Bull. Iraq nat. Hist. Mus.
June, (2019) 15 (3): 293-318
https://doi.org/10.26842/binhm.7.2019.15.3.0293

CHECKLISTS OF PARASITES OF FISHES OF AL-DIWANIYAH PROVINCE, IRAQ

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Received Date: 30 December 2018, Accepted Date: 24 February 2019, Published Date: 27 June 2019

ABSTRACT

Literature reviews of reports concerning the parasitic fauna of fishes of Al-Diwaniyah province, Iraq till the end of December 2018 showed that a total of 43 parasite species are so far known from 13 valid fish species investigated for parasitic infections. The parasitic fauna included one euglenozoan, two myzozoans, six ciliophorans, three myxozoans, three trematodes, nine monogeneans, four cestodes, six nematodes, three acanthocephalans and six crustaceans. The infection with the trematodes, one monogenean, two cestodes and one nematode occurred with larval stages, while the remaining infections were either with trophozoites or adult parasites. Among the inspected fishes, *Carasobarbus luteus* was infected with the highest number of parasite species (20 parasite species), followed by *Planiliza abu* (17 species) and *Cyprinus carpio* (16 species) while two fish species (*Ctenopharyngodon idella* and *Hypophthalmichthys molitrix*) were infected with the minimum number of parasite species (three parasite species each). The ciliophoran *Trichodina domerguei* and the crustacean *Lernaea cyprinacea* were the commonest parasite species as they were reported from nine fish species each, followed by the monogenean *Dactylogyrus extensus* and the nematode *Contracaecum* sp. which were reported from eight and six host species, respectively, while the minimum number of one host species was reported for 22 parasite species.

Keywords: Al-Diwaniyah, Checklists, Fishes, Iraq, Parasites.

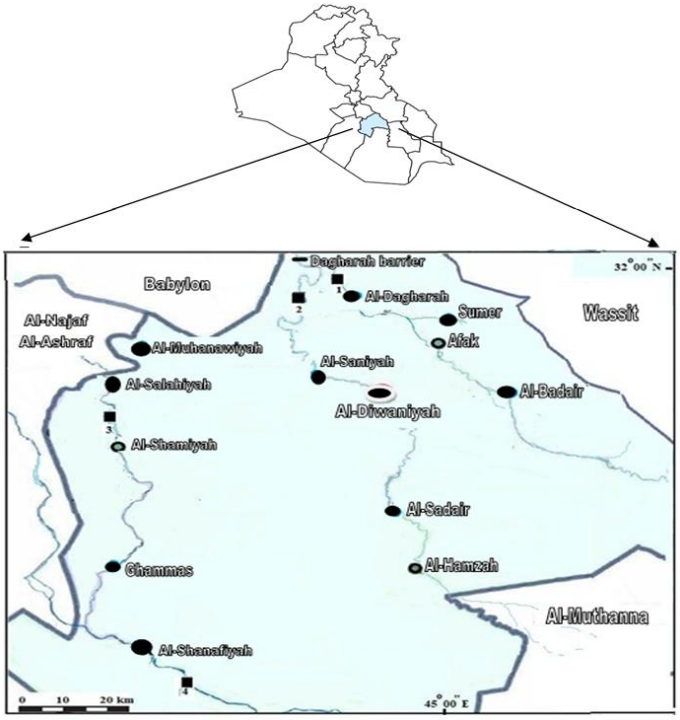
INTRODUCTION

Al-Diwaniyah province is one of the Iraqi provinces in the centre-south of the country. It shares boundaries with the provinces of Babylon, Al-Najaf Al-Ashraf, Al-Muthanna, Thi-Qar and Wassit (Map 1). It is located between 31.17° and 32.24° North latitude and 44.24° and 45.49° East longitude. This province was used to be known as Al-Qadisiyyah province, but in 2004, its name was returned to its original name, Al-Diwaniyah province. The following information is available on rivers of this province according to Solon (2018). The main inland waters of this province can be summarized in the following statement: Shatt Al-Hilla enters Al-Diwaniyah province as Al-Dagharah River and Al-Diwaniyah River. Al-Dagharah River

passes through Al-Dagharah, Sumer, Afak (also spelled as Afaq) and Al-Badair and then proceeds toward Thi-Qar province, while Al-Diwaniyah River enters Al-Saniyah, Al-Diwaniyah, Al-Sadair and Al-Hamzah and then it fades away into small branches in Al-Muthanna province. Al-Shamiyah River enters Al-Diwaniyah province, passes through Al-Muhanawiyah, Al-Salahiyah, Al-Shamiyah and Ghammas and fades away into Al-Shanafiyah River which forms from the union of both Al-Shamiyah River and Al-Kufa River. It enters Al-Muthanna province and fades away there. Each of such rivers is also known as shatt.

The parasites of fishes of this province received little attention from fish parasitologists in Iraq. Herzog (1969) was the first one to report some parasites of fishes of Iraq. He revealed the occurrence of 16 parasite species as well as three fungal species from 16 fish host species from many regions of Iraq, but the exact locality was not stated for some host species and no data seemed to be from Al-Diwaniyah province. Apart from two comprehensive surveys (Al-Jadoaa, 2002; Al-Waaly, 2005), all the available reports were concerned with few parasite species from a single fish species or sometimes two fish species and rarely three fish species.

The aim of the present article is to gather and review all literature in order to provide parasite-host list and host-parasite list for fishes of Al-Diwaniyah province. It is well known that such lists are so important for future studies. Recently, some of such lists dealing with different groups of parasites and fishes of different regions in Iraq were published; among them were those of Mhaisen and Abdullah (2016), Mhaisen and Al-Rubaie (2016a, b), Mhaisen and Abdullah (2017), Mhaisen *et al.* (2017a, b), Mhaisen and Al-Rubaie (2018) and Mhaisen *et al.* (2018a, b). This article also includes updating scientific names of all concerned parasites and their fish hosts.



Map (1): Map of Iraq (above) showing Al-Diwaniyah province in a light blue colour and a detailed map of Al-Diwaniyah province (below) showing its cities and towns as well as the main rivers: 1- Al-Dagharah, 2- Al-Diwaniyah, 3- Al-Shamiyah and 4- Al-Shanafiyah. This map was prepared by the second author of this article.

MATERIALS AND METHODS

Fourteen references (nine research papers, one Higher Diploma project, two unpublished M. Sc. theses and two Ph. D. theses) dealing with the parasites of fishes of Al-Diwaniyah province till the end of December 2018 were used to prepare the present checklists. Data from such references were gathered to provide parasite-fish list and fish-parasite list based on some electronic sites concerned with classification (EOL, 2018; GBIF, 2018; Global Cestode Database, 2018; ITIS, 2018; WoRMS, 2018) as well as some relevant taxonomic references (Gibson *et al.*, 1996; Amin, 2013). The layout and names of the major taxonomic groups of the concerned parasites (phyla, classes, orders and families) followed a checklist of FAO Fisheries Technical Papers (Kirjušina and Vismanis, 2007). For fishes, the scientific names were reported as they appeared in their original references but then they were checked with an account on freshwater fishes of Iraq (Coad, 2010). Fish valid names and their authorities were corrected according to well-known specialized electronic sites (Eschmeyer, 2018; Froese and Pauly, 2018). GBIF (2018) was mainly followed for the systematics of these groups. The index-catalogue of parasites and disease agents of fishes of Iraq (Mhaisen, 2018) was used to show the first record of each parasite species from fishes of Iraq as well as the number of host fish species so far recorded for each parasite species in the whole water bodies of Iraq.

