندوليجيروسو و بولي أونكو بوثريوم كلاريس و مونوبثرويدس) وقد تم عرض الوصف التفصيلي لهذه الطفيليات المعزولة.