

# Additional Records of *Dactylogyrus* (Monogenea) from Some Cyprinid Fishes from Darbandikhan Lake, Iraq

Shamall M. A. Abdullah

Department of Biology, College of Science Education, University of Salahaddin, Erbil, Iraq

## Abstract

A total of 48 fresh water fishes, belonging to four species of the family Cyprinidae (*Capoeta trutta*, *Chalcalburnus mossulensis*, *Cyprinion macrostomum* and *Leuciscus lepidus*) were collected from Darbandikhan lake, southwest Sulaimaniya city, Kurdistan region, in the north of Iraq, from March to the end of July 2008. The inspection of gills revealed the infection of these fishes with four species of monogenetic trematoda belonging to genus *Dactylogyrus* namely: *D. alatus*, *D. cyprinioni*, *D. macracanthus* and *D. microcirrus*. The record of these species in the present study is considered as the first record in Iraq.

## المخلص

تم جمع 48 سمكة تعود إلى أربعة أنواع من الأسماك الشبوطية (*Cyprinion* و *Chalcalburnus mossulensis* و *Capoeta trutta*) من بحيرة دربندخان في جنوب الغربي من مدينة السليمانية، إقليم كردستان في شمال العراق، خلال الفترة المحصورة بين شهر آذار إلى نهاية شهر تموز 2008. فحصت الأسماك للتعرف على المخزومات أحادية المنشأ من الجنس *Dactylogyrus* التي تصيبها. أظهرت النتائج وجود أربعة أنواع من هذا الجنس وهي: *D. macracanthus* و *D. cyprinioni* و *D. alatus* و *D. microcirrus*. ان تسجيل الأنواع الأربعة في الدراسة الحالية تعد أول تسجيل في العراق.

© 2009 Jordan Journal of Biological Sciences. All rights reserved

Keywords: *Dactylogyrus*; Cyprinid fish; Darbandikhan lake; Iraq

## 1. Introduction

The Cyprinidae is one of the largest families of teleosts in the world comprising at least 1700 species and over 200 genera. Natural populations of cyprinids are widely distributed in most freshwater rivers, lakes and ponds in world (Hoole *et al.*, 2001). Thirty six species occur in the fresh waters of Iraq (Coad, 2008), and 21 species have been recorded from Darbandikhan lake (Abdullah *et al.*, 2007).

*Dactylogyrus* spp. (belonging to Class: Monogenea, Phylum: Platyhelminthes) are ectoparasites living on the gills, present the largest group of fish parasites and major importance in the pathology of fishes (Woo, 2006). Young fishes are subjected to the risk of infection with these parasites which might cause diseases and mortalities among fry in hatcheries, and among larger fishes (Amlacher, 1970). For example *D. vastator* caused great damage to the gill filaments of carps and goldfishes in California hatcheries (Hoffman, 1998).

The first information on genus *Dactylogyrus* from the Iraqi freshwater fish was given by Ali *et al.* (1987), who recorded two species from river Tigris in Baghdad, *D. vastator* from *Cyprinion macrostomum* and *D. cornu* from *C. macrostomum*, *Barbus xanthopterus* and *Acanthobrama centisquama*. The checklist of parasites of fishes from Iraq includes 104 species of monogenea belonging to 21

genera, with the highest number (59) of species in *Dactylogyrus* (Mhaisen, 2009).

This is the second paper in a series on trials by the author to known the parasitic fauna of some freshwater fishes collected from Darbandikhan lake. In the first trial, the author surveyed the parasitic fauna of 17 species of fishes, and he recorded 19 species of parasites which included two species of protozoans, nine species of monogenetic trematodes, three species of cestodes, one species of nematode larvae and four species of crustaceans (Abdullah, 2005). In this paper sheds light on monogenea only parasitizing some cyprinid fishes obtained from the lake.

## 2. Materials and Methods

### 2.1. Study Area:

Darbandikhan lake is located about 76km southwest Sulaimaniya city, Kurdistan region, in the north of Iraq. It is situated between 35°- 36° north latitude and 45°- 46° east longitude. With the altitude of 511 meters above sea's level. The surface area is about 121km<sup>2</sup> and the lake capacity is 3 million m<sup>3</sup>.