Parasitological investigations on fishes of Al-Diwaniyah province

The following is a short historical account on different researches carried out on fishes of Al-Diwaniyah province for the investigation of their parasites. Only a brief account on such surveys will be given here as the details will be given in the forthcoming parts of this review.

Al-Jadoaa (2002) made a comprehensive investigation on the parasites of nine fish species from the northern sector of Al-Diwaniyah River which is situated between Al-Saniyah (misspelled as Al-Siniya) town center and Al-Diwaniyah city center, in addition to his investigation on the parasitic fauna of three carp species from Al-Furat fish farm in Babylon province, which will be excluded from the contents of the present article. From the river, he detected one euglenozoan, five ciliophorans, three myxozoans, two trematodes, five monogeneans, one cestode, three nematodes, two acanthocephalans and three crustaceans.

Al-Waaly (2005) investigated the parasites of the cyprinid fish *Carasobarbus luteus* (reported as *Barbus luteus*) from Al-Dagharah River and the nearby drainage network and detected two ciliophorans, one myxozoan, five monogeneans, one cestode, three nematodes, one acanthocephalan and three crustaceans.

Al-Jadoa and Al-Wualy (2007) published an extracted article from Al-Waaly (2005) in which they compared the infection of *Carasobarbus luteus* (reported as *Barbus luteus*) from both Al-Dagharah River and the nearby drainage network with five monogeneans and the occurrence of one cestode species. It is relevant to state here that both names reported here (Al-Jadoa and Al-Wualy) were misspelled for Al-Jadoaa and Al-Waaly which were given before in this list of investigations.

Al-Jadoaa (2008) examined 124 specimens of the mugilid fish *Planiliza abu* (reported as *Liza abu*) from local drainage network, north of Al-Diwaniyah province and detected three ciliophorans, one myxozoan, one monogenean, two nematodes, one acanthocephalan and one crustacean.

Enad (2009) detected the infection of the common carp *Cyprinus carpio* from Shatt Al-Diwaniyah at Al-Diwaniyah city center (from the Plastic factory to the slaughterhouse) with three species of the monogenean *Dactylogyrus*.

Yassin (2010) examined 64 specimens of *C. carpio* and 80 specimens of *P. abu* (reported as *L. abu*) from Al-Shinafiyah River and recorded two nematodes, one acanthocephalan and two crustaceans from these fishes.

Abd and Abdul Wahab (2011) examined three species of carps: the common carp *C. carpio*, the grass carp *Ctenopharyngodon idella* and the silver carp *Hypophthalmichthys molitrix* from some fish farms and from fish markets (from Al-Shamiyah River) and detected the occurrence of *Diplostomum* sp., unidentified cestode, *Argulus* sp. and *Lernaea* sp. in addition to some bacterial diseases. All these parasites were not identified to the specific level and one was even just reported as a cestode.

Karawan *et al.* (2012) while inspecting 809 specimens of *P. abu* (reported as *L. abu*) from different rivers in Al-Diwaniyah city for parasites, detected one species each of myzozoan, nematode and acanthocephalan.

Al-Mahi (2014) conducted a detailed study on the bio-accumulation of eight heavy metals in tissues of one cestode, one nematode and two acanthocephalans which were detected from

the intestine of the cyprinid fish *Arabibarbus grypus* (reported as *Barbus grypus*) and *P. abu* (reported as *L. abu*) from four rivers in Al-Diwaniyah province. It is appropriate to mention here that Al-Mahi (2014) is the same researcher Yassin (2010).

Al-Mahi and Al-Mayali (2015) published an extracted article from Al-Mahi (2014) concerned with the measurements of eight heavy metals in one cestode and one nematode species from both *A. grypus* (reported as *B. grypus*) and *P. abu* (reported as *L. abu*) from four locations in Al-Diwaniyah province. No mention was given to the specific name of these parasites in the whole article but they will be considered here as *Schyzocotyle acheilognathi* and *Contracaecum* sp., respectively.

Al-Mahi and Al-Mayali (2016) published another extracted article from Al-Mahi (2014) concerned with record of three worms (cestode, nematode and acanthocephalan) from *A. grypus* (reported as *B. grypus*) as well as one nematode and one acanthocephalan from *P. abu* (reported as *L. abu*) in addition to the demonstration of some of the histopathological changes caused by such parasites without determination of such changes for each parasite species.

Mohammad (2016) investigated the parasites of the redbelly tilapia *Coptodon zillii* (reported as *Tilapia zillii*) from Al-Dalmaj marsh of Al-Diwaniyah province as well as from the Central marshes in Thi-Qar province. His results showed that there is no infection in fishes of Al-Dalmaj marsh, while he recorded two parasite species from *C. zillii* of Thi-Qar province.

Shakir (2018) inspected the parasites of both *Coptodon zillii* and *P. abu* from two stations in Al-Diwaniyah province (Al-Saniyah town and Al-Diwaniyah city center) as well as two stations in Al-Muthanna province. He detected the infection of both fish species from both provinces with two ciliophorans and two myzozoans.

Shakir and Al-Asadiy (2018) published an extracted article from Shakir (2018) concerned with the record of two ciliophorans and two myzozoans from both *C. zillii* and *P. abu* from waters of both Al-Diwaniyah and Al-Muthanna provinces.

RESULTS AND DISCUSSION

Surveying literature concerning the parasites which were recorded from fishes of Al-Diwaniyah province till the end of 2018 showed the infection of 13 valid fish species with 43 parasite species. The full authority of each valid fish host species is shown in Table (1). The parasitic fauna included one euglenozoan, two myzozoans, six ciliophorans, three myxozoans, three trematodes, nine monogeneans, four cestodes, six nematodes, three acanthocephalans and six crustaceans.

Table (1): List of fishes of Al-Diwaniyah province.

