

PARASITIC FAUNA OF SOME FRESHWATER FISHES FROM GREATER ZAB RIVER, KURDISTAN REGION, IRAQ

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ABSTRACT

A total of 74 fishes, belonging to six species (*Barbus grypus*, *B. kersin*, *B. luteus*, *Cyprinion macrostomum*, *Cyprinus carpio* and *Silurus triostegus*) were collected from Greater Zab river near Gwer district, southwest Erbil city, Kurdistan region, Iraq, from November 2011 until the end of March 2012. The fishes were examined for ecto- and endoparasites. The study revealed the existence of eight species of parasites which included one species of protozoa (*Trichodina mutabilis*), three species of monogenean (*Dactylogyus barbuli*, *Gyrodactylus kherulensis* and *Paradiplozoon cyprini*), metacercaria *Diplostomum spathaceum*, two species of cestodes (*Bothriocephalus acheilognathi* and *Proteocephalus osculatus*) and one species of crustacean (*Pseudolamproglena annulata*). *S. triostegus* was regarded as a new host for *T. mutabilis* and *G. kherulensis*. Also, *B. kersin* for *D. barbuli* and *C. macrostomum* for *P. cyprini* in Iraq.

KEYWORDS: Ecto- endoparasite, Fish, Greater Zab river, Iraq.

INTRODUCTION

The parasites of freshwater fishes have had a great deal and much attracted the attention of biologists in Iraq as a result of fish culture industry. However the importance of fish parasites is related directly to the importance of the fish that they may affect. Therefore it's important for economic point of view for fish farming to have knowledge of the occurrence of parasites on the fresh water fishes. Once we have sound back ground knowledge, it will be possible to control some of the more harmful parasite (Ali *et al.*, 1988).

The fish parasites may directly affect the fish population and its nutritive value. With the increase in world population, and increasing the gap of protein supply, fish is of a higher nutritive value as compared to red meat. Efforts are being made throughout the world towards the exploitation of more healthy fishes. A large number of fish may perish or become inedible due to parasitic diseases (Hoffman, 1998).

The study of fish parasites is necessary and important to increase the productivity of pond farms, to improve the stocks of valuable commercial fisheries in the natural waters and enhance the possibility of fish acclimatization in new sites or localities (Shul'man, 1961). Also, the study of prevalence of fish parasites is necessary and important to decrease their effects on fish population (Hoffman, 1998). Freshwater fishes are well known as intermediate hosts for many helminthes, carrying the infective stages of many cestodes, trematodes and nematodes pathogenic to fish eating animals and to human

such as *Diphyllobothrium latum*, *Clonorchis sinensis*, *Heterophyes heterophyes* and *Anisakis simplex* (Roberts and Janovy, 2005).

The main purpose of the present investigation, is to identify some parasites from the fishes collected from the Greater Zab river in Kurdistan region, Iraq

MATERIALS AND METHODS

Study area

Greater Zab river is a large river (392km), located to the east of Tigris river in Kurdistan region, north of Iraq. The sampling area in this study was located near Guwer district (36° - 37 ° north latitude, 43° - 44 ° east longitude) southwest of Erbil city.

Sampling

A total of 74 fishes, belonging to six species (*Barbus grypus*, *B. kersin*, *B. luteus*, *Cyprinion macrostomum*, *Cyprinus carpio* and *Silurus triostegus*) were collected from Greater Zab river, from November 2011 until the end of March 2012. The fish specimens were collected by gill netting, cast netting and electro fishing by local commercial fishermen.

Fish were transported alive in a cool box with pond or local river water to the laboratory of Parasitology, College of Education, Department of Biology, and University of Salahaddin. The fishes were identified according to Coad (2010).

In the laboratory, the fish were examined externally and internally for parasites. Skin, fin and buccal cavity smears were prepared by slight scraping and examined. The gill arches and filaments were examined under a dissecting

microscope at 4-10X magnification. The fish were opened from the abdominal side and each organ was separated and examined carefully under a dissecting microscope (Amlacher, 1970). Methods used for collecting, fixing, staining and mounting of the parasite specimens were as follows:

Protozoa: The protozoan parasites were identified directly without any technique, by preparation of smears, and important measurements were taken for each parasite.

Monogenea: Worms were separated from the gills and fixed under coverlid according to Gussev *et al.* (1993) in glycerol-gelatin or a mixture of neutral red and glycerin (1:3).

