Monogenean Infections on Fishes from Darbandikhan Lake in Kurdistan Region, Iraq

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Abstract. A total of 226 freshwater fishes, belonging to 14 species, were collected from Darbandikhan Lake, southeast of Sulaimania city, Kurdistan region, Iraq, from March 2012 to the end of October 2012. The fishes were examined for monogeneans parasites. The study revealed the existence of 25 species of parasites including 20 species of *Dactylogyrus*, three species of *Dogielius* and two species of *Gyrodactylus*. Five species of these parasites (*D. dyki*, *D. persis*, *D. mascomi*, *D. suchengtaii* and *G. molnari*) were recorded for the first time in Iraq, and four species (*D. barbiodies*, *D. formosus*, *D. lenkorani* and *G. sprostonae*) were recorded in Kurdistan region. Also, some fish species were recorded as new hosts for some parasite species. The present study revealed that *D. suchengtaii* and *D. carassobarbi* had the highest prevalence f 100% and 90.90%, respectively in the lake.

Keyword: Monogenea, Fishes, Darbandikhan Lake, Kurdistan Region, Iraq.

Introduction

The monogeneans are group of ectoparasites living on the skin, fins and gills representing the largest group of fish parasites, with up to 20000 species described to date (25). They are belonging to phylum Platyheminthes. They cause fish death and mass mortalities associated with large economical losses. For example, *Gyrodactylus salaris* caused losses accounted for about 300 tons in salmon farms of Norway (28). *Dactylogyrus vastator* caused great damage to the gill filaments and severe mortalities of carp and gold fishes in California and southern Ontario fish farms (19).

The first information on monogeneans from the Iraqi freshwater fishes was given by Fattohy (16), who recorded *Diplozoon kasimii* on the gills of *Cyprinion macrostomum* from Tigris River in Mosul city. The checklist of parasites of fishes from Iraq includes 104 species of monogeneans belonging to 21 genera (22).

The main purpose of the present investigation is to identify monogeneans on fishes from Darbandikhan Lake in Kurdistan Region, to compare the parasite fauna with that reported in the Iraqi literature and to report possible new host and locality records.

Materials and Methods

A total of 226 fish specimens were collected from Darbandikhan Lake (located at about 60 km southeast of Sulaimania city, in the north of Iraq, situated between 35°N and 45°E) by local

fishermen by using gill netting, cast netting, electrofishing, hook or bow-net twice monthly during the period from March to the end of October 2012.

The fishes were placed in a container with the local lake water, and transferred immediately to the laboratory of Biology Department, College of Science, University of Sulaimania, as soon as possible and were examined within 48 hours after their capture. However, some fishes were deeply frozen (4^{o}C) and examined within one week (24). The fishes were identified according to Coad (15).

In the laboratory, gills of fishes were placed in a separate Petri dish with only small amount of tap water. Pieces of gill filaments were tiered by a fine needle. Worms (after leaving the gills) were removed from the water by a small pipette and placed on a slide, with a very small amount of water. They were covered with a cover slip with glycerin-gelatin. A piece of melted glycerin-gelatin was dropped with cover slip onto the worms. The cover slip was dried by a blotting paper carefully, and the worms in glycerin-gelatin are cautiously thickened (20). Smears from the skin were taken by slide scraping and examined directly under the microscope. The measurement of *Dactylogyrus* and *Gyrodactylus* species was achieved by ocular micrometer and the terms were used as recommended by Gussev (18) and Pugachev *et al*. (26). Photos were taken with Sony Optical Steady Shot Digital camera model DSC-W570, 16.1 mega pixels. The figures were drawn by using a Camera Lucida (drawing tube). Measurements of parasite were made with an Olympus ocular micrometer. The detected parasites were morphologically identified by using keys of three major books of parasite identification (14, 17, 26).

Results and Discussion

A total of 255 fishes, belonged to 14 species of the family Cyprinidae and Mastacembelidae, were collected from Darbandikhan Lake. The inspection of fishes revealed their infection with 25 species of monogenean parasites including: 20 species of *Dactylogyrus*, three species of *Dogielius* and two species of *Gyrodactylus*. The distribution of these monogeneans, their location on the fish hosts body and the prevalence and mean intensity of infection are summarized in Table (1). The following is an account on the description and measurements of these parasites, especially those which were recorded for the first time in Iraq and Kurdistan region.