Class Actinopterygii
Order Cypriniformes
Family Cyprinidae
Arabibarbus grypus (Heckel, 1843)
Carasobarbus luteus (Heckel, 1843)
Ctenopharyngodon idella (Valenciennes, 1844)
Cyprinion macrostomum Heckel, 1843
Cyprinus carpio Linnaeus, 1758

Garra rufa (Heckel, 1843)
Hypophthalmichthys molitrix (Valenciennes, 1844)
Leuciscus vorax (Heckel, 1843)
Luciobarbus xanthopterus Heckel, 1843
Mesopotamichthys sharpeyi (Günther, 1874)
Order Siluriformes
Family Bagridae
Mystus pelusius (Solander, 1794)
Order Perciformes
Family Cichlidae
Coptodon zillii (Gervais, 1848)
Order Mugiliformes
Family Mugilidae
Planiliza abu (Heckel, 1843)

Parasite-host list

Species of the parasitic fauna of fishes of the Al-Diwaniyah province are grouped here into ten major groups (phyla for some species or classes for others) according to Kirjušina and Vismanis (2007). For each major group, a list of species will be given according to their systematic account. This will be followed by an alphabetical listing of each parasite species in each major group.The parasites listing will include alphabetically arranged fish hosts involved for each parasite. Finally, for each parasite species, its first record in Iraq will be indicated and the total number of its hosts, so far recorded from fishes of Iraq will be declared depending on the index-catalogue of Mhaisen (2018).

Major groups of parasites and their hosts

As names of some major groups of parasites had been changed during the last few years, attention was paid to use the most recent names for the major parasite groups which infect fishes (EOL, 2018; GBIF, 2018; ITIS, 2018; WoRMS, 2018). Ten major parasite groups are reported in this study. These included the groups of Euglenozoa, Myzozoa, Ciliophora, Myxozoa, Trematoda, Monogenea, Cestoda, Nematoda, Acanthocephala and Crustacea.

Phylum Euglenozoa

The phylum Euglenozoa is recognized with this name by EOL (2018), GBIF (2018) and WoRMS (2018), but as Sarcomastigophora by ITIS (2018). It is represented in fishes of Al-Diwaniyah province with one unidentified species of the genus *Trypanosoma* as indicated in the following systematic scheme according to GBIF (2018).

Phylum Euglenozoa
Class Kinetoplastea
Order Trypanostomatida
Family Trypanosomatidae
Trypanosoma sp.

Trypanosoma sp. was reported from the blood of *C. luteus* (reported as *B. luteus*) by Al-Jadoaa (2002). So far, unidentified *Trypanosoma* species were recorded from 13 fish host species in Iraq in addition to nine identified species of this genus from fishes of Iraq (Mhaisen, 2018).

Phylum Myzozoa

The phylum Myzozoa (according to GBIF, 2018; WoRMS, 2018) is also known as Apicomplexa (EOL, 2018; ITIS, 2018). It is represented in fishes of Al-Diwaniyah province with one unidentified species each of the genera *Cryptosporidium* and *Eimeria* as indicated in the following systematic scheme according to GBIF (2018).

Phylum Myzozoa
Class Conoidasida
Order Eucoccidiorida
Family Cryptosporidiidae
Cryptosporidium sp.
Family Eimeriidae
Eimeria sp.

Cryptosporidium sp. oocysts were reported from the intestine of *C. zillii* by Shakir (2018) and Shakir and Al-Asadiy (2018), the intestine of *P. abu* (reported as *L. abu*) by Karawan *et al.* (2012) and intestine of the same fish (*P. abu*) by Shakir (2018) and Shakir and Al-Asadiy (2018). In Iraq, two identified *Cryptosporidium* species in addition to some unidentified *Cryptosporidium* species were so far recorded from three fish species (Mhaisen, 2018).

Eimeria sp. was reported from the intestine of *C. zillii* by Shakir (2018) and Shakir and Al-Asadiy (2018) and the intestine of *P. abu* by Shakir (2018) and Shakir and Al-Asadiy (2018). In Iraq, ten identified *Eimeria* species in addition to some unidentified *Eimeria* species were so far recorded from eight fish species (Mhaisen, 2018).

Phylum Ciliophora

The phylum Ciliophora is represented in fishes of Al-Diwaniyah province with one species each of the genera *Apiosoma*, *Chilodonella* and *Ichthyophthirius* and three species of the genus *Trichodina* as indicated in the following systematic scheme according to GBIF (2018). WoRMS (2018) showed some alternative names for some ranks of some of these ciliophorans. Such alternatives are indicated in brackets in the following systematic scheme.

Phylum Ciliophora
Class Oligohymenophorea
Order Peritrichida (Mobilida)
Family Trichodinidae
Trichodina borealis Shul'man and Shul'man-Albova, 1953
Trichodina domerguei Wallengren, 1897
Trichodina nigra Lom, 1961
Family Epistylididae
Apiosoma piscicola (Blanchard, 1885)
Order Hymenostomatida
Family Ichthyophthiriidae
Ichthyophthirius multifiliis Fouquet, 1876
Class Cyrtophorea (Phyllopharyngea)
Order Cyrtophorida (Chlamydodontida)
Family Chilodonellidae
Chilodonella cyprini (Moroff, 1902) Strand, 1928

Apiosoma piscicola (Blanchard, 1885) was detected from skin and gills of *C. luteus* by Al-Jadoaa (2002). This parasite was reported for the first time in Iraq from skin, buccal cavity

and gills of *C. idella*, *C. carpio* and *H. molitrix* from Al-Suwairah and Al-Latifiah fish ponds (Ali *et al.*, 1988). It is appropriate to indicate here that WoRMS (2018) considered the genus *Apiosoma* within the order Sessilida instead of the order Peritrichida as with GBIF (2018). However, it belongs to the same family and class mentioned in both GBIF (2018) and WoRMS (2018). Eleven fish host species are so far known for *A. piscicola* in Iraq (Mhaisen, 2018).

Chilodonella cyprini (Moroff, 1902) Strand, 1928 was reported from gills of *C. macrostomum* by Al-Jadoaa (2002) and skin and gills of *C. carpio* by Al-Jadoaa (2002). This parasite was reported for the first time in Iraq from skin, buccal cavity and gills of *M. pelusius* from Tigris River at Baghdad (Ali *et al.*, 1987a). So far, 12 fish host species are known for *C. cyprini* in Iraq (Mhaisen, 2018).

Ichthyophthirius multifiliis Fouquet, 1876 was reported from gills and skin of *C. luteus* (reported as *B. luteus*) by Al-Jadoaa (2002) and Al-Waaly (2005), gills of *G. rufa* by Al-Jadoaa (2002), gills of *L. vorax* (reported as *A. vorax*) by Al-Jadoaa (2002), gills of *M. sharpeyi* (reported as *B. sharpeyi*) by Al-Jadoaa (2002) and from fins, gills and skin of *P. abu* (reported as *L. abu*) by Al-Jadoaa (2002, 2008). *I. multifiliis* was recorded for the first time in Iraq from skin and gills of *Planiliza subviridis* (reported as *Mugil dussumieri*) from Tigris River at Baghdad by Herzog (1969). Thirty-five fish host species are so far known as hosts for *I. multifiliis* in addition to some unidentified species of *Ichthyophthirius* from four fish host species from fishes of Iraq (Mhaisen, 2018).

