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GENERAL INFORMATION

Abbassa International Journal for Aquaculture is Egyptian specific publication in aquaculture of the Egyptian society for water, aquaculture and environment. The journal is published in four volumes per year to include results of research in different aspects of aquaculture sciences. The journal publishes also special issues of advanced topics that reflect applied experiences of importance in aquaculture sector.

ECOLOGICAL AND BIOLOGICAL IMPLICATIONS OF *AFRODIPLOZOON POLYCOTYLEUS* (PAPERNA, 1973) INFESTING *CYPRINUS CARPIO* IN ABBASSA

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Abstract

This study quantized the prevalence and intensity of *Afrodiplozoon polycotyleus* on *Cyprinus carpio* from Abbassa research fish ponds. Begin from June 2009 to August 2010, the ecological interactions between a gill parasite, *A.polycotyleus* and its host, *C.carpio* were studied. A total of 630 *C.carpio* were collected over the study period with length (between 44 and 50 cm) Weight (250-500g).Oxygen levels were low in the ponds over the 12-month study, averaging only 2.5mg \ liter (monthly range 1.2-4.3mg \litre). However, parasite prevalence was high (47.2%), suggesting high tolerance to low oxygen in *A.polycotyleu*s. The prevalence of parasites varied with host body size, with the highest frequency of occurrence in the middle size classes. Prevalence also varied over the year; seasonal peaks of water level coincided with a lower frequency of *A. polycotyleus*. Of the hosts infected, 37.1% infested by one parasite, and 62.9% infested by two parasites. No fish were infested with more than two diplozoons. There was evidence for strong site specificity within hosts; 77.7% of the parasites were located on the filaments of the second gill arch, which may relate to increased oxygen availability. In addition, only one of 178 infested fish had more than one parasite on one side of the branchial filaments. Although *A.polycotyleu*s is undoubtedly parasitic, we found no evidence of a negative parasitic effect on the condition or reproductive status of *Cyprinus carpio*.

INTRODUCTION

Form Africa to date, four diplozoidae parasites have been described, namely *D.aegyptensis* and *D.ghanense* from sites in Northern Africa; *Neodiplozoon polycotyleus*. A tightly linked ecological relationship between the eggs, larval stages, and definitive host come from being a simple life cycle. Diplozoidae feed primarily on host blood (Erasmus & Chapman, 1972). Gills parasitic have access to abundant oxygen, but, some species live in oxygen-deficient habitats, and at least one exhibits a well-developed mechanism for obtaining oxygen (Kearn, 1971). The effects of gill parasites on host condition and survival may be particularly important in these oxygen-scarce habitats where any loss in oxygen-uptake efficiency could be critical for the host. Hypoxia is widespread in tropical fresh waters, particularly in heavily vegetated ponds and dry season pools of intermittent streams (Chapman and Kramer, 1991). In oxygen-deficient waters, strong selection for low oxygen tolerance in gill monogeneans and their fish hosts may influence host and parasite density, parasite site selection, and effects on host condition. Most species infect only a specific host species, genus, or family. Parasitism in this group also varies with host characteristics, such as host habitat, behavior, and age (Rohde, 1979). Le Brun *et al.* (1990, 1992) found that the prevalence and intensity of *Diplozoon gracile* were associated with behavior and habitat of the cyprinid hosts. Habitat specificity in monogeneans is also well defined within the host (Smyth and Halton, 1983). Gill monogenea are highly specific on gills of individual hosts and they may be restricted to certain gill arches, to certain parts of gill filaments, to external or internal filaments, or to right or left gills (Rohde, 1979). Begon *et al.* (1996) view the role of parasites in the community structure shaping of as least significant in communities where physical conditions are more severe, variable or unpredictable as located in a pointedly stab le environment, it would thus seem to imply that small variations in conditions such as the geographic location, season, temperature, host biology, size and habits of the host

Because the host's environment can be seen as the macro-environment of the parasite, it is quite obvious that the physical connection between parasite and host would constitute the microenvironment. All environment influences would depend on the host, thus factors such as sex, age, length and weight of the host (Barse, 1998).Parasite attachment site of can be highly affected by external environment temperature so obvious influence of the seasons and temperatures on the prevalence, mean intensity and abundance of parasites (Somia Awad, 2007).A decline in the physical water quality is shown to have a generally negative effect on ectoparasite numbers (Bagge and Valtonen, 1996). Specifically the dissolved oxygen concentration, pH-values, salinity and temperature all have an influence on the parasites (Chapman *et al*., 2000). Some attempts to ascertain a clear connection between different factors and the actual chosen host and the preference attachment site of monogenean parasites (Gelnar, 2000).