1- *Dactylogyrus anchoratus* (Dujardin, 1845)

This monogenean was found on gills of *Carassius auratus* and *Luciobarbus esocinus* with prevalence of 30.76% and 9.09%, respectively (Table 1). *D. anchoratus* was recorded for the first time in Iraq from *C. carpio* from Tigris River at Al-Zaafaraniya in south Baghdad (23). After that, it was recorded from *C. auratus* in the same fish farm (27). In Kurdistan region, it was reported from *C. carpio* in Ainkawa fish hatchery and Lesser Zab River (21). No further

host was reported after that. So, *L. esocinus* of the present study represents a new host for this parasite in Iraq.

2- *Dactylogyrus barbioides* Gussev, Ali, Abdul-Ameer, Amin & Molnár, 1993

This worm was found on gills of *Barbus grypus* with a prevalence of 20% (Table 1). Small or moderate sized worms, body length 0.60-0.650 mm, width 0.140-0.160 mm. Marginal hooks with distinctly projected heel of blade, length 0.025-0.030 mm. Total length of median hooks 0.052-0.056 mm. Length of connecting bar 0.035-0.040 mm. width 0.004-0.008 mm. Supplementary bar simple, straight and slightly enlarged in middle, length 0.026-0.028 mm, width 0.015-0.025 mm. Copulatory organ thin, slightly curved tube with bubble-shaped or triangular enlarged portion and bifurcate accessory piece, total length 0.055-0.058 mm. Vagina sclerotized, bean-shaped, with a cup-shaped structure on one side and massive enlargement on other, size 0.020-0.023 x 0.007-0.011 mm (Fig. 1).

The present worm shows a great similarity with the specimens of Gussev *et al.* (18) who described it for the first time in Iraq as a new species from the same host from Tigris River near Baiji. Later, it was reported from the gills of *B. xanthopterus* from the Euphrates River near Al-Musaib city (10). The present record of *D. barbioides* is considered as the first one in Kurdistan region.

3- *Dactylogyrus baueri* Gussev, 1955

This worm was recorded on gills of *C. auratus* with a prevalence of 30.76% (Table 1). *D. baueri* was recorded for the first time in Iraq by Al-Aubaidi (9) from *C. carpio* from Al-Zaafaraniya fish farm. After that, it was reported from *C. carassius* from the same fish farm (27) and from *C. auratus* from three fish farms, south of Baghdad (12). In Kurdistan Region, it was reported from *C. carpio* from Lesser Zab River (21).

4- *Dactylogyrus carassobarbi* Gussev, Jalali & Molnár, 1993

This parasite was found on gills of *Capoeta trutta* and *Carasobarbus luteus* with prevalence of 7.24% and 90.90%, respectively (Table 1). This worm was recorded for the first time in Iraq by Al-Ali (8) from gills of *B. luteus* from Garmat Ali River in Basrah province. After that, it was reported from four different fish hosts namely *C. luteus*, *C. trutta*, *C. umbla* and *B. xanthopterus* (22). In Kurdistan Region, it was reported by Abdullah (2) from gills of *C. umbla* from Lesser Zab and Greater Zab rivers.

5- *Dactylogyrus deziensioides* Gussev, Jalali & Molnár 1993

This monogenean was isolated from gills of *B. barbulus* with a prevalence of 50% (Table 1). *D. deziensioides* was recorded for the first time in Iraq from *B. barbulus* and *B. xanthopterus* from Lesser Zab River (2). After that, it was reported on gills of *B. kersin* from Bahdinan River (13) and from *C. carpio* from Lesser Zab River (21).

6- *Dactylogyrus deziensis* Gussev, Jalali & Molnár, 1993

This worm was found on gills of *B. barbulus* and *L. esocinus* with prevalence of 20% and 45.45%, respectively (Table 1). This species was recorded for the first time in Iraq from *B. barbulus* and *B. kersin* from Bahdinan River (13). After that, it was reported on gills of *B. xanthopterus* from the Euphrates River near Al-Musaib city (10). No further host was reported after that. So, *L. esocinus* of the present study represents a new host for this parasite in Iraq.

7- *Dactylogyrus dyki* Ergens & Lucky, 1959

This worm was isolated on the gills of *Squalius lepidus* with a prevalence of 5.88% (Table 1). Small worms, total length 0.5-0.55 mm, width 0.1 mm. length of marginal hooks 0.020-0.026 mm. Length of median hook 0.040-0.046 mm, main part 0.028-0.035 mm, inner root 0.013-0.020 mm, outer root 0.002-0.005 mm, point 0.015-0.020 mm. Connecting bar 0.003-0.005 x 0.030-0.035 mm. Supplementary bar 0.008-0.012 x 0.018-0.022 mm. Total length of copulatory organ 0.040-0.045 mm. Length of vagina disc shape, 0.012-0.015 mm (Fig. 2).