Trichodina borealis (Dogiel, 1940) Shul'man and Shul'man-Albova, 1953 was reported from gills of *C. zillii* and from gills of *P. abu* by Shakir (2018) and Shakir and Al-Asadiy (2018). The first record of this parasite in Iraq was from gills of *Gambusia holbrooki* (reported as *Gambusia affinis*) from Hilla River by Hussain (2008) who gave neither description nor illustration of this parasite. Three host species are so far known for this parasite in Iraq (Mhaisen, 2018).

Trichodina domerguei Wallengren, 1897 was reported from gills and skin of *C. luteus* (reported as *B. luteus*) by Al-Jadoaa (2002) and Al-Waaly (2005), gills of *C. zillii* by Shakir (2018) and Shakir and Al-Asadiy (2018), fins, gills and skin of *C. carpio*, gills and skin of each of *C. macrostomum*, *G. rufa*, *L. vorax* (reported as *A. vorax*), *M. sharpeyi* (reported as *B. sharpeyi*) and *M. pelusius* by Al-Jadoaa (2002), gills of *P. abu* (reported as *L. abu*) by Al-Jadoaa (2008) and gills of the same fish (*P. abu*) by Shakir (2018) and Shakir and Al-Asadiy (2018). It is appropriate to mention here that WoRMS (2018) puts the authority of this parasite inside brackets in contrary to GBIF (2018). The first record of *T. domerguei* in Iraq was from skin and gills of eight freshwater fish species from Tigris River, Al-Tharthar lake and fish markets in Baghdad city (Shamsuddin *et al.*, 1971). So far, 39 fish host species are known for *T. domerguei* in Iraq which makes it the most distributed ciliophoran species among fishes of Iraq (Mhaisen, 2018).

Trichodina nigra Lom, 1961 was reported from gills and skin of both *C. carpio* and *M. pelusius* by Al-Jadoaa (2002) and gills and skin of *P. abu* (reported as *L. abu*) by Al-Jadoaa (2002, 2008). This parasite was reported for the first record in Iraq from skin and gills of both *C. carpio* and *H. molitrix* from Al-Furat fish farm (Al-Zubaidy, 1998). Nine fish host species are so far known for *T. nigra* in Iraq (Mhaisen, 2018).

Phylum Myxozoa

The phylum Myxozoa, according to GBIF (2018), is considered within the phylum Cnidaria according to EOL (2018), ITIS (2018) and WoRMS (2018). Myxozoans of fishes of Al-Diwaniyah province included two species of *Myxobolus* as well some unidentified species of the genus *Myxidium* as indicated in the following systematic scheme according to GBIF (2018).

Phylum Myxozoa
Class Myxosporea
Order Bivalvulida
Family Myxidiidae
Myxidium sp.
Family Myxobolidae
Myxobolus ellipsoides Thélohan, 1892
Myxobolus pfeifferi Thélohan, 1895

Myxidium sp. was reported from gills, liver and ovaries of *C. macrostomum* by Al-Jadoaa (2002). This was the first record of unidentified *Myxidium* species from fishes of Iraq. Five identified species of this genus are so far known from fishes of Iraq (Mhaisen, 2018).

Myxobolus ellipsoides Thélohan, 1892 was reported from gills, intestine, spleen and kidneys of *C. macrostomum* by Al-Jadoaa (2002). This was the first record of this parasite in Iraq. So far, three fish host species are known for *M. ellipsoides* in fishes of Iraq (Mhaisen, 2018).

Myxobolus pfeifferi Thélohan, 1895 was reported from gills of *C. luteus* (reported as *B. luteus*) by Al-Waaly (2005), gills, intestine, liver and kidneys of *L. xanthopterus* (reported as *B. xanthopterus*), gills, liver, kidneys and ovaries of *M. sharpeyi* (reported as *B. sharpeyi*) by Al-Jadoaa (2002) and gills and liver of *P. abu* (reported as *L. abu*) by Al-Jadoaa (2008). *M. pfeifferi* was reported for the first time in Iraq from gills of *Acanthobrama marmid* from Tigris River at Mosul city (Fattohy, 1975). So far, *M. pfeifferi* has 35 fish host species in Iraq which makes it as the most distributed species within the genus *Myxobolus* in fishes of Iraq (Mhaisen, 2018).

Phylum Platyhelminthes- Class Trematoda

The class Trematoda of fishes of Al-Diwaniyah province includes one species each of the genera *Clinostomum* and *Diplostomum* as well as some unidentified species of *Diplostomum*. These trematodes are as indicated in the following systematic scheme according to GBIF (2018).

Phylum Platyhelminthes
Class Trematoda
Order Diplostomida
Family Clinostomidae
Clinostomum complanatum (Rudolphi, 1819) Braun, 1899
Family Diplostomidae
Diplostomum spathaceum (Rudolphi, 1819) Olsson, 1876
Diplostomum sp.

Clinostomum complanatum (Rudolphi, 1819) Braun, 1899 was recorded as metacercaria from the gills of *C. carpio* by Al-Jadoaa (2002). This parasite was reported for the first time

in Iraq from gills of *C. luteus* from Mehaijeran creek, Basrah (Khamees, 1983). So far, *C. complanatum* has 27 fish host species in Iraq (Mhaisen, 2018).

Diplostomum spathaceum (Rudolphi, 1819) Olsson, 1876 was recorded as metacercaria from eyes of *C. carpio* by Al-Jadoaa (2002). This parasite was recorded for the first time in Iraq from the eyes of *C. luteus* (reported as *B. luteus*), *C. macrostomum* and *C. carpio* from Dokan lake (Abdullah, 1990). So far, 35 fish host species are known for *D. spathaceum* in Iraq (Mhaisen, 2018).

Diplostomum sp. metacercariae were detected from eyes of *C. idella*, *C. carpio* and *H. molitrix* by Abd and Abdul Wahab (2011). Mhaisen (2004) gave a detailed account on species of *Diplostomum* causing worm cataract in freshwater fishes of Iraq. So far, nine identified *Diplostomum* species as well as some unidentified species of *Diplostomum* from 27 fish host species are known in Iraq (Mhaisen, 2018).

Phylum Platyhelminthes- Class Monogenea

The class Monogenea of fishes of Al-Diwaniyah province included one species each of genera *Gyrodactylus* and *Paradiplozoon*, five species of *Dactylogyrus* as well as some unidentified species of the genera *Dactylogyrus* and *Diplozoon*. Names of *Dactylogyrus* species were according to Gibson *et al.* (1996). Lim *et al.* (2001) discussed the awareness of translating names of some Russian and Chinese authors, and hence this reference was followed for checking names of some Russian authorities of some of the following monogeneans. List of monogeneans of fishes of Al-Diwaniyah province is indicated in the following systematic scheme according to GBIF (2018).