According to Le Brun (1990), the host-specificity in the natural environment can be considered to express the realization of three independent but essential conditions and they reported ecological condition, an ethological condition and mesological condition. Another factor to consider is the impact of the quantity of the parasite species on the physical condition of the host, i.e. the condition factor of the host.

This work is focused on host size, parasite site and seasonal patterns in frequency of infection considered in light of oxygen acquisition that could be linked to environmental characteristics.

MATERIALS AND METHODS

Ecological studies

From June 2009 to August 2010 the ecological interactions between a gill parasite, *A.polycotyleus* and its host, *C.carpio* were studied. A total of 630 *C.carpio* were collected over the study period with length (between 44 and 50 cm) Weight (250-500g). The state of gonadal maturity (Pečínková *et al*., 2007a). To quantify infestation we moved the operculum from each side of each fish, and recorded the number of parasites and the gill arch of attachment. Dissolved oxygen concentration and water temperature were recorded monthly in all ponds allover the period of investigation.

The prevalence, intensity and mean intensity were calculated according to the method of Margolis (1982). Site selection of *A. polycotyleus*, compare the abundance of parasites among sites of attachment on the host gill. Attachment sites on gills were classified according to the following categories: fish side (right or left), gill arch (1–4), arch face (internal or external), and gill region (dorsal, medial, or ventral). The differences in parasite abundance on each fish side, gill arch, and arch face were examined by comparing the number of parasites per attachment site per fish. (Zurawski *et al*., 2003a, b).

Whole mounts.

The parasites were removed from the 70% ethanol solution and placed in a saturated solution of iodine-ethanol (70%) for 6-7 hours. The parasitic worms were then transferred to 70% ethanol for a further 12 hours before counter-staining in 3% Borax carmine (Gaigher, 1984) in distilled water (Humason, 1979) for 2 hours. This was followed by dehydration with ethanol. Thereafter the parasites were cleared in Xylene and mounted in Canada balsam.

Morphological measurements.

Measurements of the whole mounts were made with the aid of light microscope. All measurements were compared to available data concerning other members of the Diplozoidae.

Statistical analysis.

The chi-squared test of independence was used to examine whether parasite prevalence was independent Chapman (2000) In addition, because variables other than parasitism may affect host condition, these other variables were also included host length, number of parasites on the host, host sex, season of collection, and state of gonadal maturity (Pečínková *et al*., 2007a). To analyze a relationship between number of adult *A.polycotyleus* and weight or standard length of the laboratory reared fish.

RESULTS AND DISCUSSION

Morphological measurements:

Diporpa (Photo 1a, b).

The post-oncomiracidium stage is called the diporpa. Diporpae, are blood-feeders. Two diporpae fuse and as a juvenile stage undergo development of attachment apparatus and reproductive organs. First pair of clamps and a pair of central hooks are presented already in the oncomiracidium to establish their attachment on host gills. After invading a host, the central hooks lose their function and in addition to the first pair of clamps, additional pairs of clamps are developed towards the anterior part of diplozoid body. Two diporpae with two or three pairs of attachment clamps usually fuse together. If a diporpa does not find another specimen to pair with, development of a full attachment apparatus is impossible; however, these unpaired specimens fail to mature. In this developmental stage, the second and third pairs of clamps develop subsequently; the fourth pair has been observed solely in individuals that remained non-paired. Diagonal muscle fibers largely comprise the body wall of the diporpa and longitudinal muscle bundles run from its forebody to the haptor. The digestive tract comprises a prominent pharynx and a blind-ending gut with cecal lining.

Adult *Afrodiplozoon polycotyleus* (Photo 2), TABLE 1.