The description and measurement of the present specimen are similar to those reported by Pugachev *et al.* (26) for *D. dyki* found on gill filaments of *Barbus barbus* from Tisa River in Russia. This parasite has never been reported from any fish species in Iraq before. Therefore, the present record is considered as the first record in Iraq.

8- *Dactylogyrus elegantis* Gussev, 1966

This parasite was found on gills of both *Chonodrostma regium* and *S. lepidus* with prevalence of 85.71% and 11.76%, respectively (Table 1). This worm was recorded for the first time in Iraq by Abdullah (2) from the gills of *C. regium* from Lesser Zab River in Kurdistan Region. No further host was reported after that. So, *S. lepidus* in this study is considered as a new host for this parasite in Iraq.

9- *Dactylogyrus formosus* Kulwiec, 1927

This worm was found on gills of *C. auratus* with a prevalence of 30.76% (Table 1). Small or medium worm, body length up to 0.55-0.60 mm, width 0.12 mm. Length of marginal hooks 0.012-0.033 mm. Total length of median hooks 0.060-0.075 mm. Connecting bar 0.003-0.005 x 0.024-0.026 mm. Total length of copulatory organ 0.025-0.033 mm (Fig. 3).

This worm was recorded for the first time in Iraq by Asmar *et al.* (12) from the same host from some fish farms, south Baghdad. No further record was reported for *D. formosus*. Therefore, this record is considered as the first one in Kurdistan Region.

10- *Dactylogyrus inutilis* Byvhowsky, 1949

This parasite was recorded on gills of *L. esocinus* with a prevalence of 9.09% (Table 1). The present worm shows a great similarity with the specimens of Gussev *et al.* (18) who recorded it for the first time in Iraq from *Barbus xanthopterus* from Tigris River near Baiji. Later on, it

was reported from two other hosts (*B. barbulus* and *B. grypus*) from Euphrates River near Al-Musaib city (10). In Kurdistan Region, it was recorded from *B. barbulus* and *B. esocinus* from Lesser Zab and Greater Zab rivers (6).

11- *Dactylogyrus lenkorani* Mikailov, 1967

This worm was found on the gills of both *C. trutta* and *C. umbla* with prevalence of 2.89% and 83.33%, respectively (Table 1). Medium sized worms, body length 0.50-0.85 mm, width 0.09-0.10 mm. Length of marginal hooks 0.033-0.043 mm. Total length of median hook 0.050-0.060 mm. Connecting bar 0.006-0.010 x 0.028-0.034 mm. Supplementary bar 0.002-0.004 x 0.025-0.030 mm. Total length of copulatory organ 0.030-0.040 mm (Fig. 4).

The present worm shows a great similarity with the specimens of Abdul-Ameer (1) who recorded *D. lenkorani* for the first time in Iraq from *B. sharpeyi* from Diyala River. This parasite was reported only in two fish hosts in Iraq (22). No further record was reported after that. So, *C. trutta* and *C. umbla* the present study represent two new hosts for this parasite in Iraq. Also, the present record of *D. lenkorani* is considered as the first one in Kurdistan Region.

12- *Dactylogyrus macrostomi* Gussev, Ali, Abdul-Ameer, Amin & Molnár, 1993

This monogenean was found on gills of *C. macrostomum* with a prevalence of 45.45% (Table 1). This parasite was reported for first time in Iraq from the same host from Tigris River near Baiji (18). In Kurdistan Region, it was recorded on gills of the same host from Lesser Zab and Greater Zab rivers and Bahdinan River (2, 6, 13).

13- *Dactylogyrus mascomai* El-Gharbi, Renaud & Lambert, 1992

This worm was recorded on gills of *C. macrostomum* with a prevalence of 9.09% (Table 1). Small worm, total length about 0.5-0.55 mm, width 0.06-0.08 mm. Length of marginal hooks 0.020-0.035 mm. Length of median hooks 0.040-0.050 mm. main part 0.030 mm, outer root 0.005 mm, inner root 0.015 mm, point 0.013 mm. Size of connecting bar 0.006-0.008 x 0.026-0.032 mm. Size of supplementary bar 0.003-0.006 x 0.020-0.025 mm. Total length of copulatory organ 0.025-0.030 mm (Fig. 5).

The present species closely resembles *D. mascomai*, which was reported by Pugachev *et al*. (26) in the shape and measurement of parts of the haptor, but the total length of the present species is shorter than that reported by Pugachev *et al*. (26). The possible explanation for this difference could be due to the different host, as Pugachev *et al*. (26) detected it on the gill filaments of *Labeobarbus guiraonis* and *Barbus haasi* from Spain. This parasite was never been reported from any fish species in Iraq before. Therefore, the present parasite is considered as the first record in Iraq.