Phylum Platyhelminthes
Class Monogenea
Order Dactylogyridea
Family Dactylogyridae
Dactylogyrus achmerowi Gusev, 1955
Dactylogyrus extensus Mueller and Van Cleave, 1932
Dactylogyrus gobii Gvosdev, 1950
Dactylogyrus minutus Kulwiec, 1927
Dactylogyrus vastator Nybelin, 1924
Dactylogyrus sp.
Order Gyrodactylidea
Family Gyrodactylidae
Gyrodactylus elegans von Nordmann, 1832
Order Mazocraeidea
Family Diplozoidae
Diplozoon sp.
Paradiplozoon kasimii (Rahemo, 1980) Khotenovsky, 1982

Dactylogyrus achmerowi Gusev, 1955 was recorded from gills of *C. luteus* (reported as *B. luteus*) by Al-Jadoaa (2002), Al-Waaly (2005) and Al-Jadoa and Al-Wualy (2007) and gills of *C. carpio* by Al-Jadoaa (2002). The first report of this parasite in Iraq was from gills of *C. carpio* from Al-Wahda fish hatchery at Al-Suwaira and Babylon fish farm (Mhaisen *et al.*, 1988). Now, *D. achmerowi* has 13 host species in Iraq (Mhaisen, 2018).

Dactylogyrus extensus Mueller and Van Cleave, 1932 was detected from gills of *C. luteus* by Al-Jadoaa (2002), Al-Waaly (2005) and Al-Jadoa and Al-Wualy (2007), gills of *C. carpio* by

Al-Jadoaa (2002), gills and skin of the same fish by Enad (2009), gills of *G. rufa*, *L. vorax* (reported as *A. vorax*), *L. xanthopterus* (reported as *B. xanthopterus*), *M. sharpeyi* (reported as *B. sharpeyi*) and *M. pelusius* by Al-Jadoaa (2002) as well as gills of *P. abu* (reported as *L. abu*) by Al-Jadoaa (2002, 2008). The first record of *D. extensus* in Iraq was from the buccal cavity and gills of *C. carpio* from Al-Suwaira and Al-Latifiya fish farms (Salih *et al.*, 1988). *D. solidus* which was also recorded from the same host by Salih *et al.* (1988) as well as by Mhaisen and Abul-Eis (1991) and Al-Rubaie *et al.* (2007) from other parts of Iraq is considered as a synonym of *D. extensus* according to Gibson *et al.* (1996). *D. extensus* and its synonym *D. solidus* have so far 20 fish host species in Iraq (Mhaisen, 2018).

Dactylogyrus gobii Gvozdev, 1950 was reported from fins, gills and skin of *C. carpio* by Enad (2009) who misspelled the authority of this parasite as Gvosdev instead of Gvozdev. This monogenean was reported for the first time in Iraq from gills of *C. carpio* at Al-Shark Al-Awsat fish farm, Babylon province by Hussain (2005). So far, this parasite has three fish hosts in Iraq (Mhaisen, 2018).

Dactylogyrus minutus Kulwiec, 1927 was reported from fins, gills and skin of *C. carpio* by Enad (2009). *D. minutus* was reported for the first time in Iraq (in a conference abstract) from gills of *C. carpio* from Tigris River at Al-Zaafaraniya, south of Baghdad as well as from the Euphrates River at Al-Qadisia dam lake (Mhaisen *et al.*, 1997), but the full paper was published later on (Mhaisen *et al.*, 2003). Twelve fish host species are so far known for *D. minutus* in Iraq (Mhaisen, 2018).

Dactylogyrus vastator Nybelin, 1924 was reported from gills of *C. luteus* (reported as *B. luteus*) by Al-Jadoaa (2002), Al-Waaly (2005) and Al-Jadoa and Al-Wualy (2007) as well as from gills of both *C. macrostomum* and *M. sharpeyi* (reported as *B. sharpeyi*) by Al-Jadoaa (2002). The first record of this parasite from Iraq was from skin and gills of *C. macrostomum* from Tigris River at Baghdad (Ali *et al.*, 1987 b). So far, *D. vastator* was reported from 33 fish host species in Iraq, which makes it as the most common *Dactylogyrus* species among fishes of Iraq (Mhaisen, 2018).

Dactylogyrus sp. was reported from gills of *M. sharpeyi* (reported as *B. sharpeyi*) by Al-Jadoaa (2002). So far, unidentified *Dactylogyrus* species were recorded from 12 fish host species in Iraq in addition to 82 identified species of this genus from fishes of Iraq (Mhaisen, 2018).

Diplozoon sp. was reported as diporpa larva from gills of *C. luteus* (reported as *B. luteus*) by Al-Waaly (2005) and Al-Jadoa and Al-Wualy (2007). In addition to one identified *Diplozoon* species in Iraq (*D. paradoxum*), ten fish host species are so far known for unidentified *Diplozoon* species (Mhaisen, 2018).

Gyrodactylus elegans von Nordmann, 1832 was reported from fins and gills of *C. luteus* (reported as *B. luteus*) as well as from gills of *C. macrostomum*, *L. xanthopterus* (reported as *B. xanthopterus*) and *M. sharpeyi* (reported as *B. sharpeyi*) by Al-Jadoaa (2002). This monogenean was reported for the first time in Iraq from both *C. carpio* and *P. abu* (reported as *L. abu*) from Al-Zaafaraniya and Al-Latifiya fish farms by Ali and Shaaban (1984). *G. elegans* has so far 23 fish host species in Iraq (Mhaisen, 2018).

Paradiplozoon kasimii (Rahemo, 1980) Khotenovsky, 1982 was reported as *Diplozoon kasimii* from gills of *C. luteus* (reported as *B. luteus*) by Al-Waaly (2005) and Al-Jadoa and Al-Wualy (2007). This parasite was recorded for the first time in Iraq as *D. kasimii* from gills

of *C. macrostomum* (erroneously reported as *C. macrostomus*) from Tigris River in Mosul city by Fattohy (1975) and published later on by Rahemo (1980). Khotenovsky (1985) transferred *D. kasimii* to the genus *Paradiplozoon* and considered it as a species inquirenda. Now, *P. kasimii* and its synonym have 13 fish host species in Iraq (Mhaisen, 2018).

Phylum Platyhelminthes- Class Cestoda

The class Cestoda of fishes of Al-Diwaniyah province included one species each of genera *Eubothrium*, *Ligula* and *Schyzocotyle* in addition to unspecified species of a cestode larva. Names of all cestodes followed Global Cestode Database (2018). These cestodes are indicated in the following systematic scheme according to GBIF (2018).

Phylum Platyhelminthes
Class Cestoda
Order Bothriocephalidea
Family Bothriocephalidae
Schyzocotyle acheilognathi (Yamaguti, 1934) Brabec, Waeschenbach, Scholz, Littlewood and Kuchta, 2015
Family Triaenophoridae
Eubothrium salvelini (Schrank, 1790) Nybelin, 1922
Order Diphyllobothriidea
Family Diphyllobothriidae
Ligula intestinalis (Linnaeus, 1758) Bloch, 1782
Unidentified larval cestode

Eubothrium salvelini (Schrank, 1790) Nybelin, 1922 was reported from the body cavity of *C. lutues* (reported as *B. luteus*) by Al-Waaly (2005) who misspelled the generic name as *Eubotherium* instead of *Eubothrium*, this was the first record of *E. salvelini* in Iraq. Al-Jadoa and Al-Wualy (2007) also reported this cestode from the same fish and also misspelled the generic name of this cestode as *Eubotherium* instead of *Eubothrium*. So far, only two fish host species are known for this cestode in Iraq (Mhaisen, 2018).