Digenea and Cestoda: Live worms were washed in 0.6% saline solution and fixed in 5% hot formalin, stained with haematoxylin or acetocarmine, then cleared in xylene and mounted in Canada balsam (Scholz, 1989).

Crustacea: Specimens were cleared with 85% lactic acid, and permanent slides were prepared by using jelly glycerin (Lin and Ho, 1998).

Photos were taken with an Olympus camera. Measurements of the parasites were made with an Olympus ocular micrometer, and the detected parasites identified according to their morphology. The following keys were consulted for identification: Bykhovskaya-Pavlovskaya *et al.* (1962) and Hoffman (1998).

RESULTS AND DISCUSSION

The study presented the occurrence of eight species of freshwater fish parasites that occurred in Greater Zab river. The prevalence,

distribution of the parasites and their location in the fish host body are summarized in the Table (1). The following is an account on description and measurements of these parasites:

Trichodina mutabilis Kazubski et Migala, 1968 (Fig. 1)

This ciliated protozoan was recorded from the gills of *S. triostegus* with a prevalence of 25% (Table1). The body is circular in shape when seen from below, and bell-shaped when seen from the side. Posterior end expanded and saucer like to form adhesive or attaching disk, with denticular ring which consisted the teeth. The teeth consisting corona with conspicuous external and internal processes. External processes straight or curved, internal rod like, in form of spines or needles of varied length. Central conical parts of teeth lacking anteriorly directed shoots. A dorsal spiral winds through are of varying length. Macronucleus and Micronucleus are not clear. Diameter of body 55-65, diameter of adhesive disk 45-55 and diameter of denticular ring 30-35. The number of teeth 27-30. Length of external processes 7-9, length of internal processes 15-18 and central conical part 2.

The description and measurements of the present specimen are similar to those referred to by Abdullah (2002), which isolated from the gills of *C. carpio* from Lesser Zab river, for first time in Iraq. No further record was reported for this parasite. So, *S. triostegus* represent a new host for *T. mutabilis* in Iraq.

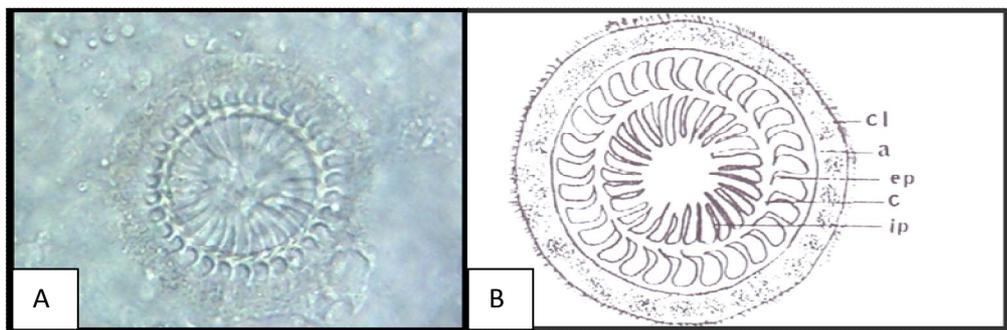


Fig. (1): *Trichodina mutabilis*.

A: photomicrograph of adhesive disk; **B:** camera lucida drawing of adhesive disk
cl, cilia; a, adhesive disk; ep, external process; c, central conical; ip, internal process

Table (1): The distribution of parasites on different sites of fish species from Greater Zab river.

Hosts	Parasites	No. of examined Fishes	No. of infected Fishes	Prevalence %	Site infection
<i>Barbus grypus</i>	-	8	-	-	-
<i>B. kersin</i>	<i>Dactylogyrus barbuli</i> *	14	2	14.28	Gills
<i>B. luteus</i>	<i>Diplostomum spathaceum</i>	8	2	25	Gills
	<i>Pseudolamproglena annulata</i>		2	25	Gills
<i>Cyprinion macrostomum</i>	<i>Paradiplozoon cyprini</i> *	12	2	16.66	Gills
<i>Cyprinus carpio</i>	<i>Bothriocephalus acheilognathi</i>	24	3	12.5	Intestine
<i>Silurus triostegus</i>	<i>Trichodina mutabilis</i> *	8	2	25	Gills
	<i>Gyrodactylus kherulensis</i> *		1	12.5	Skin
	<i>Proteocephalus osculatus</i>		4	50	Intestine