14- *Dactylogyrus microcirrus* Gussev, Jalali & Molnár, 1993

This worm was recorded on gills of *C. trutta* with a prevalence of 24.63% (Table 1). Previously, *D. microcirrus* was recorded in Iraq from the same host from Darbandikan Lake (5).

15- *Dactylogyrus pavlovskyi* Bychowsky, 1949

This monogenean was recorded on gills of *B. grypus* with a prevalence of 80% (Table 1). This parasite was recorded for first time in Iraq on gills of *B. grypus* and *B. sharpeyi* from Tigris River near Baiji (18). Later on, it was reported from other three different hosts (*B. barbulus*, *B. luteus* and *Liza abu*) from Euphrates River near Al-Musaib city (10). In Kurdistan Region, it was recorded by Abdullah (3) on *B. grypus* in Darbandikhan Lake.

16- *Dactylogyrus persis* Bychowsky, 1949

This parasite was found on gills of *C. luteus* with a prevalence of 27.27% (Table 1). Small worm, total length 0.25-0.35 mm, width 0.06 mm. Length of marginal hooks 0.018-0.020 mm. Length of median hooks 0.030-0.035 mm, main part 0.022-0.026 mm, inner root 0.010-0.015 mm, outer root 0.003-0.004 mm, point 0.010-0.012 mm. Size of connecting bar 0.003 x 0.020-0.024 mm. Supplementary bar 0.020-0.023 x 0.020-0.026 mm. Length of copulatory organ 0.033-0.035 mm. Vaginal armament is absent (Fig. 6).

The morphological data of the present specimen fall within the size range given by Pugachev *et al.* (26) for *D. persis* found on gill filaments of the same host from Karkheh River in Iran. The present finding of *D. persis* represents the first record of this species in Iraq.

17- *Dactylogyrus pulcher* Bykhovsky, 1957

This worm was found on gills of both *C. trutta* and *C. umbla* with prevalence of 66.66% and 16.66%, respectively (Table 1). Previously, *D. pulcher* was recorded on gill of *B. xanthopterus*, *C. trutta*, *C. regium* and *C. macrostomum* (22). No further host was reported after that. So, *C. umbla* of the present study represent a new host for this parasite in Iraq.

18- *Dactylogyrus rectotrabus* Gussev, Jalali & Molnár, 1993

This parasite was isolated from gills of *Garra rufa* with a prevalence of 16.66% (Table 1). The present worm shows a great similarity with the specimens of Abdullah (4) who recorded *D. rectotrabus* for the first time in Iraq from the same host from Greater Zab River in Kurdistan Region.

19- *Dactylogyrus suchengtaii* Gussev, 1962

This worm was found on gills of *Hypophthalmichthys molitrix* with a prevalence of 100% (Table 1). Moderate or large sized, body length 0.6-1.2 mm, width 0.08-0.12 mm. Length of marginal hooks 0.022-0.040 mm. Total length of median hooks 0.035-0.041 mm. Connecting bar 0.023-0.033 x 0.006-0.008 mm, supplementary bar 0.027-0.033 x 0.003-0.005 mm. Total

length of copulatory organ about 0.030-0.040 mm. Vaginal armament in form of a short tube about 0.006-0.009 mm long (Fig. 7).

The present worm shows a great similarity with the specimens of Pugachev *et al*. (26) who recorded it for the first time as a new species from gills of *H. molitrix* from Amur River in Russia, except that the present parasite is larger and this may be due to a the different environment.

20- *Dactylogyrus vistulae* Prost, 1957

This species was recorded on gills of both *S. lepidus* and *Mastacembelus mastacembelus* with prevalence of 23.52% and 7.14%, respectively (Table 1). The first report about *D. vistulae* in Iraq was done by Abdullah (2) from gills of *L. lepidus* in Lesser Zab and Greater Zab rivers. No further host was reported after that. So, *M. mastacembelus* is considered as a new host for *D. vistulae* in Iraq.

By recording the four species of *Dactylogyrus* (*D. dyki*, *D. mascomi*, *D. persis* and *D. suchengtaii*) in the present study, a total of 77 species of *Dactylogyrus* become known from different species of fishes in Iraq. Among this number, 47 species were recorded in Kurdistan Region and most of them were found on gills of cyprinid fishes (22).

