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CHECKLISTS OF PARASITES OF FARM FISHES OF KURDISTAN REGION, IRAQ

F. T. Mhaisen* Sh. M. A. Abdullah**

ABSTRACT

Literature review of all references concerning the parasitic fauna of fishes in fish farms of Kurdistan Region, northern Iraq showed that a total of 38 valid parasite species are so far known from the common carp (*Cyprinus carpio*), the grass carp (*Ctenopharyngodon idella*) and the silver carp (*Hypophthalmichthys molitrix*) as well as three freshwater fish species (*Arabibarbus grypus*, *Cyprinion macrostomum* and *Planiliza abu*) which were found in some farms of Kurdistan Region. The parasitic fauna included 12 ciliophorans, one myxozoan, 19 monogeneans, two cestodes, one nematode and three crustaceans. The common carp was found to harbour 34 parasite species, the grass carp one parasite species, the silver carp two parasite species, *A. grypus* three parasite species, *P. abu* two parasite species and *C. macrostomum* one parasite species. A host-parasite list for each fish species was also provided.

INTRODUCTION

Fish farming in Iraq started in 1955 with a small pond in Al-Zaafaraniya, south of Baghdad city (4). During the seventies and early eighties of the last century, an advance was achieved in fish farming industry in Iraq when many fish farms were established especially in middle of Iraq (36). Such achievement was hindered due to consequences of the war situations during 1980-1988 and 1991 as well as the economic sanction imposed by the UN against Iraq on 6 August 1990. During the last few years, a great advance was achieved in fish farming in general and fish cages in particular due to increasing demand on fish protein as well as the increasing investment in fish culture industry in most provinces of Iraq. By the end of 2015, a total of 1011 earthen fish farms, 906 floating cage fish farms and 28 closed system fish farms were scattered in 15 provinces of Iraq (46). These figures excluded Kurdistan Region which by the end of 2015 had a total of 326 earthen fish farms, 15 floating cage fish farms and 11 concrete salmon fish farms scattered in the provinces of Erbil, Sulaymaniyah and Dohuk (47).

Fish farms are vulnerable to great hazards due to the infection with parasites and other disease agents as well as some fish natural enemies when such farms are under extensive fish culture and inadequate administrative and control measures (37, 38). Parasites with direct life cycles such as ciliophorans, monogeneans and crustaceans can easily spread among farm fishes suffering from crowd and bad management (35).

Parasites of farm fishes of Kurdistan region received little attention from fish parasitologists and veterinarians in comparison with fish farms of Basrah province (42) or Babylon province (40) or even with a single fish farm such as Al-Furat fish farm in Babylon province (41). Data on farmed fishes of Kurdistan region are scattered in different local journals, unpublished theses and one FAO report. Therefore, this article was aimed to gather data from such literature and

* Katrineholm, Sweden (e-mail: mhaisenft@yahoo.co.uk).

**College of Agric., Salahaddin University, Erbil, Iraq.

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provide a list of parasite species according to their major groups as well as a host-parasite list for culture fishes of these farms as well as some other wild fish species found in such farms. Such parasite list is important for owners of fish farms as well as for fish veterinarians as it helps in knowing what sort of parasites are found in their fish farms and so, it will help them later in taking appropriate measures for their control.

MATERIALS AND METHODS

A total of 14 references (seven journal articles, four proceeding articles, two unpublished M. Sc. theses and one FAO report) dealing with the parasites of farm fishes of Kurdistan region were used to prepare the present article. Data from such references was gathered to provide host-parasite and parasite-host lists. The systematic account of these parasites is based on some electronic sites (49, 50, 56) as well as some taxonomic references (24, 51). The index-catalogue of parasites and disease agents of fishes of Iraq (39) was used to show the total number of fish hosts harbouring each parasite species in the whole water bodies of Iraq. Fish valid scientific names and their authorities were corrected according to the well known Catalog of Fishes (22)