* New host in Iraq

***Dactylogyrus barbuli* Gussev, Ali, Abdul-Ameer, Amin et Molnár, 1993 (Fig. 2)**

This monogenean was recorded on the gills of *B. kersin* with a prevalence of 14.28% (Table1). Worms of medium size with a length of 0.8-1.2 mm, and a width of 0.17 mm. Length of hooklet, 0.035-0.04 mm. Median hook stout, rather short with a total length of 0.058-0.06 mm. Connecting bar of Wunderi-type, 0.005 X 0.05 mm. Supplementary bar five-rayed, 0.038-0.042 X 0.025 mm. Copulatory organ with

spiral tube of 2-3 coils, base of tube enlarged, triangular. Total length of copulatory organ 0.075-0.08 mm. Vagina sclerotised forming coiled tube, diameter of coil 0.033-0.035 mm.

This parasite was described as a new species on gills of *B. barbulus* from Tigris river in Iraq (Gussev *et al.*, 1993). Later, it was recorded on the gills of *B. esocinus*, *B. luteus*, *B. sharpeyi* and *B. xanthopterus* from different locations in Iraq (Mhaisen, 2012). So, *B. kersin* represent a new host for *D. barbuli* in Iraq.

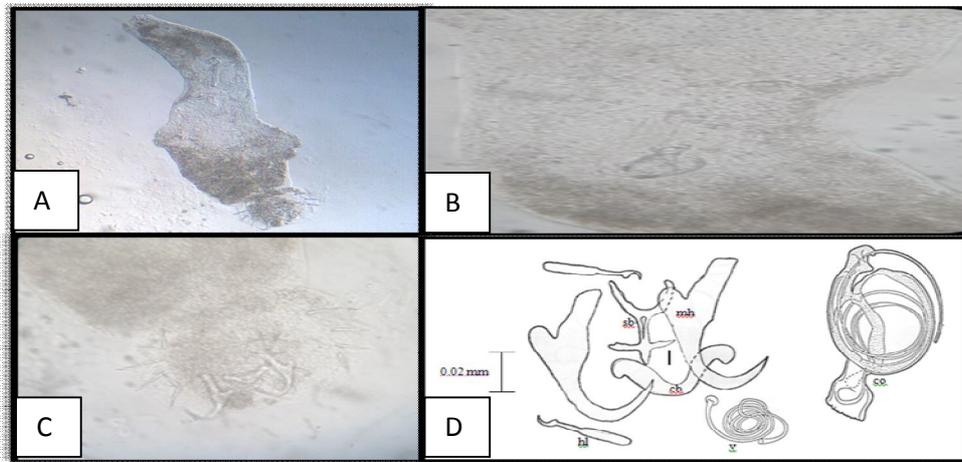


Fig. (2): *Dactylogyrus barbuli*

A: photomicrograph of whole mount; **B:** photomicrograph of median section
C: photo micrograph of anterior end; **D:** camera lucida drawing sclerotised structure
 cb, connective bar; co, copulatory organ; hl, hooklet; mh, medial hooks; sb, supplementary bar; v, vagina

***Gyrodactylus kherulensis* Ergens, 1974 (Fig. 3)**

This monogenean was found on the skin of *S. triostegus* with a prevalence of 12.5% (Table 1). Body length 0.35-0.42 mm and width 0.08-0.11 mm. Total length of hooklets 0.025-0.032 mm. Total length of median hooks 0.060-0.076 mm, main part 0.047-0.055 mm, point 0.029-0.033 mm, inner root 0.020 - 0.0287 mm. Size of ventral bar 0.006-0.009 X 0.020-0.025 mm,

membrane 0.016-0.023 mm. Size of dorsal bar 0.003 X 0.011-0.017 mm.

G. kherulensis has been recorded for the first time in Iraq from *C. carpio* in Babylon fish farm (Ali *et al.*, 1988). After that, it was found on the skin and gills of *Ctenopharyngodon idella* in Al-Furat fish farm, Babylon province (Al-Zubaidy, 1998). In Kurdistan region, it was recorded on the skin of *C. carpio* from Ainkawa

fish hatchery (Mama, 2012). No further record was reported for this parasite. So, *S. triostegus*

represent a new host for *G. kherulensis* in Iraq.