Ligula intestinalis (Linnaeus, 1758) Bloch, 1782 was reported as plerocercoid larva from body cavity of *M. sharpeyi* (reported as *B. sharpeyi*) by Al-Jadoaa (2002). The first report of this cestode in Iraq was from the body cavity of *L. vorax* (reported as *A. vorax*) from Shatt Al-Arab River by Al-Hasani (1985). Fifteen fish host species are so far known for *L. intestinalis* (Mhaisen, 2018).

Schyzocotyle acheilognathi (Yamaguti, 1934) Brabec, Waeschenbach, Scholz, Littlewood and Kuchta, 2015 was reported as *Bothriocephalus acheilognathi* from the intestine of *A. grypus* (reported as *B. grypus*) by Al-Mahi (2014), Al-Mahi and Al-Mayali (2015, 2016) and from the intestine of *P. abu* (reported as *L. abu*) by Al-Mahi (2014) and Al-Mahi and Al-Mayali (2015). The first report of this cestode (reported as *B. acheilognathi*) in Iraq was from the intestine of *C. carpio* from some fish ponds near Baghdad (Khalifa, 1982). According to Brabec *et al.* (2015), *B. acheilognathi* as well as two of its synonyms (*B. gowkongensis* and *B. opsariichthydis*) are considered as synonyms of *S. acheilognathi*. Twenty-one host species in Iraq are so far known for *S. acheilognathi* and three of its synonyms (*B. acheilognathi*, *B. gowkongensis* and *B. opsariichthydis*), in addition to the occurrence of some unidentified *Schyzocotyle* species (reported as *Bothriocephalus* sp.) from five fish host species in Iraq (Mhaisen, 2018).

Unidentified cestode larvae were found in body cavity of *C. idella* from fish markets (caught from Al-Shamiya River) by Abd and Abdul Wahab (2011). The provided photograph showed a similarity with plerocercoid of *L. intestinalis*.

Phylum Nematoda

The phylum Nematoda of fishes of Al-Diwaniyah province included one species each of the genera *Cucullanus*, *Kalmanmolnaria* and *Rhabdochona* in addition to some unspecified species of genera *Capillaria*, *Contracaecum* and *Rhabdochona* as in the following systematic scheme. GBIF (2018) was followed for arrangement of the higher taxonomic groups of these nematodes as in the following systematic scheme. WoRMS (2018) showed some alternative names for some ranks of some of these nematodes. Such alternatives are indicated in brackets in the following systematic scheme.

Phylum Nematoda
- Class Adenophorea (Enoplea)
  - Order Trichocephalida (Trichinellida)
    - Family Trichuridae (Capillariidae)
      - *Capillaria* sp.
- Class Secernentea (Chromadorea)
  - Order Ascaridida (Rhabditida)
    - Family Anisakidae
      - *Contracaecum* sp. larva
    - Family Cucullanidae
      - *Cucullanus cyprini* Yamaguti, 1941
  - Order Rhabditida
    - Family Skrjabillanidae
      - *Kalmanmolnaria intestinalis* (Dogiel and Bychowsky, 1934) Sokolov, 2006
    - Family Rhabdochonidae
      - *Rhabdochona* (*R.*) *hellichi* (Šrámek, 1901)
      - *Rhabdochona* sp.

Capillaria sp. was reported from intestine of *P. abu* (reported as *L. abu*) by Karawan *et al.* (2012). So far, ten fish host species are known to be infected with unidentified *Capillaria* species in Iraq (Mhaisen, 2018).

Contracaecum species larvae were detected from the intestine of *A. grypus* (reported as *B. grypus*) by Al-Mahi (2014) and Al-Mahi and Al-Mayali (2015), body cavity of *C. luteus* (reported as *B. luteus*) by Al-Jadoaa (2002) and the intestinal wall of the same fish by Al-Waaly (2005), different locations (unspecified) of *C. carpio* by Yassin (2010), intestine of both *L. vorax* (reported as *A. vorax*) and *L. xanthopterus* (reported as *B. xanthopterus*) by Al-Jadoaa (2002), liver, spleen and body cavity of *P. abu* (reported as *L. abu*) by Al-Jadoaa (2002), intestine of the same fish by Al-Jadoaa (2008), from unspecified locations of the same fish by Yassin (2010) and intestine of the same fish by Al-Mahi (2014) and Al-Mahi and Al-Mayali (2015, 2016). *Contracaecum* spp. larvae were recorded for the first time in Iraq from ten fish species from different inland waters of Iraq (Herzog, 1969). So far, a total of 40 fish host species are known for *Contracaecum* spp. larvae in Iraq (Mhaisen, 2018).

Cucullanus cyprini Yamaguti, 1941 was reported from the intestine of *C. luteus* (reported as *B. luteus*) by Al-Waaly (2005). This nematode was reported for the first time in Iraq from the intestine of both *Alburnus caeruleus* and *L. xanthopterus* (reported as *B. xanthopterus*) from

Al-Tharthar lake by Al-Saadi (1986). So far 15 fish host species are known for *C. cyprini* in Iraq (Mhaisen, 2018).

Kalmanmolnaria intestinalis (Dogiel and Bychowsky, 1934) was reported as *Philometra intestinalis* from the intestine of *C. luteus* (reported as *B. luteus*) by Al-Jadoaa (2002) and Al-Waaly (2005) as well as from intestine of both *C. carpio* and *P. abu* (reported as *L. abu*) by Yassin (2010). According to GBIF (2018), *P. intestinalis* is considered as a synonym of *Molnaria intestinalis*. Sokolov (2006) considered the genus *Molnaria* Moravec, 1968 as a homonym to fossile foraminiferan genus and therefore, he replaced the generic name from *Molnaria* Zalessky, 1926 to *Kalmanmolnaria* Sokolov, 2006. So far, a total of three fish host species are known for *K. intestinalis* and its synonym *P. intestinalis* in fishes of Iraq. In all such host species, this parasite was also reported as *P. intestinalis* (Mhaisen, 2018).

Rhabdochona (*R.*) *hellichi* (Šrámek, 1901) was reported from the intestine of *C. macrostomum* by Al-Jadoaa (2002) who misspelled the specific name as *bellichi* instead of *hellichi*. The first record of this nematode (also erroneously spelled as *R. belichii*) in Iraq was from the intestine and coelom of *L. xanthopterus* (reported as *B. xanthopterus*), *H. fossilis* and *M. pelusius* (reported as *M. halepensis*) from Tigris River at Baghdad by Ali *et al.* (1987c). Eight fish species are so far known for this parasite in Iraq (Mhaisen, 2018).

