

## Field Studies on Parasitic Diseases Caused by Flukes of Digenetic Trematodes in Catfish (*Clarias gariepinus*)

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### Abstract

A total number of 100 catfish *Clarias gariepinus* were collected randomly alive from Nile branch at Ismailia governorate. They were of different total lengths and body weights. The clinical examination revealed no pathognomonic signs or lesions. The isolated flukes were identified as *Paracoenogonimus ovatus*, *Afromacrodieroides lazera*, *Orientocreadium lazera*, *O. batrachoides*, *Astiotrem reniferum*, *Acanthostomum spiniceps* and *A. abescondatum*. The seasonal prevalence showed the highest prevalence was in autumn and summer and the lowest in winter. Also, it was revealed that the heavier and longest ones were highly infested as well as males were more exposed to infestation by flukes than females.

### Introduction

The catfish *Clarias gariepinus* is a widely distributed food fish in Africa. It is a hardy, omnivorous species, tolerant to low oxygen concentrations due to its efficient air-breathing organ (pseudo-branch). Such catfish has a great potential as a protein and energy source in human nutrition and its lipids are a good source of polyunsaturated fatty acids, which have a well-defined nutritional role (16). These catfish occupy a high trophic level in the aquatic food web, sometimes feeding on smaller fish and zooplankton (30). A recent checklist recorded 568 species of adult helminthes and several larval forms infecting African fishes (21). Fish are the usual intermediary hosts of these parasites, with humans as the definitive host. Trematodes infection in human generally presents itself as fluke infestations of the liver, lung, and intestine. Although the disease is seldom fatal, trematodes can cause morbidity and serious complications among humans (6; 11; 20).

The present study was planned to investigate the diseases affecting both sexes of wild catfish *C. gariepinus* seasonally with flukes in relation to body weight and total length at Ismailia governorate.

## Materials and Methods

### 1-Fish:

A total number of 100 of *Clarias gariepinus* of different lengths and body weights were collected randomly in different seasons. The fish were collected from Nile branch at Ismailia governorate then transported alive to the Fish Diseases Lab., Faculty of Vet. Med. Suez Canal Univ. The total length and body weights of both sexes were carried out.

### 2- Clinical examination:

The clinical examination of *C. gariepinus* was performed (5) for the external abnormalities.

### 3- Postmortem examination:

The examined catfish were sacrificed and the abdominal wall was removed and the internal organs were exposed and examined macroscopically for any gross abnormalities (25).

### 4- Parasitological examination:

#### 4.1- Microscopical examination:

The gastrointestinal tracts as well as gall bladder were examined. The stomach was separated from the intestine and each part was opened and examined and kept in physiological saline. The mucosa of stomach and intestines were scraped to get rid of mucus and coarse particles that may be adherent to the parasites. The collected worms were washed several times by normal saline and examined microscopically.

#### 4.2- Fixation, staining and mounting of the collected flukes:

The procedures adopted were done (22) by keeping the flukes between two slides. By gentle pressure, they were fixed in small vials containing 5% formalin and left overnight. They were washed with tap water to get rid of any traces of formalin solution and stained with alum carmine stain (Lucky, 1977) or Semichon's acetocarmine stain (22). They were dehydrated using different grades of ethyl alcohol which was changed several times to insure dehydration and cleared in clove oil. The specimens were mounted in Canada balsam and left to dry and covered with a cover slide and examined.

#### 4.3- Identification of flukes:

The isolated flukes were identified (17; 35).

## Results and Discussion:

### 1- Clinical picture:

No pathognomonic clinical signs or abnormalities were observed on the external body surface. Generally emaciated, pale or hemorrhagic and in some cases there were enlargement of liver, gall bladder, spleen, and kidneys, sometimes there were hemorrhages and excessive mucus in intestines. These results came to support a previous report (6) suggesting that the internal parasitic diseases of fish do not manifest clear and pathognomonic signs.