A.polycotyleus were found on the gills of *C.carpio*, the mouth was situated at the ventral side the anterior extremity of the body and led into the pharynx laid in the middle line, behind the oral sucker. The oral sucker situated anteriorly as a pair of the sticky glands was found anterior to the sucker there were four pairs of well developed posterior adhesive organs, which were ellipsoidal, in the vicinity of the posterior extremity. Average dimensions of various organs of the worm were as follows; the ratio between posterior length and anterior length is 1:2.1 – 5.2 with a mean ratio of 1:1.9.The ratio between posterior length and total length is 1:3.1 – 7.9 (mean 1:2.9), and that between anterior length and total length is 1:1.5 – 3.8 (mean 1:1.5). The measurements of anterior suckers show that on average the suckers have equal measurements for length and width (50µm - 150µm, mean 100µm) and a minimum contraction diameter of 50 µm. The diameter of the pharynx is less than that of the suckers, but it is longer. The suckers are well differentiated and clearly circular (Photo 4.1 A). The median trunk of the intestine was present in the anterior portion of the body, right ad left, lateral braches, which ramified dichotomously once or twice. Some of these branches were distinctly paired, other were clearly unpaired. The Vitelline gland was an extensive lobed body located exclusively in the anterior portion of the body all around the intestinal braches both on the dorsal and ventral sides.

The posterior part of the body (Photo 3 a, b) is divided into two parts, namely the opisthaptor with clamps and the remainder which shows 5 – 16 folds across both the dorsal and ventral surfaces. Due to these folds, the body length shows great variation, but the ratio of all measurements remains constant 35. The opisthaptor show the width being equal to the length. The ratio of opisthaptor length to total posterior length from fusion point is 1:1.7 –4.6 (mean 1:3) and the opisthaptor width to total posterior length is 1:4.5 – 12(mean 1:2.6).At the posterior terminal tip of the opisthaptor, a protrusion is present. This protrusion is present on both the dorsal and ventral surface of the opisthaptor and can be extended or contracted close to the body (photo 4.1D and photo 4.2 B). The fully formed attachment apparatus of adult diplozoids consists of four pairs of clamps and one pair of central hooks on each individual of a pair. Mean values show that, all clamps are equal in size. The maximum and minimum width values of the clamps (Photo 4.1 B and photo 4.2 B). These sets of four clamps are carried on a stalk which can extend to the periphery of the opisthaptor (photo. 4.1 B). All description coined with that of *A.polycotyleus* (Paperna, 1973**);** Matejusová et al., (2004) and Pečínková et al., (2007b).

Table (1): Morphological measurements as obtained from the specimen of *A.polycotyleus* from *C.carpio*.

Characteristic	**min**	**Max**	**median**	**std div**	**n**
anterior length	1.75	4.41	3.08	1.90	41
posterior length	0.85	2.30	1.58	1.03	41
total length	2.60	6.71	4.66	2.91	41
sucker 1 width	0.05	0.15	0.1	0.10	67
sucker 1 length	0.05	0.13	0.09	0.10	67
sucker 2 width	0.05	0.13	0.09	0.10	51
sucker 2 length	0.05	0.15	0.1	0.10	51
opisthaptor width	0.05	1.00	0.53	0.70	72
opisthaptor length	0.19	1.00	0.60	0.60	72
clamp 1 width	0.07	0.15	0.11	0.02	7
2clamp 1 length	0.02	0.11	0.07	0.01	81
clamp 2 width	0.05	0.15	0.12	0.02	74
clamp 2 length	0.03	0.10	0.06	0.01	83
clamp 3 width	0.04	0.16	0.12	0.02	73
clamp 3 length	0.04	0.09	0.06	0.01	82
clamp 4 width	0.05	0.15	0.12	0.02	66
clamp 4 length	0.01	0.11	0.07	0.02	76
Body of central hook	0.08	0.13	0.08	2.64	9
Handle f central hook	0.02	0.05	0.04	1.33	9

Adult *A.polycotyleus* (photo 1) was collected from the gills of *C.carpio* with prevalence of 82.86% and mean intensity of infection of 3.45. Diporpae (Photo) with one or two pairs of clamps were recorded. Only one diporpa with three pairs of clamps. The first juveniles were recorded at the same time as diporpae, confirming that diplozoids attempt to fuse quickly to continue their development. Diporpae and juveniles were found abundant for the remaining period of the experiment. In abundant of diporpae with maximum intensity of infection 5 diporpae on the gills of one laboratory reared fish were found during the duration of study. Juveniles with different numbers of pairs of clamps on each haptor were identified.