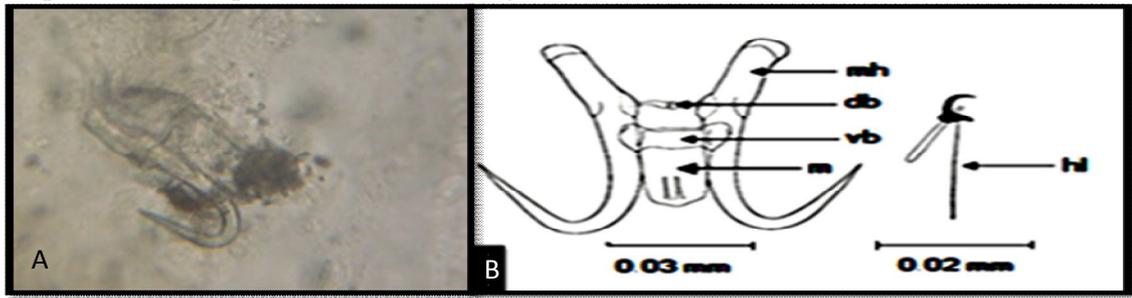


Fig. (3): *Gyrodactylus kherulensis*

A: photomicrograph of median hook; **B:** camera lucida drawing median hook
db, dorsal bar; hl, hook let; m, main part; mh, median hooks; vb, ventral bar.

***Paradiplozoon cyprini* Khotenovskiy, 1982 (Fig. 4)**

This species was obtained from the gills of *C. macrostomum* river with a prevalence of 16.66% (Table 1). The body has different sizes and is divided into an anterior part, which lies before the cross connivent clamp jaws by one short sclerite, a foliate anterior portion containing vitellaria and holdfast apparatus of the worm. The posterior part of the body has folds, the folds are minute. The posterior portion is differentiated into three sections anterior section carrying genital glands, midsection with terminations of intestine trunk and posterior section (attaching disc) with ventral surface bearing attachment clamps. Body length 1.4-2.6 mm, anterior part 0.9-1.6 mm, posterior part 0.4-0.9 mm, the latter has many small folds in its

anterior part. Size of clamps (1: 0.06-0.09 X 0.10-0.11; 2: 0.06-0.09 X 0.10-0.12; 3: 0.07-0.09 X 0.12-0.15; 4: 0.07-0.11 X 0.10-0.13 mm). Length of hooks anchors 0.02-0.025 mm. Diameter of suckers 0.07-0.1 mm, pharynx 0.06mm. The testis rounded or has little lobes.

The first report about *P. cyprini* in Iraq was done by Al-Nasiri and Mhaisen (2009) from *Barbus grypus* from Tigris river passing through Abu-Ajeel village at Tikreet city (Salah-Al Deen province). In Kurdistan region, this parasite was reported on the gills of *C. carpio* from Greater Zab river (Mama and Abdullah, 2012). No, further records are available for it in Iraq. So, *Cyprinion macrostomum* is now considered as a new host for *P. cyprini* in Iraq.

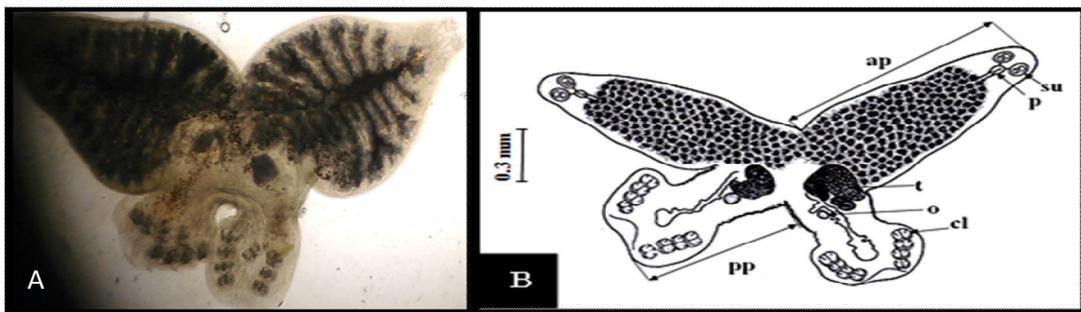


Fig. (4): *Paradiplozoon cyprini*

A: photomicrograph of whole mount; **B:** camera lucida drawing of sclerotised structure
ap, anterior part; cl, clamp; pp, posterior part; su, sucker; o, oesophagus; t, testis; p, pharynx.