### 2.2. Sampling:

The fish specimens taken by gill netting, cast netting, electrofishing, hook or bow-net by local commercial fisherman during the period from March to the end of July 2008.

Fish were put in placed tanks with local river water and immediately transferred to the laboratory as soon as

\* Corresponding author. Shamall\_M\_A\_Abdullah@yahoo.com

possible and were examined within 24 hours after their capture. Fishes were identified according to Froese and Pauly (2008).

In the laboratory, the gill arches from both sides were separated, kept moist in Petri dish, examined under an Olympus dissecting microscope for counting *Dactylogyrus* on each gill lamella. Worms removed from the water by a small pipette and placed onto a slide, with a very small amount of water, then were stained with aqueous neutral red, and permanent slides were prepared with glycerol-gelatin (Gushev et al., 1993a).

Parasites were identified according to shape of the sclerotized parts of the haptor (median hooks or anchors, connecting bars, supplementary bars and hooklet or marginal hooks) and reproductive organs (copulatory organ and vaginal armament), using light microscope equipped. The measurement of parasites was achieved by ocular micrometer, and the terminology (Fig. 1) was used as recommended by Gushev (1985) and Jarkovský et al. (2004). The figures were drawn by using a Camera Lucida (Drawing tube). Parasite identification was done according to Bykhovskaya-Pavlovskaya et al. (1962) and Gushev (1985).

Each of scale bars in the figures corresponds to 0.02 mm. Designations in the figures are: cb= connective bar, co= copulatory organ, hl= hooklet, mh= median hook, sb= supplementary bar.

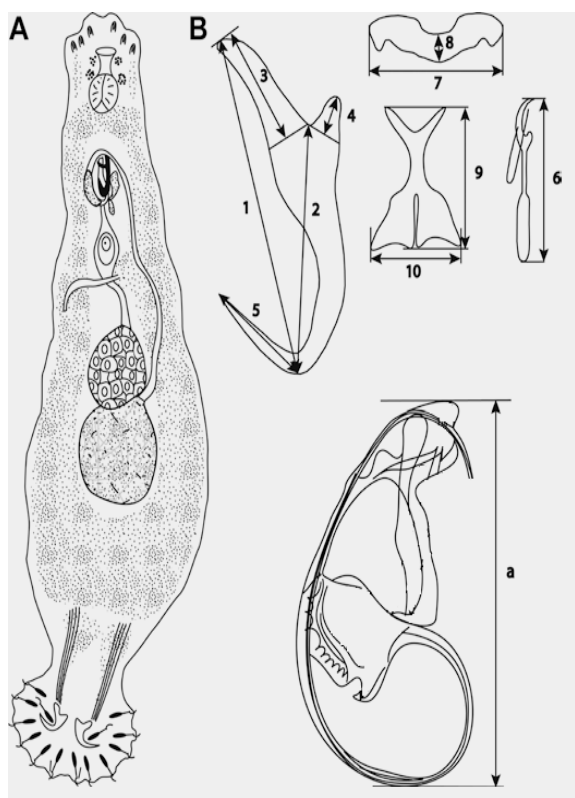


Figure 1 a. *Dactylogyrus* overall view according to Jarkovský et al. (2004).