### 2- Parasitological examination:

Based on the morphological and parasitological examinations, the following flukes were identified as:

#### 2.1- Paracoenogonimus ovatus:

The flukes obtained from the gastrointestinal tracts of *C. gariepinus*: it was ovoid in shape, varied in size (0.83-1.03) with mean 0.93mm in length and (0.31-0.51) with mean 0.41mm in width. The oral sucker was relatively larger than ventral one which located just anterior to the tribocytic organ. The prepharynx was absent, while the pharynx was present. The oesophagus was very short, intestinal caeca were thick, simple and hidden by vitelline follicles at middle and posterior parts. Testes were rounded, oblique, near the posterior extremity. The ovary was antero-lateral to the anterior testis. Vitelline follicles were large and located in the most posterior part of the fluke (Fig. A). The above description came nearly similar to that observed in some previous studies (19; 28; 31).

#### 2.2- Orientocreadium batrachoide:

Another genus was elongated in shape, wider at the testicular region. The total body length was (1.63-1.83) with mean 1.73mm and the body width was (0.48-0.68) with mean 0.58mm. The oral sucker was spherical and sub-terminal while the ventral one was larger. The cecal bifurcation began anterior to the ventral sucker, ran along the lateral sides, and ended blindly to the posterior extremity. The testes were rounded, tandem in the position. The ovary was located in the front of testes. The vitellaria were extending from the level of the ovary to the posterior

extremity (Fig. B). The parasitological structures came nearly in agreement with some previous investigations (7; 14; 15).

2.3- *Orientocreadium lazeri*:

This worm was elongated body, covered with fine spines which diminished posteriorly. The total body length was (1.23-1.43) with mean 1.33mm and the body width was (0.32-0.52) with mean 0.42mm. The sub-terminal oral sucker was oval to round. The two intestinal caeca extended from midway, between the oral and ventral suckers to the posterior body margin and its posterior tip was surrounded by the vitelline glands. The gonads were comparatively large smoothly and arranged in one vertical median plane. The testes were large, tandem in position and being located in the posterior half of the body. The ovary was located in front of the middle third of the body (Fig. C). The above description came nearly similar to that mentioned in some previous reports (3; 4; 31).

2.4- *Afromacroderoides lazera*:

The body was elongated, oval of fairly uniform width tapering slightly towards the blunt extremities. The total length was (0.87-1.07) with mean 0.97mm and the width was (0.21-0.41) with mean 0.31mm. The body was spinoses, where the spines on the forebody were larger and numerous than those on the rest of the body, the oral sucker was subterminal. The pharynx was circular, followed by esophagus opened into a wide intestinal caecum which bifurcated nearly a region half away between the two suckers and extended to the posterior end of the body. The ventral sucker was nearly equal to the oral. The testes were situated in the posterior half of the body. The ovary situated on the right side of the median line (Fig. D). The structure came in agreement with some previous studies (1; 4; 10; 24).

2.5- *Astiotrema reniferum*:

Another fluke revealed lanculated body, its anterior end bent ventrally, the tegument was provided with minute spines distributed in the anterior two third of the body. The oral sucker slightly ovoid, the ventral one was nearly equal the oral. The pharynx followed by bifurcated esophagus into two simple caeca that ran along the lateral side and ended blindly a little distance anterior to the caudal extremity. The vitellaria extended along the lateral field from the posterior level of the ventral sucker to the middle of the posterior testis (Fig. E). These morphological

structures came nearly similar to that observed previously (2; 3; 4; 26; 28; 29).

#### 2.6- Acanthostomum sp:

Slender body, spinulate, oral sucker was funnel shape with crown of spines and short esophagus. Semina between ovary and anterior testis, uterus coiled from side to side between ovary and acetabulum.. The total length of *Acanthostomum spinicipes* (Fig F) measured (1.37-1.57) with mean 1.47 mm. and the width was (0.38-0.58) with mean 0.48 mm. while *A. abescondatum* measured (1.61-1.81) with mean 1.71 mm. long and width (0.25-0.45) with mean 0.35 mm (Fig G). The above description came nearly similar to that *observed by others* (35). *Acanthostomum* sp. has been referred to only in freshwater fishes and reptiles. The first report of a member belonging to this genus in a marine fish was recorded by Fernandes et al. (12). This species was originally described from *Bagrus bayad* from Egypt and has also been reported from the type-host and locality (13;18; 32). Also, *A. spiniceps* was recorded from *Bagrus filamentosus* (33) and from *Morone labrax* (9).