Parasitological Investigations Achieved on Fish Farms of Kurdistan Region

Ali (6) surveyed fishes of FAO fish projects and private fish projects in Duhok, Suliemanyia and Erbil provinces for parasites for three months during 2002 and reported the occurrence of the anchor worm *Lernaea cyprinacea* from all the three cultured fishes: the common carp (*Cyprinus carpio*), the grass carp (*Ctenopharyngodon idella*) and the silver carp (*Hypophthalmichthys molitrix*), in addition to the infection of *C. carpio* only with one protozoan (*Trichodina* sp.), three monogeneans (*Gyrodactylus elegans, Dactylogyrus* sp. and *Diplozoon* sp.) and two cestodes: a caryophyllid species and *Schyzocotyle acheilognathi* (reported as *Bothriocephalus gowkongensis*).

Abdullah (2) inspected two small ponds in two fish farms south of Erbil province and recorded one myxozoan (*Myxobolus* sp.), three monogeneans (*Dactylogyrus extensus, D. minutus* and *G. elegans*), one cestode (*S. acheilognathi* which was reported as *B. acheilognathi*) and two crustaceans (*L. cyprinacea* and *Ergasilus barbi*) infecting the common carp in addition to seven parasite species in three wild fish species (*Arabibarbus grypus, Cyprinion macrostomum* and *Planiliza abu*) which were found in the same ponds.

While performing his M. Sc. thesis, Al-Marjan (12) examined samples of *C. carpio* from Ainkawa fish hatchery, northwest Erbil city and recorded nine ciliophorans, four monogeneans and two crustaceans. Three articles were extracted from this thesis which included the record of five *Trichodina* species, namely *T. acuta, T. domerguei, T. heterodentata, T. mutabilis* and *T. nobilis* (13), experimental investigation of the whole life cycle of *L. cyprinacea* (14) and the record of four ciliophorans (*Chilodonella cyprini, Tetrahymena pyriformis, Ichthyophthirius multifiliis* and *Apiosoma amoeba*), four monogeneans (*Dactylogyrus arcuatus, D. extensus, D. minutus* and *G. elegans)* and two crustaceans which included the fish lice *Argulus foliaceus* and the anchor worm (15).

Al-Marjan and Abdullah (16) reported the ciliophoran *Balantidium polyvacuolum* from the intestine of *C. carpio* taken from three fish farms, 10 km south of Erbil city.

Bilal and Abdullah (21) reported the monogenean *D. skrjabini* from gill filaments of *H. molitrix* from fish ponds in Ainkawa town, northwest Erbil city.

Through M. Sc. project, Mama (30) sampled *C. carpio* from Ainkawa fish hatchery and from Lesser Zab river passing Alton Kupri district and detected six ciliophorans, 12 monogeneans and one crustacean species from *C. carpio* of the hatchery. Five articles were published from this thesis which included a comparison between the parasitic fauna of *C. carpio* from Ainkawa fish hatchery (19 parasite species) and Lesser Zab river of 16 parasite species (31), record of the monogenean *Paradiplozoon cyprini* for the first time in Kurdistan (32), record of seven *Dactylogyrus* species from *C. carpio* of Ainkawa fish hatchery (33), record of four *Gyrodactylus* species from *C. carpio* of the same hatchery (3) and record of six ciliophorans from *C. carpio* of the same hatchery (34).

RESULTS AND DISCUSSION

Major Groups of Fish Parasitic Fauna: Parasite-Host List

The major groups of fish parasites (phyla or classes) are arranged here according to Kirjušina and Vismanis (29). For each major group, list of all concerned parasites down to the specific name is given according to their systematic account. This list will be followed by an alphabetical listing of all parasite species. For each parasite species, all records in farm fishes of Kurdistan region are given together with the first record of each concerned parasite in Iraq as well as the present number of all hosts so far known in Iraq for each parasite species based on the index-catalogue of parasites and disease agents of fishes of Iraq (39).