### 3. Results

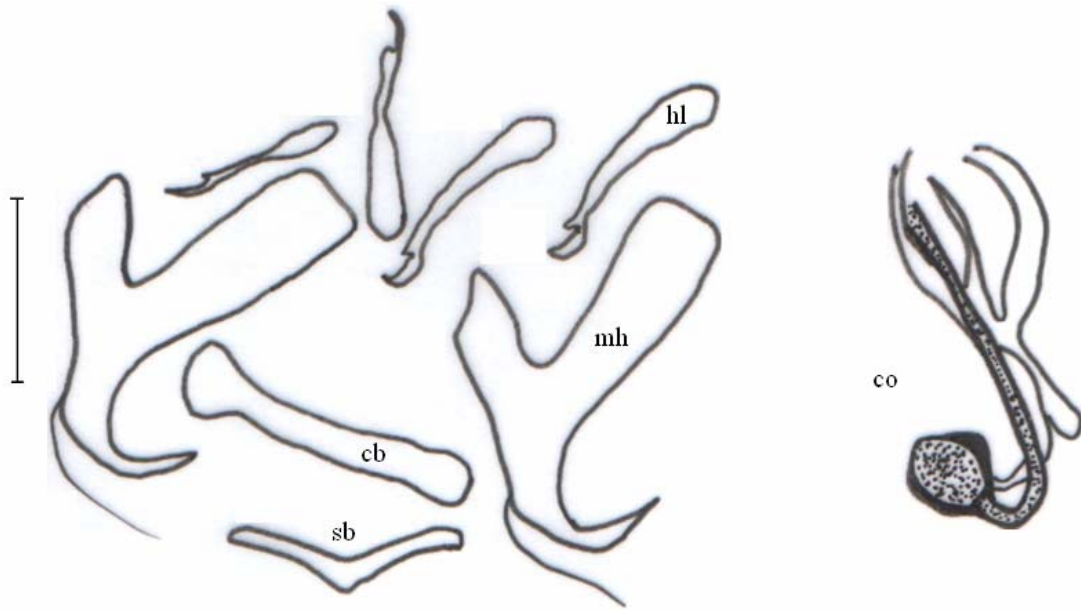
A total of 48 fishes, belonged to four species of the family Cyprinidae, were collected from Darbandikhan lake. The inspection of fishes revealed their infection with four species of the genus *Dactylogyrus*. The distribution of these parasites and the prevalence are summarized in Table (1). The following is an account on description and measurements of these parasites.

Table 1. The distribution of *Dactylogyrus* from the gills of fish hosts from Darbandikhan Lake.

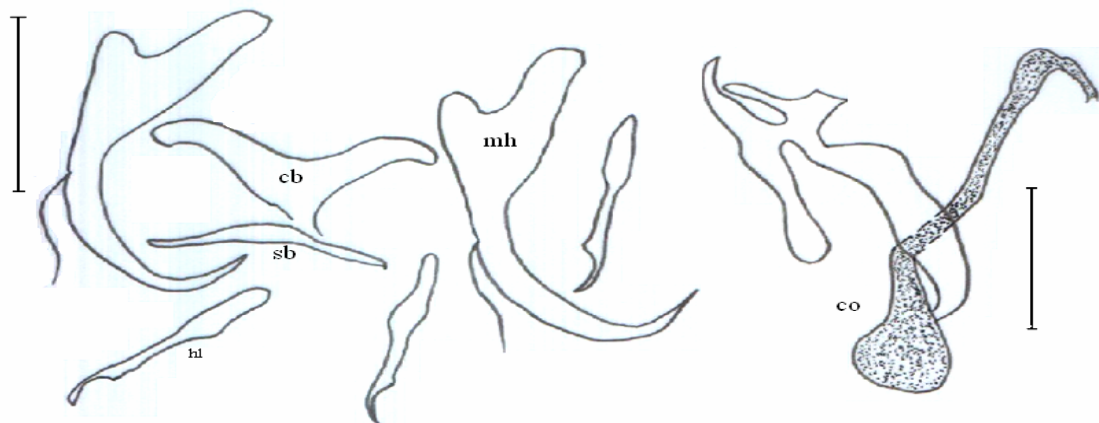
Species of the <i>Dactylogyrus</i>	Host	No. of fishes examined/infected	Prevalence %	Mean intensity (range)
<i>D. alatus</i>	<i>Chalcalburnus mossulensis</i>	3 / 1	33.33	3
<i>D. cyprinioni</i>	<i>Cyprimon macrostomum</i>	20 / 3	15	5 (4-6)
<i>D. macracanthus</i>	<i>Leuciscus lepidus</i>	15 / 3	20	4.3 (3-7)
<i>D. microcirrus</i>	<i>Capoeta trutta</i>	10 / 2	20	4 (2-6)

The following is an account on description and measurements of these parasites:

- *Dactylogyrus alatus* Linstow, 1878
- Host: *Chalcalburnus mossulensis* (Heckel, 1843)
- Site infection: Gill filaments
- Prevalence: 33.33% (Table 1).
- Locality: Darbandikhan lake.
- Description: Large worms, length: 0.8-1.2mm, width: 0.22-0.28mm. Length of hooklet: 0.018-0.03mm. Median hooks massive, with powerful processes, particularly inner, which expand terminally, their length equal to base or larger, external process at least half as large as base. Overall length of median hooks 0.042-0.055mm, shaft 0.014-0.018mm, point 0.008-0.01mm, inner root 0.014-0.016mm, outer root 0.006-0.008mm. Connecting bar: 0.005-0.0055 x 0.03-0.038mm. Supplementary bar: 0.004-0.0048 x 0.02-0.024mm. Copulatory organ: about 0.038-0.045mm, diameter of tube: somewhat over 0.002mm (Fig. 2).
- b. Metric parameters of the *Dactylogyrus* attachment apparatus and copulatory organ: 1= total median hook length, 2= shaft of median hook, 3= inner root of median hook, 4= outer root of median hook, 5= point of median hook, 6= length of hooklet, 7= length of connecting bar, 8= width of connecting bar, 9= length of supplementary bar, 10= width of supplementary bar, a= total length of copulatory organ.

Figure 2. *Dactylogyrus Alatus*.

- *Dactylogyrus cyprinioni* Gussev, Jalali et Molnár, 1993
- Host: *Cyprimon macrostomum* (Heckel, 1843)
- Site infection: Gill filaments
- Prevalence: 15% (Table 1).
- Locality: Darbandikhan lake.
- Description: Worms of medium size with a length of 0.5-0.65mm, and width: 0.12-0.22mm. Length of hooklet of 0.015-0.028mm. Median hook of wunderi-type, with well-developed roots and with a short recurved point. The total length of median hook: 0.030-0.040mm, shaft: 0.025-0.03mm, inner root: 0.010-0.012mm, outer root: 0.003-0.004mm, point: 0.007-0.0075mm. Connecting bar of wunderi-type, but with a small posterior process in the middle and with a membranous tuft on the posterior edge, 0.003-0.004 x 0.025-0.03mm in size. Supplementary bar: sticklike, with enlarged central part, 0.002-0.0025 x 0.016-0.022mm in size. Length of copulatory organ: 0.03-0.04mm (Fig. 3).

Figure 3. *Dactylogyrus cyprinioni*.

- *Dactylogyrus macracanthus* Wegener, 1909
- Host: *Leuciscus lepidus* (Heckel, 1843)
- Site infection: Gill filaments
- Prevalence: 20% (Table 1).
- Locality: Darbandikhan lake.
- Description: Large worms, length: 0.7-1.2mm, width: 0.2-0.25mm. Length of hooklet: 0.025-0.035mm. Median hooks massive, with powerful processes, particularly inner, which expand terminally, their length equal to base or larger,

external process at least half as large as base. Overall length of median hooks 0.045-0.052mm, shaft: 0.013-0.017mm, point: 0.007-0.01mm, inner root: 0.012-0.015mm, outer root: 0.005-0.007mm. Connecting bar: 0.01-0.012 x 0.03-0.04mm. Supplementary bar: 0.002-0.0025 x 0.02-0.026mm. Copulatory organ: about 0.045-0.055mm (Fig. 4).