Occurrence and Seasonality (Table 2 & 3).

Water temperature averaged 15.4°C (range. 14.3-24.9°C). Seasonal changes in parasite prevalence were examined for large size fish (between 44 and 50 cm), because fish in smaller size had a very low prevalence of infection . Infection of *C. carpio* with *A.polycotyleus* was found throughout the year, but the prevalence 51% of infection linked with temperature 23.3°C in June (2009)but negatively with dissolved oxygen to 0.5mg/l also the distribution of parasite lodged in 2nd filaments of the arch (45). The depression was clear. the last two months of the year where in November the prevalence of infection 13% at temperature 15.9°C but the distribution of parasite lodged in 2nd filaments of the arch (8).while in December the availability of oxygen was high7.6mg/l and the prevalence was the lowest of the year 3%. So the remarkable note that, with slower currents and lower dissolved oxygen, were characterized by higher frequencies of parasitic infestation.

The result declared that winter months (October to January) coincided with lower prevalence of *A.polycotyleus* (0 to 13%). While a higher frequency of occurrence in the summer season months (June to September) (41 to 51%), may result from relatively higher host susceptibility. Organisms under stress or in poor body condition are generally less resistant to parasites (Zuk, 1990). Seasonally summer months conditions lead to habitat contraction, lower oxygen availability, and higher fish densities, and in some cases lower fish condition and higher mortality (Pečínková *et al.*, 2007a). Chandler *et al.* (1995) found host density to be a significant predictor of the prevalence of `diplostomulum' in the poeciliid fish *poecilia gillii*, in isolated pools of a dry forest stream. they suggest that the high densities of *p. gillii* in some pools may induce high levels of stress as the dry season progresses. Higher densities of the host may also lead to higher prevalence of infection by increasing host availability. Le brun *et al*. (1990) found that diplozoon larvae spend about 60% of their lifetime on river bottoms, favoring infestation of benthic hosts. *Cyprinus carpio* is active throughout the water column, but tends to spend much time hidden under rocks and other bottom materials. Activity decreases during the summer months (Andrea *et al*., 2010), which probably leads to increased time near the bottom. In addition, the much reduced water flow during the summer months may pose less difficulty for the small swimming parasitic larvae. Le brun *et al*. (1990) noted lower prevalence of *Diplozoon gracile* in large deep rivers with rapid current than in smaller tributaries and they attributed this pattern to higher host-finding abilities for the larvae in slower waters.

Finally the study imposed that, No definite seasonal occurrence of *A. polycotyleus* could be clearly established, and the development of such could possibly thus rely on a number of other stimuli. The differing peaks in prevalence appear to be in no way connected to the fluctuations in temperature, and it is thus clear that other factors are the main influences of the reproductive cycles of this parasite.

Table (2): Prevalence and mean abundance ± SE of *A.polycotyleus* parasitizing the gills of *C. carpio* from Abbassa.

Fish sampled	Prevalence %	Mean ±SE abundance	Dissolved oxygen (mg/L)	Water temperature (°C)	Water current (index)	Site of *A. polycotyleus* Arch attachment (%)			
						1	2	3	4
June	51	1.60 ±0.13	0.5	23.3	0.00	7	45	1	0
July	43	0.92±0.17	2.07	24.9	0.50	0	34	17	0
August	41	1.08 ±0.17	2.15	24.0	0.50	0	33	19	0
September	42	0.77 ±0.14	2.1	20.2	0.45	0	32	10	0
October	38	0.68 ±0.16	4.4	16.7	0.42	12	13	5	0
November	13	0.44 ±0.12	6.9	15.9	0.88	25	8	30	0
December	3	0.13± 0.01	7.6	15.1	1.18	0	2	0	0
January	0	0 ± 0	7.6	14.3	1.28	0	0	0	0
February	0	0 ± 0	7.0	15.6	1.08	0	0	0	0
March	2	0.93± 0.22	7.2	15.8	1.18	0	2	0	0
April	12	0.73± 0.28	7.1	17.8	1.18	0	2	0	0
May	11	0.33± 0.12	1.4	19.8	1.18	0	2	0	0
June	33	0.53± 0.87	2.9	22.3	0.01	10	44	1	0
July	25	0.83± 0.45	2.8	24.3	0.40	0	33	1	0
August	33	1.03± 0.4	2.6	22.9	0.50	0	43	6	0

Table (3): Percentage of *Cyprinus carpio* parasitized with *Afrodiplozoon polycotyleus* relative to the dissolved oxygen concentration (mg/L, solid line) and an index of water current.