Phylum Ciliophora

The phylum Ciliophora is represented in farm fishes of Kurdistan region with 12 species, five of which belonged to the genera *Apiosoma*, *Balantidium*, *Chilodonella*, *Ichthyophthirius* and *Tetrahymena*, six to the genus *Trichodina* as well as unidentified species of the genus *Trichodina* as indicated below:

Phylum Ciliophora
- **Class Kinetophragminophorea**
  - **Order Trichostomatida**
    - **Family Balantidiidae**
      - ***Balantidium polyvacuolum* Li in Chen, 1963**
  - **Order Cyrtophorida**
    - **Family Chilodonellidae**
      - ***Chilodonella cyprini* (Moroff, 1902) Strand, 1928**
- **Class Oligohymenophorea**
  - **Order Hymenostomatida**
    - **Family Ichthyophthiridae**
      - ***Ichthyophthirius multifiliis* Fouquet, 1876**
    - **Family Tetrahymenidae**
      - ***Tetrahymena pyriformis* (Ehrenberg, 1830)**
  - **Order Sessilida**
    - **Family Epistylididae**
      - ***Apiosoma amoeba* (Grenfell, 1887) Lom, 1966**
  - **Order Mobilida**
    - **Family Trichodinidae**
      - ***Trichodina acuta* Lom, 1961**
      - ***Trichodina domerguei* (Wallengren, 1897) Haider, 1964**

***Trichodina heterodentata* Duncan, 1977**
***Trichodina mutabilis* Kazubski & Migala, 1968**
***Trichodina nobilis* Chen, 1963**
***Trichodina reticulata* Hirschmann & Partsch, 1955**
***Trichodina* sp.**

***Apiosoma amoeba* (Grenfell, 1887) Lom, 1966 was recorded from skin of *C. carpio* (12, 15, 30, 31, 34). The first record of *A. amoeba* in Iraq was from the skin, buccal cavity and gills of *C. idella* from Babylon fish farm (10). So far, this parasite has five fish host species in Iraq (39).**

***Balantidium polyvacuolum* Li in Chen, 1963 was recorded from intestine of *C. carpio* (16). This was its first record in fishes of Iraq. So far, *B. polyvacuolum* has seven fish host species in Iraq (39).**

***Chilodonella cyprini* (Moroff, 1902) Strand, 1928 was recorded from skin of *C. carpio* (12, 15, 30, 31, 34). The first record of *C. cyprini* in Iraq was from skin, buccal cavity and gills of *Mystus pelusius* from Tigris river at Baghdad (8). So far, 11 fish host species are known for this parasite in Iraq (39).**

***Ichthyophthirius multifiliis* Fouquet, 1876 was recorded from skin, fins and gills of *C. carpio* (12, 15, 30, 31, 34). The first record of *I. multifiliis* in Iraq was from the skin and gills of *Chelon subviridis* (reported as *Mugil dussumieri*) from Tigris river near Baghdad (26). So far, this parasite has 35 fish host species in Iraq (39).**

***Tetrahymena pyriformis* (Ehrenberg, 1830) was recorded from skin of *C. carpio* (12, 15). The first record of *T. pyriformis* in Iraq was from the skin and gills of *C. carpio* from the new fish farm of the Fish Research Center at Al-Zaafaraniya (53). So far, *T. pyriformis* has 14 fish host species in Iraq (39).**

***Trichodina acuta* Lom, 1961 was recorded from skin of *C. carpio* (12, 13, 30, 31, 34). It is appropriate to mention here that the year of authority of this parasite was erroneously quoted as 1970 instead of 1961 by Al-Marjan (12) and Al-Marjan and Abdullah (13). *C. carpio* is the only host species so far known for *T. acuta* in Iraq (39).**

***Trichodina domerguei* (Wallengren, 1897) Haider, 1964 was recorded from skin, fins and gills of *C. carpio* (12, 13). The first record of *T. domerguei* in Iraq was from the skin, fins and gills of eight freshwater fish species from Tigris river, Al-Tharthar lake and fish markets in Baghdad city (55). So far, *T. domerguei* has 39 host species in Iraq (39).**