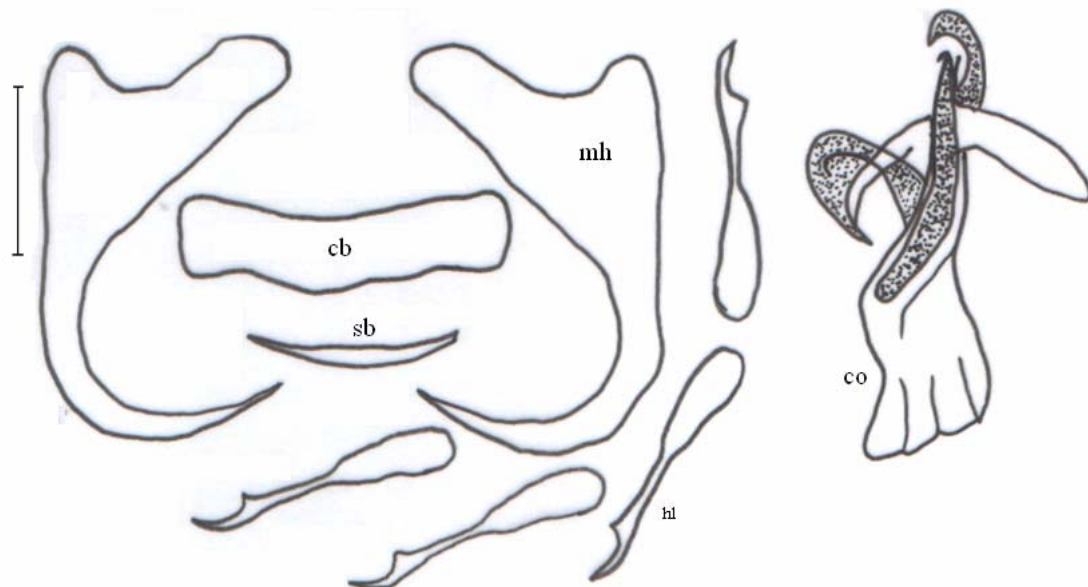


Figure 4. *Dactylogyrus macracanthus*.

- *Dactylogyrus microcirrus* Gussev, Jalali et Molnár, 1993
- Host: *Capoeta trutta* (Heckel, 1843)
- Site infection: Gill filaments
- Prevalence: 25% (Table 1).
- Locality: Darbandikhan Lake.
- Description: Worms of small size with a length of 0.30-0.40mm, and a width of 0.05-0.09mm. Hooklet: long with distinct heel of point and with an enlarged handle of similar size or slightly longer than the pivot. The total length of hooklet: 0.015-0.03mm. The total length of median hook: 0.032-0.048mm, shaft: 0.02-0.025mm, point: 0.008-0.01mm, inner root: 0.001-0.012mm, outer root: 0.002-0.0025mm. Connecting bar: bent, with tuft on the posterior edge. Size: 0.003-0.004 x 0.015-0.018mm. Supplementary bar: rodlike, slightly enlarged in the middle. Size: 0.0015-0.002 x 0.015-0.018mm. Copulatory organ: very small, with an elongated almost cylindrical tube, vesicula-like or triangular at the initial part. Accessory piece: Y-shaped, with thin, approximately parallel-running wings. Length of copulatory organ: 0.012-0.015mm (Fig. 5).

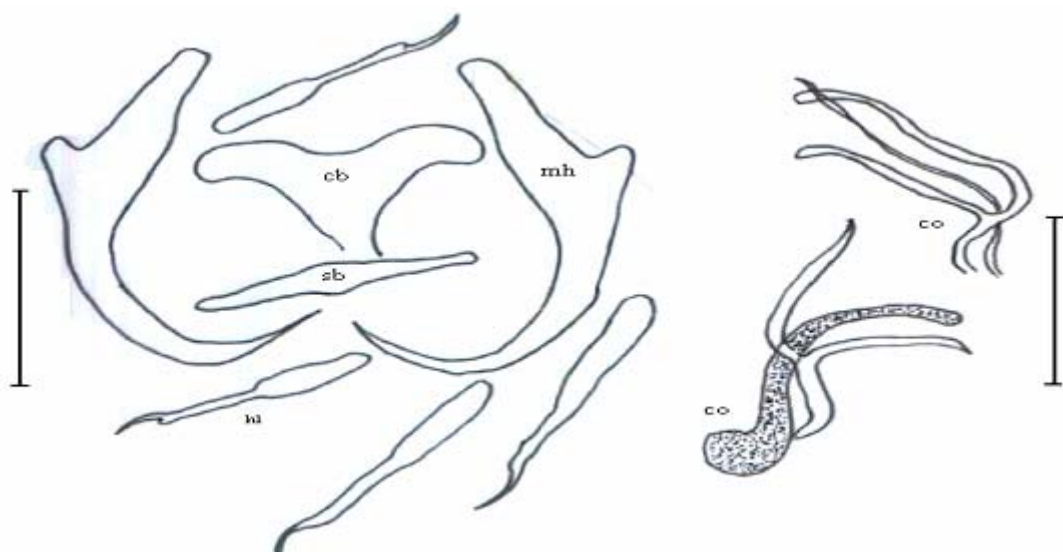


Figure 5. *Dactylogyrus microcirrus*.