Months	Prevalence %	Dissolved oxygen (mg/L)	Water current (Index)
June	51	0.5	00
July	43	2.07	0.5
August	41	2.15	0.5
September	42	2.1	0.45
October	38	4.4	0.42
November	13	6.9	0.88
December	3.0	7.6	1.18
January	00	7.6	1.28
February	00	7.0	1.08
March	2	7.2	1.18
April	12	7.1	1.18
May	11	1.4	1.18
June	33	2.9	0.01
July	25	2.8	0.4
August	33	2.6	0.5

Table (4): Status of water quality picture collected from different ponds.

Parameter / Ponds	Turbidity SD Mean ± S.D	Temp.	O2	Salinity	Alkalinity	NO2	NH4	PH
Research ponds	23 ±1.22	13.88 0.520	6.92 ±0.096	0.54 0.090	332.5 ±89.970	0.009 ±0.001	0.028 ±0.002	9±0.410
Production Ponds	11.3 **** ±1.084	16.1*** ±0.157	5.55 **** ±0.550	5.08 *** ±0.554	436 ±44.758	- -	0.006 **** ±0.001	8.7 ±0.669
Drainage canals	15.2 **** ±1.924	15 ±3.162	4.56 **** ±1.539	2.86 **** ±0.546	365.5 ±18.489	- -	0.075 **** 0.006	8.61 ±0.253
F-value	244.61	45.78	126.77	444.71	9.35	10.23	2,73	15.87
P >	0.0001	0.0001	0.0001	0.0001	.0002	0.0001	.0001	0.0001

S.D. = Standard deviation SD = Sache Disc. Means with the same letter in the column are not significantly different ($P < 0.05$)

Host size and sex

Seasonal changes in parasite prevalence were examined for large size fish Weight (250-500g) between 44 and 50 cm length of the fish, because fish in smaller size had a very low prevalence of infection. A particularly strong correlation was observed between weight and total length of the host fish. A weak correlation exists between the numbers of *A.polycotyleus* collected and the weight of the host fish. Kagel and Taraschewski (1993) found that the greater prevalence of *Diplozoon paradoxum* on *Abramis brama* occurred on larger specimen of between 46 and 55cm. The prevalence increased exponentially with an increase in host size. Increase in age comes an increase in the exposure to parasite infestation (Rohde, 1993). Host body size was the factor most consistently correlated with parasite community richness and host may consume greater quantities of food, that they may offer more space to parasites and may provide greater variety of niches for parasite occupation. (Poulin, 1995).Of the total 540 host individuals collected, 205 were male, and 335 were female. Of these gender divisions, 44 male fish (8.15%) and 102 female fish (18.9%) were infected with *A. polycotyleus*. From monthly examined data, it is indicated that preference is shown for female hosts and not male and Parasites also did not significantly affect the host length-gonadal weight relationship. Finally; parasites did not slow development of host gonads which declared from monthly examined of infected carp. In fact, the significant parasitic effect found was caused by parasitized fish having more mature gonads than did unparasitized fish of the same sex and total length.

Attachment sites Table 2.

Seasonal changes in parasite distribution among gill arches, no significant preference for a specific gill arch or position is found. The distribution of parasites did not differ between right and left sides of the gill 45% of the infected *C. carpio* had a parasite on the second arch of the right side of the gill (Table 2). Site of *A.polycotyleus* in The gill is influenced by surrounding environment (Andrea *et al.*, 2010). Rohde (1991) studied the link between gill site and number of parasite species on fish where The majority (77%) of *Neodiplozoon polycotyleus* were located on filaments of the second gill arch, but the distribution did not differ between the right and left sides of the gill of *Barbus neumayeri* (Chapman *et al*., 2000).

Water quality Table (4).

Salinity and eutrophication are the main water quality problems in Abbassa fish ponds. Eutrophication is the enrichment of water with plant nutrients (mainly nitrates and phosphates) which stimulates the growth on undesirable aquatic plants such as algae and hyacinths (Samir and Shaker, 2008), this in turn detrimentally affects the water quality. A decline in water quality will influence the health status of the host, negatively affect the occurrence of parasites on the host or increase abundance of parasites due to lowering immunological response to the parasites (Bagge and Valtonen, 1996). The highest prevalence of *Paradiplozoon homoion* was 8.5% in an eutrophic lake Koskivaara and Valtonen (1991).