***Trichodina heterodentata* Duncan, 1977 was recorded from skin, fins and gills of *C. carpio* (12, 13). No more host species are so far known for *T. heterodentata* in Iraq (39).**

***Trichodina mutabilis* Kazubski & Migala, 1968 was recorded from gills of *C. carpio* (12, 13). The first record of *T. mutabilis* in Iraq was from gills of *C. carpio* from Lesser Zab river (1). So far, this parasite has only two fish host species in Iraq, both in Kurdistan region only (39).**

***Trichodina nobilis* Chen, 1963 was recorded from skin, fins and gills of *C. carpio* (12, 13, 30, 31, 34). *C. carpio* is the only host species so far known for *T. nobilis* in Iraq (39).**

***Trichodina reticulata* Hirschmann & Partsch, 1955 was recorded from skin and fins of *C. carpio* (30, 31, 34). The first record of *T. reticulata* in Iraq was from skin, gills and blood of *S. triostegus* from Al-Hammar marshes (27). So far, this parasite has five fish host species in Iraq (39).**

***Trichodina* sp. was recorded from skin of *C. carpio* (6). In addition to 29 recognized *Trichodina* species so far recorded from fishes of Iraq, some unidentified species of *Trichodina* were so far recorded from six fish species (39).**

Phylum Myxozoa

The phylum Myxozoa is represented in farm fishes of Kurdistan region with one unidentified species of the genus *Myxobolus* as indicated below:

Phylum Myxozoa
Class Myxosporea
Order Bivalvulida
Family Myxobolidae
***Myxobolus* sp.**

Unidentified species of *Myxobolus* was recorded from fins of *Arabibarbus grypus* (reported as *Barbus grypus*) by Abdullah (2), gills of *C. carpio* (2) and skin of *P. abu* (reported as *L. abu*) by Abdullah (2). In addition to 53 recognized *Myxobolus* species so far recorded from fishes of Iraq, some unidentified species of *Myxobolus* were recorded from seven fish species (39).

Phylum Platyhelminthes- Class Monogenea

The class Monogenea of the phylum Platyhelminthes is represented in farm fishes of Kurdistan region with 19 species; five species of the genus *Gyrodactylus*, 11 species of *Dactylogyrus* and one species of the genus *Paradiplozoon* in addition to unidentified species of *Dactylogyrus* and *Diplozoon* as indicated below. It is appropriate to mention here that this group is considered as Monogenea by some electronic sites (49, 50, 56) but as Monogenoidea in other references (29, 51).

Phylum Platyhelminthes
Class Monogenea
Order Gyrodactylidea
Family Gyrodactylidae
***Gyrodactylus barbi* Ergens, 1976**
***Gyrodactylus cyprini* Diarova, 1964**
***Gyrodactylus elegans* von Nordmann, 1832**
***Gyrodactylus kherulensis* Ergens, 1974**
***Gyrodactylus longoacuminatus* Zitnan, 1964**
Order Dactylogyridea
Family Dactylogyridae
***Dactylogyrus achmerowi* Gusev, 1955**
***Dactylogyrus anchoratus* (Dujardin, 1845) Wagener, 1857**
***Dactylogyrus arcuatus* Yamaguti, 1942**
***Dactylogyrus extensus* Mueller & Van Cleave, 1932**
***Dactylogyrus macrostomi* Gusev, Ali, Abdul-Ameer, Amin & Molnár, 1993**
***Dactylogyrus minutus* Kulwiec, 1927**
***Dactylogyrus molnari* Ergens & Dulmaa, 1969**
***Dactylogyrus pavlovskyi* Bychowsky, 1949**
***Dactylogyrus sahuensis* Ling in Chen et al., 1973**
***Dactylogyrus skrjabini* Akhmerov, 1954**
***Dactylogyrus vastator* Nybelin, 1924**
***Dactylogyrus* sp.**
Order Mazocraeidea
Family Diplozoidae