#### 3- Prevalence of fluke infestation in relation to season, sex, total length and body weight:

Regarding to the total prevalence of *C. gariepinus* with digenean flukes, it was 31.0% which was higher than 19.00 % (31) and 18.57 % (3), and was lower than 76.69 % (10) and 48.09 % (27). This high prevalence in *C. gariepinus* with flukes may be attributed to their carnivorous behaviour and bottom feeder. So, they live where the intermediate hosts are abundant in intensity. In addition, such fish are scaleless; which may permit the penetration of the infective stages into the external body surface.

Regarding to the peak seasonal prevalence in *C. gariepinus* infested with flukes, it was 48.0% in autumn followed by summer and spring 32.0%, the lowest rate was in winter 12.0% (Table,1). The present results disagreed with others who mentioned that the peak was in summer and the lower in spring (24), the highest was in summer and the lower was in autumn (8) or the highest in summer and the lower in autumn (10). However, they nearly agreed with those reported that the highest was in summer and the lowest in winter (15).

As shown in table (1), the prevalence of flukes in males and females were 77.42 and 22, 58% respectively. The peak prevalence in male was during winter 100% followed by 83.33% during autumn then spring that reached 75% and the lowest 62.25% during summer. In the other hand, in females, the highest prevalence was 37% during summer followed by spring as 25 then 16.66 and 0% during autumn and winter respectively. This may be attributed to that males are highly active and characterized by more voracious feeding than females so mostly exposed to infestation.

Concerning to the infestation rate of *C. gariepinus* with flukes in relation to the body weight, the highest (50.00%) was found in 450-500g. while the lowest (20.0%) between 150-200g. In case of total length the highest infestation rate was (60.0%) between 45-50cm, the lowest one (00.0%) between 20-25cm (Table, 2&3).

As shown the highly infestation rate was in the heavier ones, this could be related to the continuous exposure of fish during their life stage to cercarial invasions from surrounded water containing high number of infected snails also when the length of fish increased this will offer a good chance of exposure to infection with cercariae.

**Table (1):** Showing seasonal prevalence of flukes in *C. gariepinus* in relation to sex

Season	No. of Examined Fish	Infected Fish		Infected Male		Infected Female	
		No.	%	No.	%	No.	%
Spring	25	8	32.00	6	75.00	2	25.00
Summer	25	8	32.00	5	62.25	3	37.50
Autumn	25	12	48.00	10	83.33	2	16.66
Winter	25	3	12.00	3	100.00	-	-
Total	100	31	31.00	24	77.42	7	22.58

Table (2): Showing prevalence of flukes in relation to total length of *C. gariepinus*

Total length (cm)	Examined fish	Infected fish	%
20 to 25	11	-	-
25 to 30	26	6	23.10
30 to 35	23	7	31.33
35 to 40	17	5	29.31
40 to 45	13	7	53.50
45 to 50	10	6	60
Total	100	31	31

Table (3): Showing prevalence of flukes in relation to body weight of *C. gariepinus*

Body weight (g)	Examined fish	Infected fish	%
150 to 200	30	6	20.00
200 to 250	18	5	27.77
250 to 300	9	3	33.33
300 to 350	10	3	30.00
350 to 400	11	4	36.63
400 to 450	10	4	40
450 to 500	12	6	50
Total	100	31	31