In Abbassa, temperature between the ponds differed by a few degrees only; the pH was generally higher, more alkaline. Levels for the conductivity, oxygen, salinity and turbidity were also generally higher. It can clearly be seen from the data sets that conductivity and salinity do not appear to have any influence on the values of parasite prevalence at either research ponds. The conditions which do however appear to have an influence are pH values and turbidity. The fluctuation in turbidity is minor, but the fluctuation for the pH levels is quite significant. The relationship between parasite prevalence and pH is seen clearly as the values change during the March and August sample periods. It would appear that with a rise in pH, a subsequent rise in Prevalence can be expected. Research ponds; show a similar increase in pH during the March sampling period, but not the August one. The change in pH also does not seem to be connected or influential to the prevalence values of the parasite. At the research ponds, the factor which appears to have the greatest influence is the turbidity levels. When the turbidity level is highest during the August sampling period, the prevalence value of the parasite is the lowest. There would thus appear to be an opposing connection between turbidity and parasite prevalence values.

Monthly oxygen levels appeared to be a marker of *A.polycotyleus* attached to the gill filaments of *C. carpio*. The lowest values were recorded in from June to September when oxygen fell to (0.5-2.1mg/liter)with peak prevalence 51% in June and 42% in September. Peak values were observed during December and January (4.6-7.6mg/liter) with depression in prevalence (0-3%).

Dissolved oxygen may contribute to arch selection in *A. polycotyleus* because it is tolerant of hypoxia, and hypoxic habitats may offer a less competitive environment if other gill parasites are sensitive to low oxygen levels. Dissolved oxygen is highly correlated with water current in this system, so dissolved oxygen levels may not directly affect arch selection in *A. polycotyleus* but simply represent the effects of water current. A competitive advantage may be associated, however, with the use of hypoxic sites characterized by low water current. It is also possible that hypoxic conditions enhance transmission probability. If this diplozoon can infect the host via inflowing respiratory current, then the higher gill ventilation rate that characterizes *B. neumayeri* in hypoxic conditions (Olowo and Chapman, 1996) may facilitate transmission. Also the selection of the second gill arch, thereby increasing mating chances and decreasing mortality Rohde (1979)

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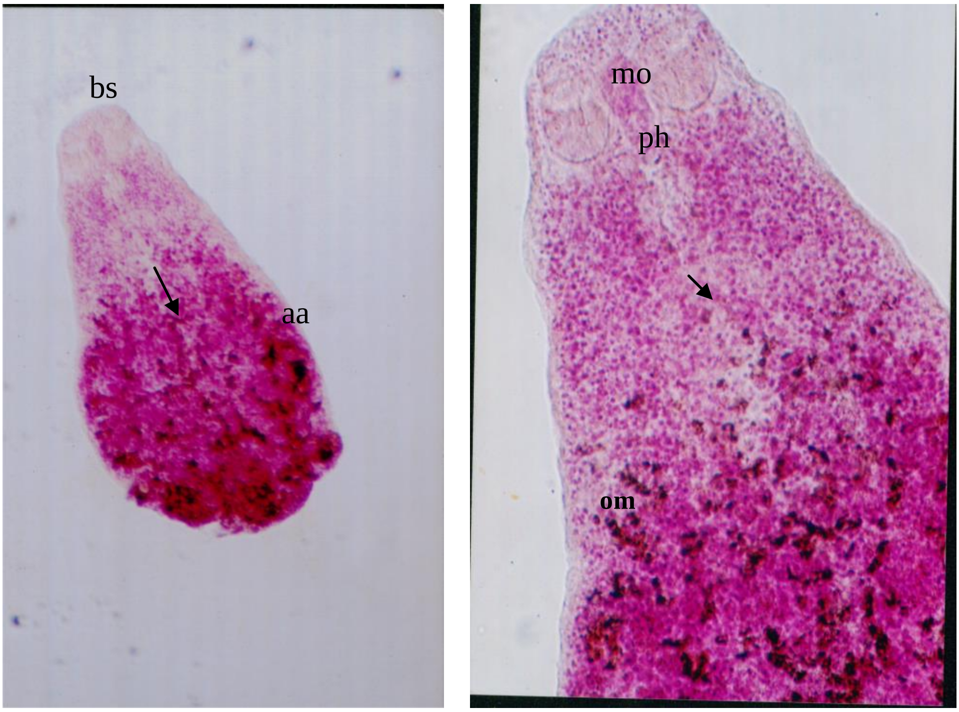