#### 4. Discussion

In the previous study conducted on the parasites of fishes from Darbandikhan lake, six species of *Dactylogyrus* were recorded namely: *D. barbui* from *Barbus barbulus*, *D. extensus* and *D. vastator* from *Cyprinus carpio*, *D. hypophthalmichthys* from *Hypophthalmichthys molitrix*, *D. pavlovskiyi* from *Barbus grypus* and *D. vistulae* from *Leuciscus lepidus* (Abdullah, 2005). In this study four species of *Dactylogyrus* (*D. alatus*, *D. cyprinioni*, *D. macracanthus* and *D. microcirrus*) were found on the gills of five fish species in this lake.

The description and measurements of *D. alatus* which recorded in the present study are nearly similar to those reported by Bykhovskaya-Pavlovskaya et al. (1962), who detected from gill filaments of Siberian roach *Rutilus rutilus* from waters of Kazakh in U.S.S.R..

*D. alatus* is a widely distributed parasite of cyprinid fishes, has been reported from *Abramis alburnus* in Poland (Prost, 1972), *Alburnoides bipunctatus*, *Alburnus charosinii* and *Chalcalburnus chalcoides* from Iran (Molnar and Jalali, 1992), *Abramis alburnus* from Turkey (Koyun, 2001), *Leuciscus idus* from Central Europe (Ondračková et al., 2004).

The present specimens of *D. cyprinioni* are similar to those of Gussev et al. (1993b), who described as a new species on gills of the same host from Kharoon River, water system of Tigris River, Iran.

The classification of *D. macracanthus* was confirmed due to the coincidence of the characters described here with those reported by Bykhovskaya-Pavlovskaya et al. (1962), who recorded it for the first time from tench *Tinca tinca* collected in Europe and U.S.S.R.. This species also was recorded from the gills of *Leuciscus cephalus* from Karoon River and Dez River in Iran (Shamsi and Jalali, 1997).

The morphological data of the species *D. microcirrus* fall within the size ranges given by Gussev et al. (1993b), who detected it from gills of the same host from Dez River, water system of Tigris River, Iran. It seems to be the geographical distribution of *D. cyprinioni* and *D. microcirrus* is limited, only exist in the Tigris and Euphrates basin.

It has been noticed that the four species which were listed in the current study showed high host specific. Each one was found on a single host. Even in studies which were carried out in the outside of Iraq, were recorded either on the same host or a specific number of hosts. In generally, most species of *Dactylogyrus* are strictly host-specific, which were limited to a single or a few closely related hosts (Kearn, 1994).

So far, more than 59 species belong to the genus *Dactylogyrus* have been reported from wild and farmed fishes of Iraq, of the 50 species reported from Cyprinid fish (Mhaisen, 2009). Only one species (*D. fallax*) was recorded on the gills of *Chalcalburnus mossulensis* from Greater Zab river (Abdullah, 2008). Six species (*D. achmerowi*, *D. cornu*, *D. latituba*, *D. macrostomi*, *D. pulcher* and *D. vastator*) were found on the gills of *Cyprinion macrostomum* (Abdullah and Mhaisen, 2000). Two species (*D. vastator* and *D. vistulae*) were reported on the gills of *Leuciscus lepidus* (Abdullah and Mhaisen,

2004), and no infection from species *D. alatus*, *D. cyprinioni*, *D. macracanthus* and *D. microcirrus* in Iraq, the present record represents the first one in this country.