***Diplozoon* sp.**

***Paradiplozoon cyprini* Khotenovsky, 1982**

***Dactylogyrus achmerowi* Gusev, 1955 was recorded from gills of *C. carpio* (30, 31, 33). The first report of *D. achmerowi* in Iraq was from gills of *C. carpio* from Al-Wahda fish hatchery at Al-Suwaira and Babylon fish farm (43). Now, it has 13 host species in Iraq (39).**

***Dactylogyrus anchoratus* (Dujardin, 1845) Wagener, 1857 was recorded from gills of *C. carpio* (30, 31, 33). The first report and description of *D. anchoratus* in Iraq was from gills of *C. carpio* from Tigris river at Al-Zaafaraniya (44, 45). Now, it has eight fish host species in Iraq (39).**

***Dactylogyrus arcuatus* Yamaguti, 1942 was recorded from skin and gills of *C. carpio* (12, 15). The first report of *D. arcuatus* in Iraq was from skin, buccal cavity and gills of *C. carpio* from Al-Suwaira and Al-Latifiya fish farms (54). Now, it has seven fish host species in Iraq (39).**

***Dactylogyrus extensus* Mueller & Van Cleave, 1932 was recorded from gills of *C. carpio* (2, 12, 15, 30, 31, 33). The first report of *D. extensus* in Iraq was from the buccal cavity and gills of *C. carpio* from Al-Suwaira and Al-Latifiya fish farms (54). *D. solidus* which so far was recorded from two fish hosts in Iraq (39) is considered as a synonym of *D. extensus* according to Gibson et al. (24). *D. extensus* and its synonym *D. solidus* have so far 17 fish host species in Iraq (39).**

***Dactylogyrus macrostomi* Gusev, Ali, Abdul-Ameer, Amin & Molnár, 1993 was recorded from gills of *Cyprinion macrostomum* (2). *D. macrostomi* was described as a new species from gills of *C. macrostomum* from Tigris river at Baiji, Salah Al-Deen province (25). So far, *D. macrostomi* has two fish host species in Iraq (39).**

***Dactylogyrus minutus* Kulwiec, 1927 was recorded from gills of *C. carpio* (2, 12, 15, 30, 31, 33). The first report on this parasite in Iraq was from gills of *C. carpio* from Tigris river at Al-Zaafaraniya, south of Baghdad and Al-Qadisia dam lake (44), while its description and illustration in Iraq was given later by Mhaisen et al. (45). So far, *D. minutus* has 12 fish host species in Iraq (39).**

***Dactylogyrus molnari* Ergens & Dulmaa, 1969 was recorded from gills of *C. carpio* (30, 31, 33). The first record of *D. molnari* in Iraq was from gills of *C. carpio* from Ainkawa fish hatchery (30). No more host species are so far known for *D. molnari* in Iraq (39).**

***Dactylogyrus pavlovskyi* Bychowsky, 1949 was recorded from gills of *A. grypus* which was reported as *B. grypus* (2). *D. pavlovskyi* was reported for the first time in Iraq from gills of *A. grypus* (reported as *B. grypus*) and *M. sharpeyi* (reported as *B. sharpeyi*) from Tigris river at Baiji, Salah Al-Deen province (25). So far, *D. pavlovskyi* has 11 fish host species in Iraq (39).**

***Dactylogyrus sahuensis* Ling in Chen et al., 1973 was recorded from gills of *C. carpio* (30, 31, 33). The first report of *D. sahuensis* in Iraq was from fins and gills of *C. carpio* from Al-Furat fish farm (19). *C. carpio* is the only host so far known for *D. sahuensis* in Iraq (39). Gibson et al. (24) indicated that this parasite was first mentioned in 1965 by Ling in unpublished MS and the authority is Ling in Chen et al., 1973.**

***Dactylogyrus skrjabini* Akhmerov, 1954 was recorded from gills of *H. molitrix* (21). It is appropriate to mention here that this parasite was spelled as *D. scrjabini* by Bilal and Abdullah (21). According to Gibson et al. (24), *D. skrjabini* is sometimes spelled as *D. scrjabini*. The first report of *D. skrjabini* in Iraq was**

from buccal cavity and gills of *H. molitrix* from Al-Suwaira and Al-Latifiya fish farms (54). Now, *D. skrjabini* has six host species in Iraq (39).