Photo 1a, b. Diporpa of *A.polycotyleus*.: mouth opening (mo),: attachment apparatus (aa), buccal suckers (bs), mouth opening (mo), pharynx (ph), pigmented photoreceptors (pr). CLSM. c: attachment apparatus (aa), outer oblique layer (om), and more prominent inner longitudinal layer of musculature (lm). CLSM. d Ventral sucker (arrow) of diporpa. Ventral sucker (arrow) of diporpa. CLSM. f Dorsal papilla (arrow)of diporpa. Anterior part of diporpa exhibiting the superficial circular structures). Borax carmine stain x 200

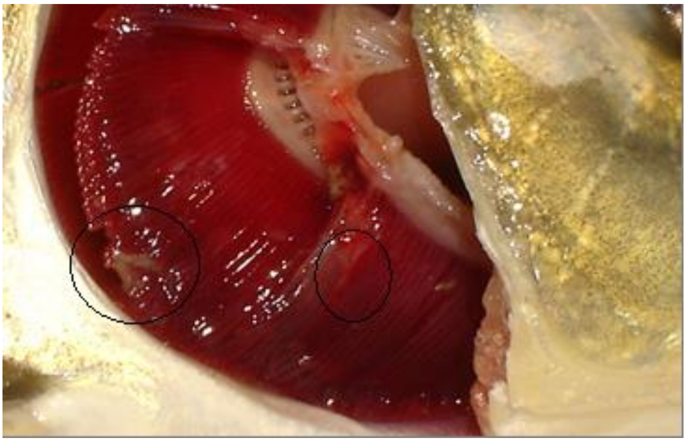

Photo 2. adult *A.polycotyleus* and diporpa grasp the gill filaments of *Cyprinus carpio*

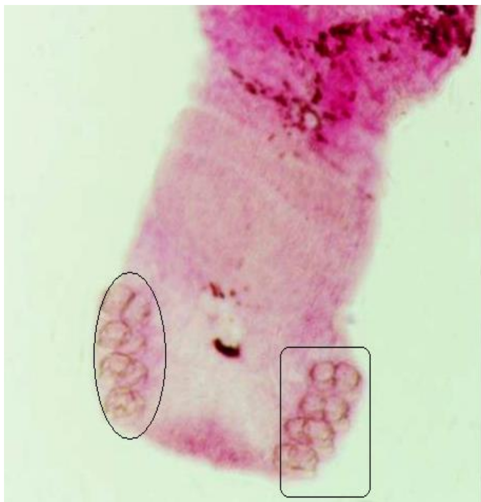

Photo 3 a, b. anterior and posterior ends of adult *A.polycotyleus* Borax carmine stain

Photo 4. Showing adult *A.polycotyleus*. Borax carmine stain x100.

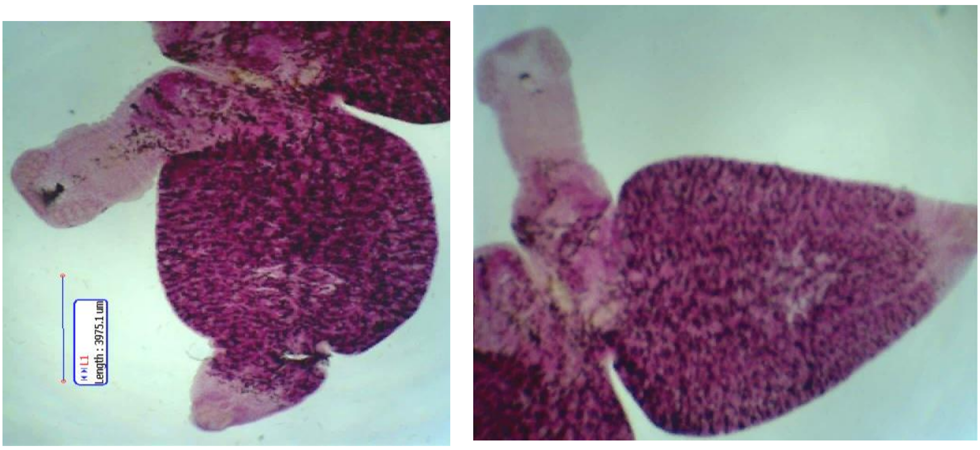

Photo 5 a, b. *A.polycotyleus* Anterior and posterior extremities and CLSM. orax carmine stain x150