21- *Dogielius mokhayeri* Jalali & Molnár, 1990

This worm was recorded on gills of both *C. trutta* and *C. luteus* with prevalence of 31.88% and 9.09%, respectively (Table 1). The present worm shows a great similarity with the specimens of Abdullah & Mhaisen (7) who recorded *D. mokhayeri* for the first time in Iraq from *A. vorax* from Greater Zab River. No further host was reported after that. So, both *C. luteus* and *C. trutta* are considered as two new hosts for this parasite in Iraq.

22- *Dogielius molnari* Jalali, 1992

This worm was recorded on gills of *C. macrostomum* with a prevalence of 4.54% (Table 1). The present worm shows a great similarity with the specimens of Abdullah & Mhaisen (7) who recorded *D. molnari* for the first time in Iraq from the same host from Greater Zab River in Kurdistan Region.

23- *Dogielius persicus* Molnár & Jalali, 1992

This species was recorded on gills of *B. grypus* with a prevalence of 10% (Table 1). Previously, *D. persicus* was recorded for the first time in Iraq from *B. luteus* from Greater Zab River (7). Later, it was reported from *B. barbulus* and *B. sharpeyi* from Euphrates River near Al-Musaib city (10). So, *B. grypus* is considered as a new host for *D. persicus* in Iraq.

24- *Gyrodactylus molnari* Ergens, 1978

This worm was recorded on gills of *Cyprinus carpio* with a prevalence of 7.69% (Table 1). Small worm, body length is 0.40 mm. Total length of median hooks is 0.055-0.065 mm, main part 0.045-0.050 mm, point 0.030 mm. inner root 0.02 mm. Size of ventral bar is 0.007-0.009 x 0.018-0.022 mm, dorsal bar is 0.001-0.002 x 0.015-0.018 mm. membrane length is 0.014-0.017 mm. Marginal hooks 0.020 mm (Fig. 8).

The description and measurements of the present specimen are similar to those reported by Pugachev *et al.* (26) for *G. molnari* found on gill filaments of *Cobitis taenia* from Tapio River (Hungary). *G. molnari* was never reported from any fish species in Iraq before. Therefore, the present parasite is considered as the first record in Iraq. By recording *G. molnari* in the present study, a total of 25 species of *Gyrodactylus* become known from different species of fishes in Iraq (22). Among this number, 11 species were recorded in Kurdistan Region.

25- *Gyrodactylus sprostonae* Ling, 1962

This species was recorded on gills of both *C. auratus* and *C. carpio* with prevalence of 15.38% and 7.69%, respectively (Table 1). Small worms, body length 0.42-0.50 mm, width 0.01 mm. Length of marginal hooks 0.020-0.025 mm. Total length of the median hooks 0.040-0.050 mm. Size of ventral bar 0.003-0.004 x 0.015-0.020 mm. Dorsal bar 0.001 x 0.013-0.020 mm in size (Fig. 9).

This worm was recorded for the first time in Iraq by Al-Zubaidy (11) from the skin and fins of *C. carpio* from Al-Furat fish farm, Babylon province. Later on, it was reported from four other different hosts (*A. orontis, C. carassius, C. sellal* and *C. kais*) from Euphrates River near Al-Musaib city (10). No further host was reported after that. So, *C. auratus* is regarded as a new host in Iraq. Also, *G. sprostonae* is regarded as a first record in Kurdistan Region.

Table (1): The prevalence of monogeneans parasitic on gills of fishes from Darbandikhan Lake.