***Dactylogyrus vastator* Nybelin, 1924 was recorded from gills of *C. carpio* (30, 31, 33). The first report of *D. vastator* from Iraq was from skin and gills of *C. macrostomum* from Tigris river at Baghdad (9). So far, *D. vastator* was reported from 33 fish host species in Iraq (39).**

***Dactylogyrus* sp. was recorded from gills of *C. carpio* (6). In addition to 83 recognized *Dactylogyrus* species so far recorded from fishes of Iraq, some unidentified species of *Dactylogyrus* were recorded from nine fish host species (39).**

***Diplozoon* sp. was recorded from *C. carpio* (6). In Iraq, in addition to *D. paradoxum* von Nordmann, 1832 which was so far reported from five fish host species (39), some adult specimens of unidentified *Diplozoon* species were so far reported from 12 fish host species. Some of such unidentified *Diplozoon* spp. were reported as larval forms (diporpa) from three fish host species in Iraq (39).**

***Gyrodactylus barbi* Ergens, 1976 was recorded from skin of *C. carpio* (30, 31, 33). The first record of *G. barbi* in Iraq was from skin of *C. carpio* from Ainkawa fish hatchery (30). So far, this parasite has five fish host species in Iraq (39).**

***Gyrodactylus cyprini* Diarova, 1964 was recorded from skin of *C. carpio* (30, 31, 33). The first record of *G. cyprini* in Iraq was from skin of *C. carpio* from Ainkawa fish hatchery (30). *C. carpio* is the only host species so far known for *G. cyprini* in Iraq (39).**

***Gyrodactylus elegans* von Nordmann, 1832 was recorded from skin and gills of *C. carpio* (6, 2, 12, 15). The first report of *G. elegans* in Iraq was from *C. carpio* from Al-Zaafaraniya fish farm and *L. abu* from Al-Latifiya fish farm (7). So far, *G. elegans* has 23 fish host species in Iraq (39).**

***Gyrodactylus kherulensis* Ergens, 1974 was recorded from skin of *C. carpio* (30, 31, 33). The first report of *G. kherulensis* in Iraq was from gills of *C. carpio* from Babylon fish farm (11). So far, *G. kherulensis* has four fish host species in Iraq (39).**

***Gyrodactylus longoacuminatus* Zitnan, 1964 was recorded from skin of *C. carpio* (30, 31, 33). The first record of *G. longoacuminatus* in Iraq was from skin of *C. carpio* from Ainkawa fish hatchery (30). So far, *C. carpio* is the only host species known for *G. longoacuminatus* in Iraq (39).**

***Paradiplozoon cyprini* Khotenovsky, 1982 was recorded from gills of *C. carpio* (30, 31, 32). The first report of *P. cyprini* from Iraq was from gills of *A. grypus* (reported as *Barbus grypus*) from Tigris river passing through Salah Al-Deen province (17). So far, *P. cyprini* has four fish host species in Iraq (39).**

Phylum Platyhelminthes- Class Cestoda

The class Cestoda of the phylum Platyhelminthes is represented in farm fishes of Kurdistan region with two species; one species of the genus *Schyzocotyle* as well as one unidentified species of *Caryophyllaeus* as indicated below:

Phylum Platyhelminthes
Class Cestoda
Order Caryophyllidea
Family Caryophyllaeidae
***Caryophyllaeus* sp.**
Order Bothriocephalidea
Family Bothriocephalidae

***Schyzocotyle acheilognathi* (Yamaguti, 1934) Brabec, Waeschenbach, Scholz, Littlewood & Kuchta, 2015**

***Caryophyllaeus* sp. was recorded from the intestine of *C. carpio* (6). *Caryophyllaeus laticepes* (Pallas, 1781) was the first *Caryophyllaeus* species which was reported from the intestine and body cavity of both *Alburnus caeruleus* and *Luciobarbus xanthopterus* (reported as *Barbus xanthopterus*) from Al-Tharthar lake (18). In addition to that, two other *Caryophyllaeus* species as well as some unspecified *Caryophyllaeus* species from two fish host species are so far known from fishes of Iraq (39).**