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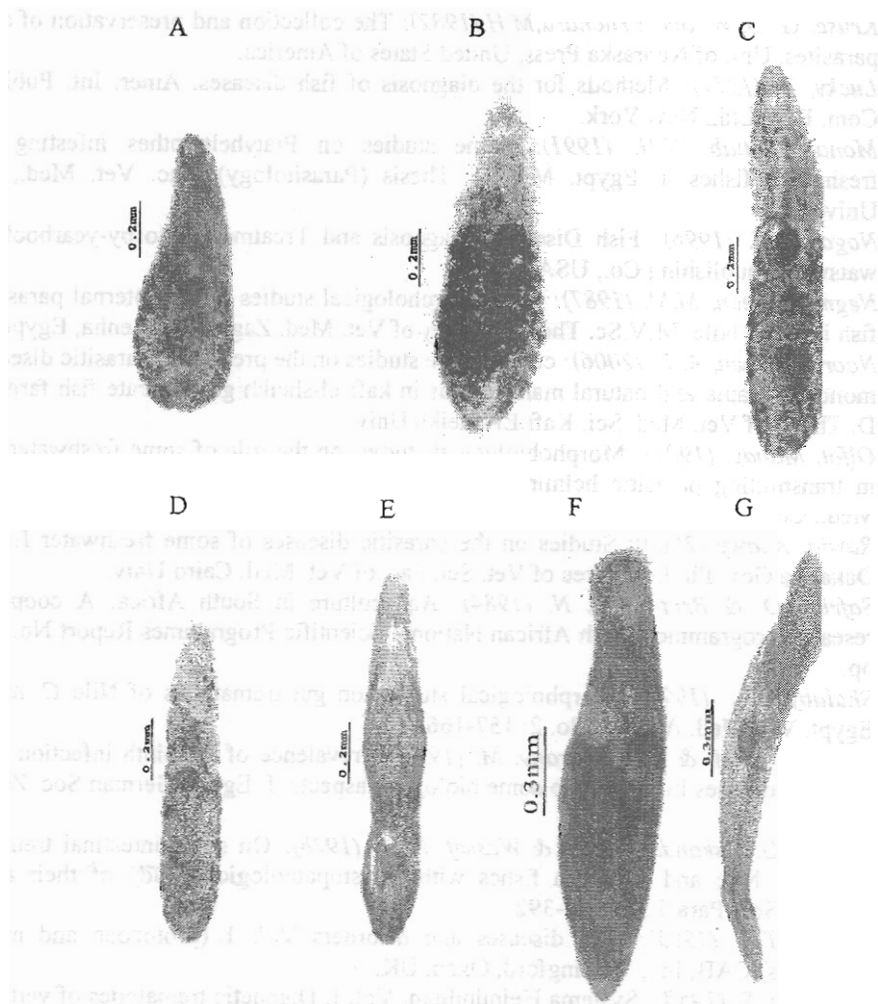


Plate (1): Showing the flukes isolated from intestines of *C. gariepinus*:  
(A) *Paracoenogonimus ovatus*; (B) *Orientocreadium batrachoides*  
(C) *O. lozera*; (D) *Afromacreroides lazera*;  
(E) *Astiotrema reniferum*; (F) *Acanthostomum spiniceps*;  
(G) *A. abescondatum*.

## دراسات حقلية عن الامراض الطفيلية الناتجة عن الاصابه بالطور البالغ للتريماطودا ثنائية العائل فى أسماك القبط (القرموط الأفريقى)

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قامت الدراسة بفحص ١٠٠ من أسماك القرموط الأفريقى الحية مختلفة الأطوال والأوزان التى تم تجميعها عشوائيا من فرع نهر النيل بمحافظة الاسماعيلية. وقد أسفر الفحص الاكلينيكى عن عدم وجود علامات مرضية مميزة. وقد تم التعرف على الديدان البالغة المعزولة (باركينوجونيمس اوفيتس، اورينتوكريديام باتراكويدس، اوريانتوكريديام لازيرا، افروماكريدرويدس، استيوتريما رينيفيرم، اكانثوستومام سينييسيپاس و اكانثوستومام ابيزكونداتام). كما تبين أن نسب الاصابة الموسمية تزيد فى الخريف والصيف وتقل فى الشتاء خاصة فى الذكور عن الاناث. بالاضافة الى أن الأسماك ذات الأوزان العالية والأطوال الكبيرة كانت أكثر تعرضا للاصابة.