***Diplostomum spathaceum* (Rud, 1819) (Fig. 5)**

The metacercaria of this digenea were obtained from the eye lens of *B. luteus* with prevalence of 25%. (Table 1). Body broad, leafy shaped, uncysted white color and feebly mobile. Anterior bluntly rounded end of body with angular lappet like protrusions. Lateral suckers (Pseudosuckers) distinct. Brandes organ round.

Body length 0.45-0.63 mm, width 0.19- 0.2 1mm. The diameter of the ventral sucker was 0.021 mm, oral sucker 0.008 mm and length of lateral sucker 0.011 mm. Intestinal caeca not branched, 0.31 x 0.1 mm.

The first record of *D. spathaceum* in Iraq was done by Abdullah (1990) from eye lens of *B. luteus*, *C. macrostomum* and *C. carpio* from

Dokan Lake. According to Mhaisen (2012), a total of 31 fish hosts species were so far known

for *D. spathaceum* in Iraq.

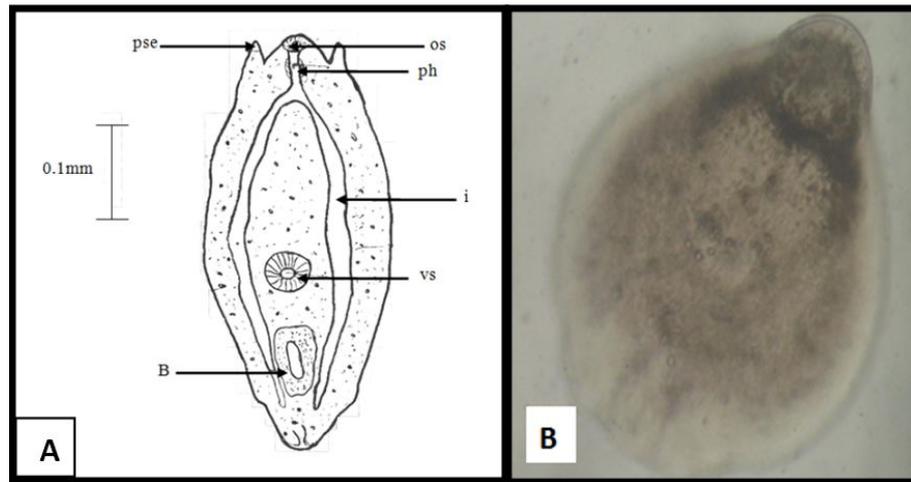


Fig. (5): Metacercaria of *Diplostomum spathaceum*.

A: Camera lucida drawing of metacercaria; **B:** Photomicrograph of metacercaria (100X).
b, barsons organ; i, intestine; os, oral sucker; ph, pharynx; pse, pseudosucker; vs, ventral sucker.

***Bothriocephalus acheilognathi* (Yamaguti, 1934) (Fig. 6)**

One worm was found in intestine of *C. carpio* with a prevalence of 12.5% (Table 1). Body length 6.0 mm, width 1.3 mm. Scolex heart-shaped, with slightly developed apical disk and two laterally situated deep and narrow bothria, measuring 1.0 x 1.2 mm. Body segmented, segments wider than long.

B. acheilognathi was recorded for first time in Iraq by Khalifa (1982) from *C. carpio*. Later, it was reported from 15 fish hosts in Iraq (Mhaisen, 2012). In Kurdistan region this

parasite was recorded from *C. carpio* and *Leuciscus lepidus* from Lesser Zab and Greater Zab rivers respectively (Abdullah, 2002, Abdullah and Mhaisen, 2011).

Two other species of *Bothriocephalus* were reported in Iraq namely: *B. gowkongensis* in intestine of four species of fishes and *B. opsariichthydis* in intestine of six species of fishes (Mhaisen, 2012). Molnár (1977), Scholz (1989) and Hoffman (1998) considered both of *B. gowkongensis* and *B. opsariichthydis* as synonyms of *B. acheilognathi*.