***Schyzocotyle acheilognathi* (Yamaguti, 1934) Brabec, Waeschenbach, Scholz, Littlewood & Kuchta, 2015 was reported as *Bothriocephalus acheilognathi* Yamaguti, 1934 from intestine of *C. carpio* (2). Also, Ali (6) reported *B. gowkongensis* from the intestine of *C. carpio*. The first report of *B. acheilognathi* in Iraq was from the intestine of *C. carpio* from different fish farms near Baghdad (28). Two other species of *Bothriocephalus*; *B. gowkongensis* Yeh, 1955 and *B. opsariichthydis* Yamaguti, 1934 were also reported from Iraq (39). According to Molnár (48), both these two species are considered as synonyms of *B. acheilognathi*. Based on recent molecular study, Brabec et al. (20) considered *B. acheilognathi* as a synonym of *S. acheilognathi*. At the present time, *S. acheilognathi* and its three above- named synonyms has so far a total of 21 fish host species in Iraq (39).**

Phylum Nematoda

The phylum Nematoda is represented in farm fishes of Kurdistan region with one species which is the unidentified larval species of the genus *Contracaecum* as indicated below:

Phylum Nematoda
Class Secernentea
Order Ascaridida
Family Anisakidae
***Contracaecum* sp.**

***Contracaecum* sp. was recorded from intestine of *P. abu* (reported as *L. abu*) by Abdullah (2). The first report of *Contracaecum* spp. larvae in Iraq was from the body cavity and different viscera of 10 fish species from different inland waters of Iraq (26). *Contracaecum* spp. larvae have so far 40 fish host species in Iraq (39).**

Phylum Arthropoda- Subphylum Crustacea

The subphylum Crustacea of the phylum Arthropoda is represented in farm fishes of Kurdistan region with three species; one species each of genera *Argulus*, *Ergasilus* and *Lernaea* as indicated below:

Phylum Arthropoda
Subphylum Crustacea
Class Maxillopoda
Order Arguloida
Family Argulidae
***Argulus foliaceus* (Linnaeus, 1758) Jurine, 1806**
Order Poecilostomatoida
Family Ergasilidae
***Ergasilus barbi* Rahemo, 1982**
Order Cyclopoida
Family Lernaeidae
***Lernaea cyprinacea* Linnaeus, 1758**

Argulus foliaceus (Linnaeus, 1758) Jurine, 1806 was recorded from skin of *C. carpio* (12, 15). *A. foliaceus* was reported for the first time in Iraq by Herzog (26) from skin of *C. carpio* from Al-Zaafaraniya fish-culture station and from *Carasobarbus luteus* (reported as *Barbus luteus*) from Al-Habbaniya lake. *A. foliaceus* has so far 16 fish host species in Iraq (39).

Ergasilus barbi Rahemo, 1982 was recorded from gills of *C. carpio* (2). This crustacean was firstly detected from gills of *A. grypus* (reported as *B. grypus*) from Tigris river at Mosul city by Fattohy (23) and its full description as a new species was achieved by Rahemo (52). *E. barbi* has so far 13 fish host species in Iraq (39).

Lernaea cyprinacea Linnaeus, 1758 was recorded from gills of *A. grypus*, which was reported as *B. grypus* (2), skin of *C. idella* (6), skin, fins, buccal cavity and gills of *C. carpio* (6, 2, 12, 14, 15, 30, 31) and skin of *H. molitrix* (6). The first report of the anchor worm *L. cyprinacea* in Iraq was from skin, fins, buccal cavity, pharyngeal cavity, gills and anus of seven freshwater fish species from Al-Zaafaraniya fish-culture station (5). *L. cyprinacea* is the commonest crustacean among fishes of Iraq as it has so far 30 fish host species (39).