#### References

- Abdullah SMA. 2005. Parasitic fauna of some freshwater fishes from Darbandikhan lake, north of Iraq. *J. Dohuk Univ.*, 8(1): 29-35.
- Abdullah SMA. 2008. First record of *Dactylogyrus fallax* (Monogenetic Trematoda) from *Chalcalburnus mossulensis* from Greater Zab River, Kurdistan region, Iraq. *J. Dohuk Univ.*, 11(1): 57-61.
- Abdullah SMA. and Mhaisen FT. 2000. Literature review and checklists of monogenetic trematodes parasitizing freshwater fishes of Iraq. Proceedings of the second Sci. Conf. Biol. Dept. Coll. Educ. (Ibn Al-Haitham), Univ. Baghdad, Baghdad: 10-12 Oct, 2000.
- Abdullah SMA. and Mhaisen FT. 2004. Parasitic infections with monogenetic trematodes on fishes of Lesser Zab and Greater Zab rivers in northern Iraq. *Zanco J. Salahaddin Univ.*, 16(4): 43-52.
- Abdullah SMA. Rahemo ZI. and Shwani AA. 2007. The inhabitant fishes in Darbandikhan lake in north of Iraq and methods for developing their culturing. *Egypt. J. Aquat. Biol. & Fish.*, 11(3): 1-7.
- Ali NM. Salih NE. and Abdul-Ameer KN. 1987. Parasitic fauna of some freshwater fishes from Tigris river, Baghdad, Iraq. II: Trematoda. *J. Biol. Sci. Res.*, 18(2): 19-27.
- Amlacher E. 1970. Textbook of fish diseases. T.F.H. Publ., Jersey City: 302pp.
- Bykhovskaya-Pavlovskaya IE. Gussev AV. Dubinia MN. Izyumova NA. Smirnova TS. Sokolovskaya IL. Shtein GA. Shul'man SS. and Epshtein VM. 1962. Key to parasites of freshwater fish of the U.S.S.R. Akad. Nauk, S. S. R., Moscow: 727pp. (In Russian).
- Coad BW. 2008. Freshwater fishes of Iraq: Scientific names checklist. A. Freshwater fishes. [http://www.briancoad.com/Checklists\\_Iraq.htm](http://www.briancoad.com/Checklists_Iraq.htm).
- Froese R. and Pauly D. 2008. FishBase. World web electronic publication. [www.fishbase.org](http://www.fishbase.org), version.
- Gussev AV. 1985. Parasitic metazoans: Class Monogenea. In: Bauer ON. Key to the parasites of freshwater fish fauna of the U.S.S.R. Nauka, Leningrad, 2: 1-424. (In Russian).
- Gussev AV. Ali NM. Abdul-Ameer KN. Amin SM. and Molnar K. 1993a. New and known species of *Dactylogyrus* Diesing, 1850 (Monogenea, Dactylogyridae) from cyprinid fishes of the River Tigris, Iraq. *Syst. Parasitol.*, 25(3): 229-237.
- Gussev AV. Jalali B. and Molnar K. 1993b. Six new species of the genus *Dactylogyrus* (Monogenea, Dactylogyridae) from Iranian freshwater fishes. *Zoosyst. Rossica*, 2: 29-35.
- Hoffman GL. 1998. Parasites of North American freshwater fishes. Cornell Univ. Press, London: 539pp.
- Hoole D. Bucke D. Burgess P. and Wellby I. 2001. Diseases of carp and other cyprinid fishes. Fishing News Books, Paris: 264.
- Jarkovský J. Morand S. Šimková A. and Gelnar M. 2004. Reproductive barriers between congeneric monogenean parasites (*Dactylogyrus*: Monogenea): attachment apparatus morphology or copulatory organ incompatibility. *Parasitol. Res.*, 92: 95-105.
- Kearn GC. 1994. Evolutionary expansion of the monogenea. *Inter. J. Parasitol.*, 24(8): 1227-1271.
- Koyun M. 2001. The helmintho fauna of some fishes in Enne Dam Lake. (PhD thesis). Science Institution (Turkey): Uludag

University. Cited by Öktener A. 2003. A checklist of metazoan parasites recorded in freshwater fish from Turkey. *Zootaxa*, 394: 1-28.

Mhaisen FT. 2009. Index-catalogue of parasites and disease agents of fishes of Iraq, Unpubl.

Molnar K. and Jalali B. 1992. Further monogeneans from Iranian freshwater fishes. *Acta Vetrinary Hungarica*, 40: 55-61.

Ondračková M. Matějsová I. Šimková A. and Gelnar M. 2004. New reports of dactylogyridean species (Monogenea) for Central Europe. *Helminthol.*, 41(3): 139-145.

Prost M. 1972. Fish monogenoidea of Poland. I parasites of *Alburnus alburnus* (L.). *Acta Parasitol. Pol.*, 20: 233-247.

Shamsi S. and Jalali B. 1997. First record of monogenean parasites of freshwater fishes of Iran. *Proceeding of 3rd Int Symp of Monogenea*. Aug; 25-30. Czech Rep, 76pp .

Woo PT. 2006. *Fish diseases and disorders*, Vol. 1: protozoan and metazoan infections. CAB International, London: 791pp.p.