Monogeneans	Hosts	No. of fishes		Prevalence (%)	Mean intensity
		examined	infected		
Dactylogyrus anchoratus	*Carassius auratus*	13	4	30.76	8
	*Luciobarbus esocinus*** *	11	1	9.09	5
D. barbioides	*Barbus grypus*	10	2	20	3.5
D. baueri	*Carassius auratus*	13	4	30.76	6
D. carassobarbi	*Capoeta trutta*	69	5	7.24	7
	Carasobarbus luteus	11	10	90.90	5.7
D. deziensioides	*Barbus barbulus*	10	5	50	4.2
D. deziensis	*Barbus barbulus*	10	2	20	7.5
	*Luciobarbus esocinus ****	11	5	45.45	8.6
D. dyki *	*Squalius lepidus*	17	1	5.88	3
D. elegantis	*Chondrostoma regium*	14	12	85.71	9
	*Squalius lepidus ****	17	2	11.76	2.5
D. formosus	*Carassius auratus*	13	4	30.76	8.75
D. inutilis	*Luciobarbus esocinus*	11	1	9.09	5
D. lenkorani	*Capoeta trutta ****	69	2	2.89	5
	*Capoeta umbla ****	12	10	83.33	12
D. macrostomi	*Cyprinion macrostomum*	22	10	45.45	13
D. microcirrus	*Capoeta trutta*	69	17	24.63	9
D. pavlovskyi	*Barbus grypus*	10	8	80	21
D. persis *	*Carasobarbus luteus*	11	3	27.27	3.33
D. pulcher	*Capoeta trutta*	69	46	66.66	18
	*Capoeta umbla ****	12	2	16.66	6.5
D. rectotrabus	*Garra rufa*	6	1	16.66	5
D. reinii *	*Cyprinion macrostomum*	22	2	9.09	2.5
*D. suchengtaii**	*Hypophthalmichthys molitrix*	4	4	100	25
D. vistulae	*Squalius lepidus*	17	4	23.52	4.5
	*Mastacembelus mastacembelus****	14	1	7.14	2
Dogielius mokhayeri	*Capoeta trutta*	69	22	31.88	10.45
	Carasobarbus luteus	11	1	9.09	7
D. molnari	*Cyprinion macrostomum*	22	1	4.54	3
D. persicus	*Barbus grypus*	10	1	10	3
*Gyrodactylus molnari**	*Cyprinus carpio*	13	1	7.69	17
*G. sprostonae***	*Carassius auratus*	13	2	15.38	14.5
	Cyprinus carpio	13	1	7.69	27

* New parasite record in Iraq.
** New parasite record in Kurdistan region.
** New host record in Iraq.

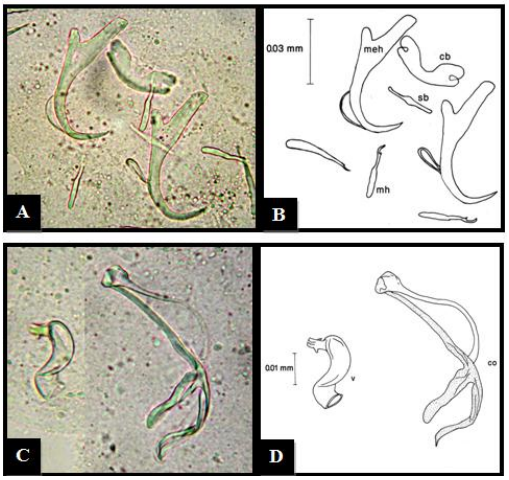

Fig. 1: ***Dactylogyrus barbioides***
A. Photomicrograph of the haptor (600x).
B. Camera Lucida drawing of the haptor.
C. Photomicrograph of the copulatory organ (1000x).
D. Camera Lucida drawing of the copulatory organ.

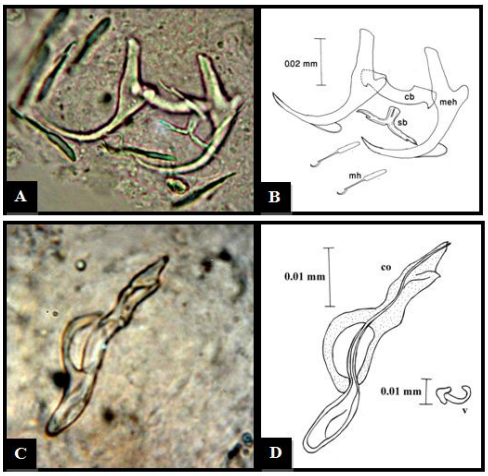

Fig. 2: ***Dactylogyrus dyki***
A. Photomicrograph of the haptor (750x).
B. Camera Lucida drawing of the haptor.
C. Photomicrograph of the copulatory organ (1500x).
D. Camera Lucida drawing of the copulatory organ.

cb= connecting bar, co= copulatory organ, meh= median hook, mh= marginal hook, sb= supplementary bar, v= vagina.

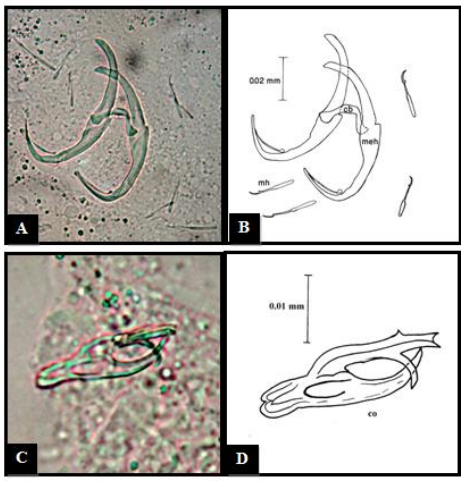

Fig. 3: ***Dactylogyrus formosus*.**
A. Photomicrograph of the haptor (500x).
B. Camera Lucida drawing of the haptor.
C. Photomicrograph of the copulatory organ (1300x).
D. Camera Lucida drawing of the copulatory organ.