Rhabdochona sp. was reported from the intestine of *P. abu* (reported as *L. abu*) by Al-Jadoaa (2008). So far, unidentified *Rhabdochona* species were recorded from seven fish host species in Iraq in addition to eight identified species of this genus (two species within the subgenus *Globochona* and six species within the subgenus *Rhabdochona*) from fishes of Iraq (Mhaisen, 2018).

Phylum Acanthocephala

The phylum Acanthocephala of fishes of Al-Diwaniyah province included two species of *Neoechinorhynchus* in addition to one unspecified species of the genus *Paulisentis* as in the following systematic scheme according to GBIF (2018). Names and authorities of these acanthocephalans were checked in accordance with Amin (2013).

Phylum Acanthocephala
Class Eoacanthocephala
Order Neoechinocephalida
Family Neoechinocephalidae
Neoechinorhynchus (*N.*) *iraqensis* Amin, Al-Sady, Mhaisen and Bassat, 2001
Neoechinorhynchus (*N.*) *rutili* (Müller, 1780) Hamann, 1892
Paulisentis sp.

Neoechinorhynchus (*N.*) *iraqensis* Amin, Al-Sady, Mhaisen and Bassat, 2001 was reported from intestine of *A. grypus* (reported as *B. grypus*) by Al-Mahi (2014) and Al-Mahi and Al-Mayali (2016), intestine of *C. luteus* (reported as *B. luteus*) by Al-Jadoaa (2002) and Al-Waaly (2005), intestine of *C. macrostomum* by Al-Jadoaa (2002) and intestine of *P. abu* (reported as *L. abu*) by Al-Jadoaa (2002), Karawan *et al.* (2012), Al-Mahi (2014) and Al-Mahi and Al-Mayali (2016). It is appropriate to mention here that Al-Jadoaa (2008) reported *N. agilis* from the intestine of *P. abu* (reported as *L. abu*), but as demonstrated by Mhaisen (2002), *N. agilis* was erroneously identified so and in fact it represented *N. iraqensis*. So far, 24 fish host species are known for this acanthocephalan in Iraq. So, this acanthocephalan is the commonest acanthocephalan in fishes of Iraq (Mhaisen, 2018).

Neoechinorhynchus (*N.*) *rutili* (Müller, 1780) Hamann, 1892 was reported from the intestine of *C. luteus* (reported as *B. luteus*) by Al-Jadoaa (2002), *C. carpio* by Al-Jadoaa (2002) and Yassin (2010), *L. xanthopterus* (reported as *B. xanthopterus*) by Al-Jadoaa (2002) and *P. abu* (reported as *L. abu*) by Al-Jadoaa (2002) and Yassin (2010). The first record of this acanthocephalan from Iraq was from the intestine of *P. abu* (reported as *Mugil abu*) from Citscher oasis in Fallujah (Herzog, 1969). *N. rutili* has so far 16 fish host species in Iraq (Mhaisen, 2018).

Paulisentis sp. was reported from the intestine of *A. grypus* (reported as *B. grypus*) by Al-Mahi (2014) and Al-Mahi and Al-Mayali (2016), in both references, the generic name was misspelled as *Paulisentus* instead of *Paulisentis*. The first identified *Paulisentis* in Iraq (*P. fractus*) was reported by Al-Jawda *et al.* (2000). No more records are so far known on unidentified *Paulisentis* species in Iraq (Mhaisen, 2018).

Phylum Arthropoda- subphylum Crustacea

The subphylum Crustacea of the phylum Arthropoda is represented in fishes of Al-Diwaniyah province with one species each of the genera *Argulus* and *Lernaea*, two species of the genus *Ergasilus* as well as one unidentified species of *Argulus* and *Ergasilus*. GBIF (2018) was followed to arrange the concerned taxonomic groups of the subphylum Crustacea of this phylum down to the scientific names as in the following systematic scheme.

Phylum Arthropoda
Subphylum Crustacea
Class Maxillopoda
Order Arguloida
Family Argulidae
Argulus foliaceus (Linnaeus, 1758) Jurine, 1806
Argulus sp.
Class Hexanauplia
Order Cyclopoida
Family Ergasilidae
Ergasilus mosulensis Rahemo, 1982
Ergasilus sieboldi von Nordmann, 1832
Ergasilus sp.
Family Lernaeidae
Lernaea cyprinacea Linnaeus, 1758

Argulus foliaceus (Linnaeus, 1758) Jurine, 1806 was reported from gills of *C. luteus* (reported as *B. luteus*) by Al-Waaly (2005). This crustacean was reported for the first time in Iraq from the skin of both *C. luteus* (reported as *B. luteus*) and *C. carpio* from Al-Habbaniyah lake by Herzog (1969). *A. foliaceus* is a common fish louse in some farm fishes as well as in some inland waters in Iraq, and it has so far 16 fish host species (Mhaisen, 2018). According to WoRMS (2018), this species belongs to the class Ichthyostraca as well as the same above-named order and family.

Argulus sp. was reported from both *C. carpio* and *H. molitrix* by Abd and Abdul Wahab (2011). So far, unidentified *Argulus* species were recorded from three fish host species in Iraq in addition to three identified species of this genus (Mhaisen, 2018).

Ergasilus mosulensis Rahemo, 1982 was reported from gills of *C. luteus* (reported as *B. luteus*) by Al-Waaly (2005). This crustacean was described as a new species from *P. abu*

(reported as *L. abu*) from Tigris River at Mosul city (Fattohy, 1975) and published later on by Rahemo (1982). *E. mosulensis* has so far 24 fish host species in Iraq (Mhaisen, 2018).

Ergasilus sieboldi von Nordmann, 1832 was reported from gills of *C. carpio*, *G. rufa* and *M. pelusius* by Al-Jadoaa (2002) as well as from gills of *P. abu* (reported as *L. abu*) by Al-Jadoaa (2002, 2008). This crustacean was recorded for the first time in Iraq from gills of *L. vorax* (reported as *A. vorax*) from Al-Habbaniyah lake by Herzog (1969); *E. sieboldi* has so far 25 fish host species in Iraq (Mhaisen, 2018).

Ergasilus sp. was reported from gills of *C. macrostomum* by Al-Jadoaa (2002). So far, unidentified *Ergasilus* species were recorded from 13 fish host species in Iraq in addition to 11 identified species of this genus from fishes of Iraq (Mhaisen, 2018).

Lernaea cyprinacea Linnaeus, 1758 was reported from skin of *C. luteus* (reported as *B. luteus*) by Al-Jadoaa (2002) as well as from skin and gills of the same fish by Al-Waaly (2005), skin of each of *C. idella* by Abd and Abdul Wahab (2011), *C. carpio* by Al-Jadoaa (2002), Yassin (2010) and Abd and Abdul Wahab (2011), *H. molitrix* by Abd and Abdul Wahab (2011), *L. vorax* (reported as *A. vorax*) by Al-Jadoaa (2002), *L. xanthopterus* (reported as *B. xanthopterus*), *M. sharpeyi* (reported as *B. sharpeyi*) and *M. pelusius* by Al-Jadoaa (2002) as well as *P. abu* (reported as *L. abu*) by Yassin (2010). This crustacean was reported for the first time in Iraq from seven fish species from Al-Zaafaraniya fish culture station, Baghdad by Al-Hamed and Hermiz (1973). It is the commonest crustacean parasite among fishes of Iraq as it has so far 31 fish host species in different fish farms and hatcheries as well as in various inland waters (Mhaisen, 2018).