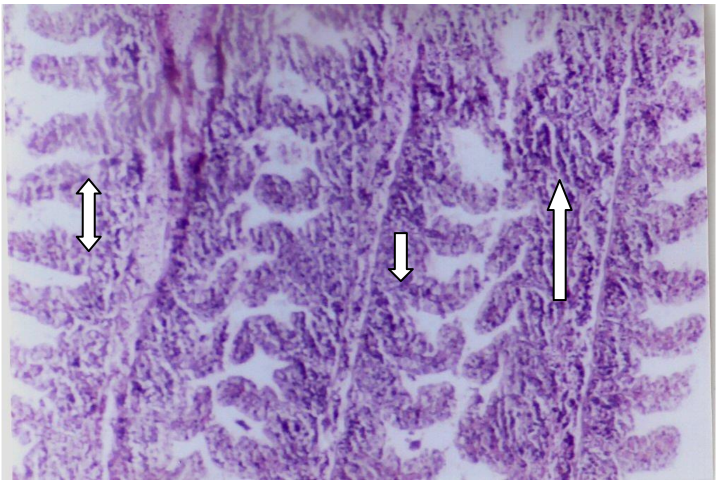

Photo (6). Gills of *Cyprinus carpio* showing hypertrophy, hyperplasia (Arrows) of epithelial covering of secondary lamellae with thickening. H&E x600

الخصائص البيئية والآثار البيولوجية للطفيل الافرودبلوزون بولى كوتيلس التى تصيب اسماك المبروك العادى فى مزرعة العباسه

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قسم أمراض الأسماك المعمل المركزى لبحوث الثروة السمكية– مركز البحوث الزراعية – وزارة الزراعة – مصر

الملخـص العربـى

هذه الدراسة تهدف إلى تقدير معدل انتشار وشدة الاصابه للطفيل الافرودبلوزون بولى كوتيلس التى تصيب اسماك المبروك العادي فى مزرعة العباسة من أحواض الأسماك البحثية. تبدأ من يونيو ٢٠٠٩ إلى أغسطس ٢٠١٠ وقد تم رصد التفاعلات البيئية بين طفيل الخياشيم، الافرودبلوزون بولى كوتيلس ومضيفه (عائله) وتمت الدراسة على اسماك ذات أطوال (بين ٤٤ و ٥٠ سم) والوزن (٢٥٠ – ٥٠٠ جرام). وقد تم رصد مستويات الأوكسجين التى كانت منخفضة في الأحواض خلال الدراسة و لمدة ١٢ شهرا، حيث بلغ متوسطها فقط ٢.٥ مليجرام \ لتر (بمدى ١.٢–٤.٣ مليجرام \ لتر). ومع ذلك، كان ارتفاع معدل انتشار الطفيليات (٤٧.٢٪)، مما يشير إلى مدى مقاومة الطفيل وتحمله للاعاشه والانتشار فى ذلك المعدل المنخفض من الأكسجين في المياه. كذلك ثبت أن معدل انتشار الطفيليات اختلفت مع حجم الجسم المضيف (العائل)، حيث وجد أن اعلي تكرار لإصابة المبروك كانت فى الأحجام المتوسطة. وأيضا وجد أن معدل انتشار الطفيلي تباينت على مدار العام، ومن ناحية توزيع الطفيلي على جانب الخيوط الخيشومية، فقد وجد ان ٧٧.٧٪ من الطفيليات على خيوط من القوس الخيشومية الثانية مما يدل على وجود خصوصية موقع (القوس الخيشومية الثانية) قوي ضمن المضيفين، والتي قد تتعلق توافر الأكسجين زيادة.

كذلك لم يثبت وجود علاقة أو اثر قوى للطفيلي مع الحالة التناسلية لسمكة المبروك العادي.