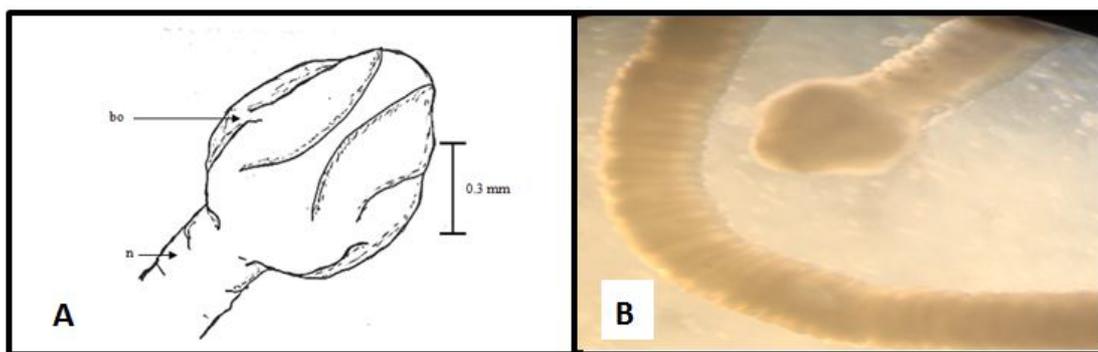


Fig. (6): *Bothriocephalus acheilognathi*.

A: Camera lucida drawing of the head end; **B:** Photomicrograph of the worm (40X).
bo, bothria; n, neck.

***Proteocephalus osculatus* (Goeze,1782) (Fig.7)**

This species was obtained from the intestine of *S. triostegus* with a prevalence of 50% (Table 1). Worms of moderate size. Scolex usually round, not armed with hooks, 4 lateral suckers,

with tip perhaps bearing fifth "crown" or sincipital sucker or rudiment of one. Mature strobila attains length of 100-150 mm, maximum width of 1.5-2.5 mm. Scolex 0.30-0.56 mm wide, lateral suckers 0.17-0.23 mm in diameter,

sincipital sucker with conspicuous radial musculature, deep, reaching diameter of 0.10-0.14 mm (unspinose). Testes oval in two layers, measuring 0.033-0.129 x 0.013-0.083 mm. Ovary bilobed, lying near posterior margin of segment, measuring 0.05-0.33 x 0.95-1.56 mm. Vitelline follicles 0.026-0.079 x 0.010-0.023 mm in size, forming two laterally situated bands.

P. osculatus was recorded for the first time in Iraq from *Aspius vorax* from Al-Tharthar Lake

(Al- Saadi, 1986). After that, it was reported from seven different host fishes including *S. triostegus* (Mhaisen, 2012). In Kurdistan region this parasite was recorded from *S. glanis* from Lesser Zab and Greater Zab rivers (Abdullah, 2002). The present specimens show a great similarity with the specimens of Abdullah (2002), but they are smaller in size.

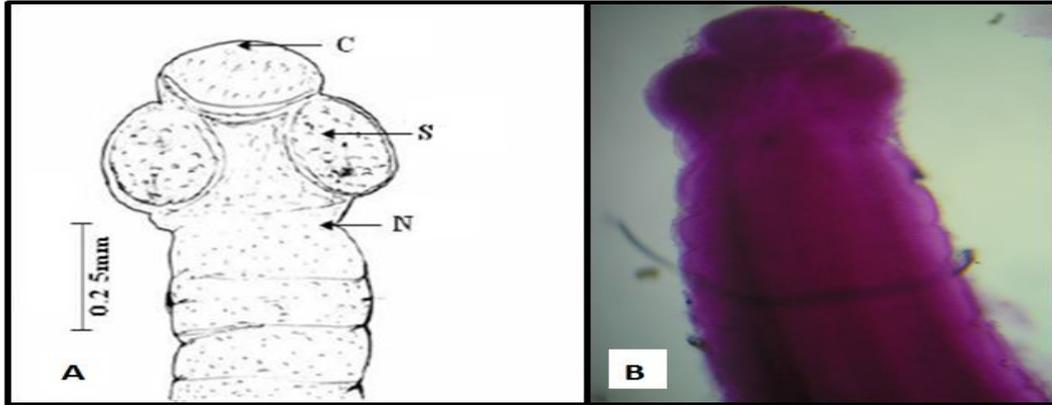


Fig. (7): *Proteocephalus osculatus*.

A: Camera lucida drawing of the Scolex; **B:** Photomicrograph of the Scolex (400X).
c, crown; n, neck; s, sucker.

***Pseudolamproglena annulata* Boxshall, 1976 (Fig. 8)**

This crustacean was found on the gills of *Barbus luteus* with a prevalence of 25% (Table1). Body distinctly segmented. Cephalothorax broad, dorsal surface concave.

Total body length 1.75-2.15 mm. Egg strings uniseriate, containing 15-18 eggs.

This parasite was described as a new species by Boxshall (1976) on the gills of *Cyprinion macrostomum* in Tigris river in Iraq. Later, it was reported on seven other host species including *B. luteus* (Mhaisen, 2012).