Host-Parasite List

The following host-parasite list for fish parasites in fish farms of Kurdistan region is compiled. The three cultured fishes as well as the three wild fishes which were found in fish farms of Kurdistan region were alphabetically arranged. For each host, the scientific names of all recorded parasites are alphabetically enlisted under their major parasitic groups. To economize space, references of previous records for each parasite species are not given here. These can be obtained from the account of each concerned parasite species in the subtitle of Major Groups of Parasitic Fauna within the Results and Discussion section.

Arabibarbus grypus (Heckel, 1843)

Myxozoa: *Myxobolus* **sp.**
Monogenea: *Dactylogyrus pavlovskyi*.
Crustacea: *Lernaea cyprinacea*.

Ctenopharyngodon idella (Valenciennes, 1844)

Crustacea: *Lernaea cyprinacea*.

Cyprinion macrostomum Heckel, 1843

Monogenea: *Dactylogyrus macrostomi*.

Cyprinus carpio Linnaeus, 1758

Ciliophora: *Apiosoma amoeba, Balantidium polyvacuolum, Chilodonella cyprini, Ichthyophthirius multifiliis, Tetrahymena pyriformis, Trichodina acuta, T. domerguei, T. heterodentata, T. mutabilis, T. nobilis, T. reticulata* **and** *Trichodina* **sp.**
Myxozoa: *Myxobolus* **sp.**
Monogenea: *Dactylogyrus achmerowi, D. anchoratus, D. arcuatus, D. extensus, D. minutus, D. molnari, D. sahuensis, D. vastator, Dactylogyrus* **sp.**, *Diplozoon* **sp.**, *Gyrodactylus barbi, G. cyprini, G. elegans, G. kherulensis, G. longoacuminatus* **and** *Paradiplozoon cyprini*.
Cestoda: *Caryophyllaeus* **sp. and** *Schyzocotyle acheilognathi*.
Crustacea: *Argulus foliaceus, Ergasilus barbi* **and** *Lernaea cyprinacea*.

Hypophthalmichthys molitrix (Valenciennes, 1844)

Monogenea: *Dactylogyrus skrjabini*
Crustacea: *Lernaea cyprinacea*.

Planiliza abu (Heckel, 1843)

Myxozoa: *Myxobolus* **sp.**
Nematoda: *Contracaecum* **sp.**

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قوائم مرجعية لطفيليات أسماك المزارع في منطقة كوردستان، العراق

فرحان ضمد محيسن* شمال محمد أمين عبدالله **

الملخص

أظهر إستعراض المراجع لكل المصادر الخاص بالمجموعة الحيوانية المتطفلة على أسماك المزارع في منطقة كوردستان، شمال العراق وجود ما مجموعه 38 نوعاً شرعياً معروفاً من الطفيليات في أسماك الكارب الإعتيادي، الكارب العشبي والكارب الفضي بالإضافة لثلاثة أنواع من أسماك المياه العذبة (الشبوط، البنيني كبير الفم والخشني) التي كانت موجودة في بعض مزارع منطقة كوردستان. إشتملت المجموعة الحيوانية المتطفلة على 12 نوعاً من حاملات الأهداب، نوع واحد من البوغيات المخاطية، 19 نوعاً من أحادية المضيف، نوعين من الديدان الشريطية، نوع من الديدان الخيطية، وثلاثة أنواع من القشريات. وجد أن أسماك الكارب الإعتيادي آوت 34 نوعاً من الطفيليات، الكارب العشبي نوعاً واحداً، الكارب الفضي نوعين، الشبوط ثلاثة أنواع، الخشني نوعين والبنيني كبير الفم نوعاً واحداً. كما تم أيضاً إعداد قائمة المضيف– الطفيلي لكل نوع من الأسماك.

*السويد، كاتريناهولم (e-mail: mhaisenft@yahoo.co.uk).
** كلية الزراعة، جامعة صلاح الدين، أربيل، العراق.