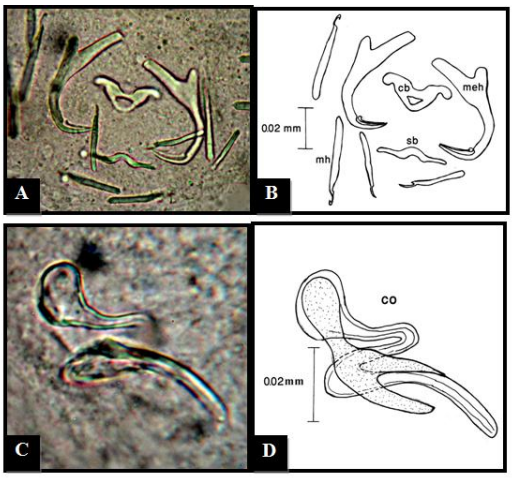

Fig. 4: ***Dactylogyrus lenkorani*.**
A. Photomicrograph of the haptor (550x).
B. Camera Lucida drawing of the haptor.
C. Photomicrograph of the copulatory organ (1500x).
D. Camera Lucida drawing of the copulatory organ.

cb= connecting bar, co= copulatory organ, meh= median hook, mh= marginal hook, sb= supplementary bar.

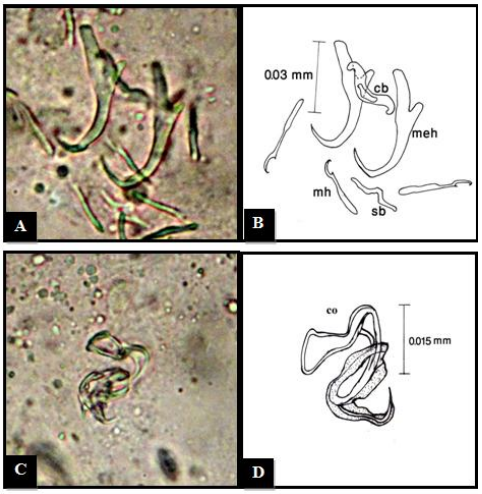

Fig. 5: ***Dactylogyrus mascomai***

A. Photomicrograph of the haptor (600x).
B. Camera Lucida drawing of the haptor.
C. Photomicrograph of the copulatory organ (1000x).
D. Camera Lucida drawing of the copulatory organ.

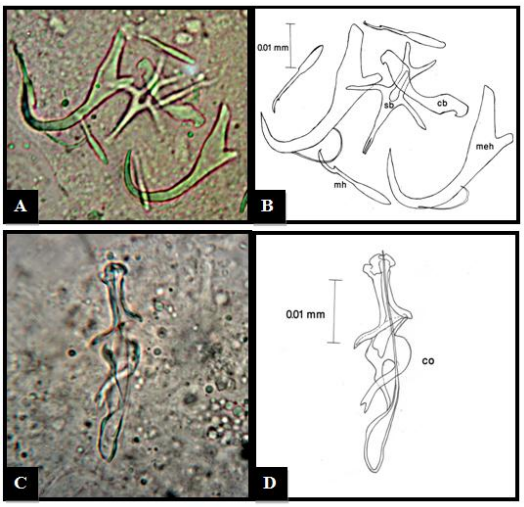

Fig. 6: ***Dactylogyrus persis***

A. Photomicrograph of the haptor (750x).
B. Camera Lucida drawing of the haptor.
C. Photomicrograph of the copulatory organ (1500x).
D. Camera Lucida drawing of the copulatory organ.

cb= connecting bar, co= copulatory organ, meh= median hook, mh= marginal hook, sb= supplementary bar.

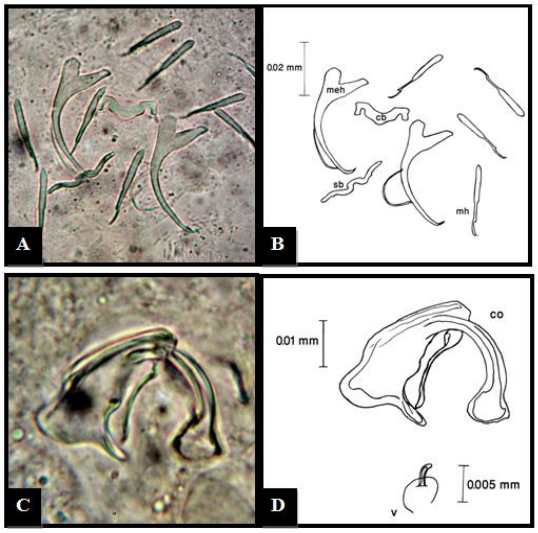

Fig. 7: ***Dactylogyrus suchengtaii*.**

A- Photomicrograph of the haptor (700x).
B- Camera Lucida drawing of the haptor.
C-Photomicrograph of the copulatory organ (1200x).
D- Camera Lucida drawing of the copulatory organ.
cb= connecting bar, co= copulatory organ, meh= median hook, mh= marginal hook, sb= supplementary bar, v= vagina.