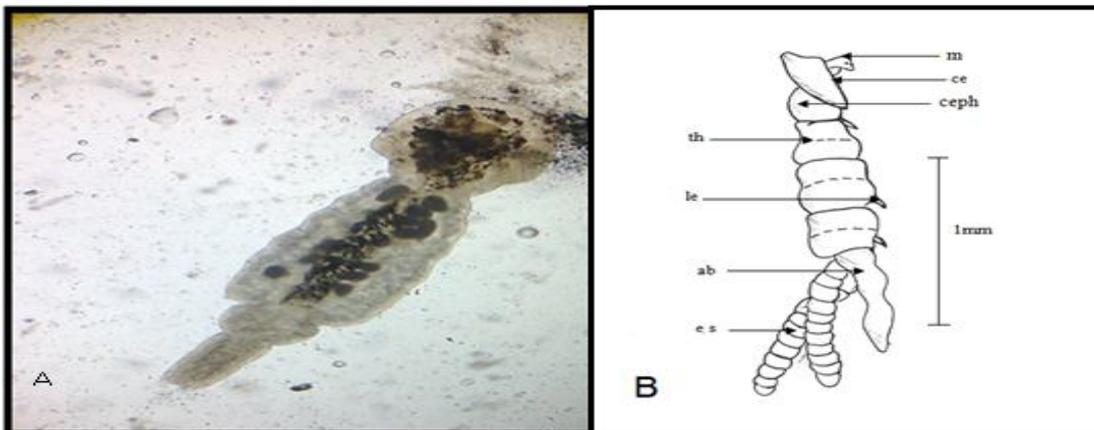


Fig. (8): *Pseudolamproglena annulata*

A: photomicrograph of whole mount; **B:** camera lucida drawing of sclerotised structure
ab, abdomen; ce, cephalon; ceph, cephalothorax; es, egg sac; le, leg; m, maxilla; th, thorax.

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گروپی مشه خوږه کانی هندی له ماسی له زئی ی زابی گهوره، ههریمی کوردستان، عیراق

پوخته

له کاتی پشکینی 74 ماسی که ده گریته وه بو شهش جور (*Barbus kersin* و *Barbus grypus* و *Silurus triostegus*) له زئی ی زابی گهوره له ناوچهی گوپ، باشووری رۆژئاوی شاری ههولیر، ههریمی کوردستان - عیراق، له ماوهی نیوان تشرینی دووهم 2011 تا وه کو کوتایی ئادار 2012، نو جور له مشه خوږه کان دۆزرانه وه که ئەمانه ده گریته: یهك جور له مشه خوږه سه ره تاي یه کان *Trichodina mutabilis* و سئ جور له کونکهره یهك خانه خوی یه کان (*Paradiplozoon cyprini* و *G,yrodactylus kherulensis*) و *Dactylogyrus barbuli* یهك جور له کونله ره دوو خانه خوی یه کان *Diplostomum spathaceum* و دوو جور له کرمه شریته یه کان *Proteocephalus osculatus* و *Bothriocephalus acheilognathi* و یهك جور له توپکلداره کان *Pseudolamproglena annulata*.

المجموعة الحيوانية المتطفلة على بعض الأسماك من نهرا الزاب الكبير، إقليم كوردستان، العراق

الخلاصة

تم فحص 74 سمكة تعود الى ستة انواع (*Barbus kersin* و *Barbus grypus* و *Barbus luteus* و *Cyprinion, macrostomum* و *Cyprinus carpio* و *Silurus triostegus*) جمعت من الزاب الكبير في منطقة طوير جنوب غرب محافظة اربيل اقليم كوردستان العراق خلال الفترة المحصورة بين شهر تشرين الثاني 2011 ولغاية شهر اذار 2012. تم العثور على ثمانية انواع من الطفيليات الخارجية تضمنت: نوعا واحدا من الحيوانات الابتدائية *Trichodina mutabilis* وثلاثة انواع من المخرمات احادية المنشأ *Paradiplozoon cyprinid*، *G,yrodactylus kherulensis* و *Dactylogyrus barbuli* نوعا واحدا من المخرمات ثنائية المنشأ *Diplostomum spathaceum* و نوعين من الديدان الشريطية *Proteocephalus osculatus* و *Bothriocephalus acheilognathi* ونوعا واحدا من القشريات *Pseudolamproglena annulata*.