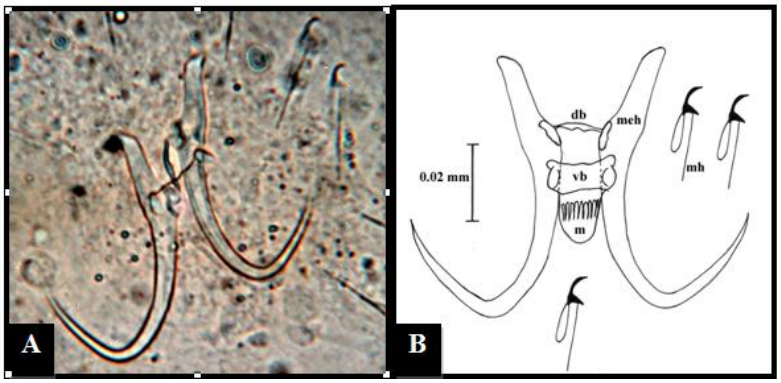

Fig. 8: *Gyrodactylus molnari*.
A-Photomicrograph of the haptor (600x).
B- Camera Lucida drawing of the haptor.

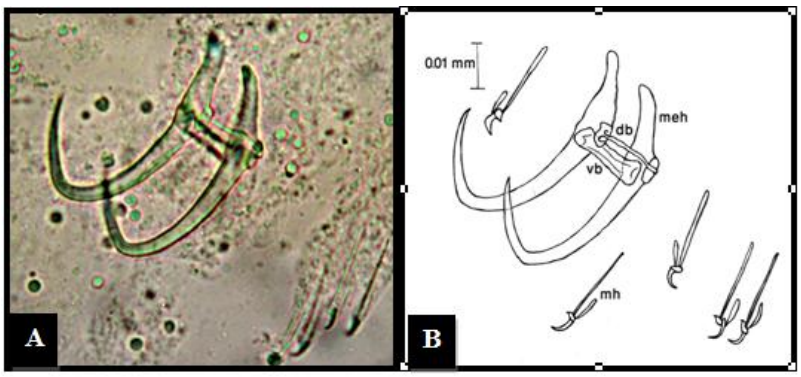

Fig. 9: *Gyrodactylus sprostonae*.
A- Photomicrograph of the haptor (600x).
B- Camera Lucid drawing of the haptor.
db= dorsal bar, m= membrane, meh= median hook, mh= marginal hook, vb= ventral bar.

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الإصابات بديدان المونوجينيا على أسماك بحيرة دربنديخان في إقليم كوردستان، العراق

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الخلاصة. تم جمع 226 سمكة تعود إلى 14 نوعاً من الأسماك، جمعت من بحيرة دربنديخان، جنوب شرقي محافظة السليمانية، أقليم كوردستان العراق، خلال الفترة المحصورة بين شهر آذار 2012 وحتى نهاية شهر تشرين الأول 2012. فحصت الأسماك للتعرف على ديدان المونوجينيا التي تصيبها. أظهرت النتائج وجود 25 نوعاً من هذه الطفيليات، تضمنت 20 نوعا من الجنس *Dactylogyrus* وثلاثة أنواع من الجنس *Dogielius* ونوعين من الجنس *Gyrogactylus*. تم تسجيل خمسة أنواع من هذه الطفيليات لأول مرة في العـراق (*D. dyki* و *D. persis* و *D. mascomai* و *D. suchengtaii* و *G .molnari*)، وتسجيل أربعة أنواع لأول مرة في إقليم كوردستان (*D. barbiodies* و *D. formosus* و *D. lenkorani* و *G. sprostonae*). كما تم تسجيل بعض أنواع الأسماك كمضيفات جديدة لبعض أنواع الطفيليات. بينت الدراسة الحالية أن *Dactylogyrus suchengtaii* و *D. carassobarbi* كانتا أكثر الطفيليات إنتشاراً في البحيرة بنسبة 100% و 90.90% على التوالي.