Table (2): List of parasite species from fishes of Al-Diwaniyah province, Iraq.

Parasite major groups	Fish host species
Phylum Euglenozoa	
Trypanosoma sp.	*Carasobarbus luteus*.
Phylum Myzozoa	
Cryptosporidium sp.	*Coptodon zillii*, *Planiliza abu*.
Eimeria sp.	*Coptodon zillii*, *Planiliza abu*.
Phylum Ciliophora	
Apiosoma piscicola	*Carasobarbus luteus*.
Chilodonella cyprini	*Cyprinion macrostomum*, *Cyprinus carpio*.
Ichthyophthirius multifiliis	*Carasobarbus luteus*, *Garra rufa*, *Leuciscus vorax*, *Mesopotamichthys sharpeyi*, *Planiliza abu*.
Trichodina borealis	*Coptodon zillii*, *Planiliza abu*.
Trichodina domerguei	*Carasobarbus luteus*, *Coptodon zillii*, *Cyprinion macrostomum*, *Cyprinus carpio*, *Garra rufa*, *Leuciscus vorax*, *Mesopotamichthys sharpeyi*, *Mystus pelusius*, *Planiliza abu*
Trichodina nigra	*Cyprinus carpio*, *Mystus pelusius*, *Planiliza abu*.
Phylum Myxozoa	
Myxidium sp.	*Cyprinion macrostomum*.

Myxobolus ellipsoides	*Cyprinion macrostomum*.
Myxobolus pfeifferi	*Carasobarbus luteus*, *Luciobarbus xanthopterus*, *Mesopotamichthys sharpeyi*, *Planiliza abu*.
Phylum Platyhelminthes- class Trematoda	
Clinostomum complanatum[*]	*Cyprinus carpio*.
Diplostomum spathaceum[*]	*Cyprinus carpio*.
Diplostomum sp.[*]	*Ctenopharyngodon idella*, *Cyprinus carpio*, *Hypophthalmichthys molitrix*.
Phylum Platyhelminthes- class Monogenea	
Dactylogyrus achmerowi	*Carasobarbus luteus*, *Cyprinus carpio*.
Dactylogyrus extensus	*Carasobarbus luteus*, *Cyprinus carpio*, *Garra rufa*, *Leuciscus vorax*, *Luciobarbus xanthopterus*, *Mesopotamichthys sharpeyi*, *Mystus pelusius*, *Planiliza abu*.
Dactylogyrus gobii	*Cyprinus carpio*.
Dactylogyrus minutus	*Cyprinus carpio*.
Dactylogyrus vastator	*Carasobarbus luteus*, *Cyprinion macrostomum*, *Mesopotamichthys sharpeyi*.
Dactylogyrus sp.	*Mesopotamichthys sharpeyi*.
Dipolzoon sp.[*]	*Carasobarbus luteus*.
Gyrodactylus elegans	*Carasobarbus luteus*, *Cyprinion macrostomum*, *Luciobarbus xanthopterus*, *Mesopotamichthys sharpeyi*.
Paradiplozoon kasimii[**]	*Carasobarbus luteus*.
Phylum Platyhelminthes- class Cestoda	
Eubothrium salvelini	*Carasobarbus luteus*.
Ligula intestinalis[*]	*Mesopotamichthys sharpeyi*.
Schyzocotyle acheilognathi	*Arabibarbus grypus*, *Planiliza abu*.
Unidentified cestode[*]	*Ctenopharyngodon idella*.
Phylum Nematoda	
Capillaria sp.	*Planiliza abu*.
Contracaecum sp.[*]	*Arabibarbus grypus*, *Carasobarbus luteus*, *Cyprinus carpio*, *Leuciscus vorax*, *Luciobarbus xanthopterus*, *Planiliza abu*.
Cucullanus cyprini	*Carasobarbus luteus*.
Kalmanmolnaria intestinalis	*Carasobarbus luteus*, *Cyprinus carpio*, *Planiliza abu*.
Rhabdochona (*R.*) *hellichi*	*Cyprinion macrostomum*.
Rhabdochona sp.	*Planiliza abu*.
Phylum Acanthocephala	
Neoechinorhynchus (*N.*) *iraqensis*	*Arabibarbus grypus*, *Carasobarbus luteus*, *Cyprinion macrostomum*, *Planiliza abu*.
Neoechinorhynchus (*N.*) *rutili*	*Carasobarbus luteus*, *Cyprinus carpio*, *Luciobarbus xanthopterus*, *Planiliza abu*.
Paulisentis sp.	*Arabibarbus grypus*.

Phylum Arthropoda- subphylum Crustacea

Argulus foliaceus	*Carasobarbus luteus*.
Argulus sp.	*Cyprinus carpio, Hypophthalmichthys molitrix*.
Ergasilus mosulensis	*Carasobarbus luteus*.
Ergasilus sieboldi	*Cyprinus carpio, Garra rufa, Mystus pelusius, Planiliza abu*.
Ergasilus sp.	*Cyprinion macrostomum*.
Lernaea cyprinacea	*Carasobarbus luteus, Ctenopharyngodon idella, Cyprinus carpio, Hypophthalmichthys molitrix, Leuciscus vorax, Luciobarbus xanthopterus, Mesopotamichthys sharpeyi, Mystus pelusius, Planiliza abu*.

* Larva, ** Species inquirenda.

Host-Parasite List

Names of all fish host species infected with parasites in Al-Diwaniyah province (13 valid fish names and six synonyms) are alphabetically arranged in the following list. For each valid host species, parasite species are alphabetically arranged according to the sequence of their major groups which were demonstrated above. For fishes, the scientific names were reported as they appeared in their original references but they were then checked with an account on freshwater fishes of Iraq (Coad, 2010). As indicated earlier in the section of Sources and Methods, authorities of fish valid scientific names were checked according to Eschmeyer (2018) and Froese and Pauly (2018).

***Arabibarbus grypus* (also reported as *Barbus grypus*)**
Cestoda: *Schyzocotyle acheilognathi* (reported as *Bothriocephalus acheilognathi*).
Nematoda: *Contracaecum* sp.
Acanthocephala: *Neoechinorhynchus* (*N.*) *iraqensis*, *Paulisentis* sp.
Aspius vorax*: See *Leuciscus vorax
Barbus grypus*: See *Arabibarbus grypus
Barbus luteus*: See *Carasobarbus luteus
Barbus sharpeyi*: See *Mesopotamichthys sharpeyi
Barbus xanthopterus*: See *Luciobarbus xanthopterus
***Carasobarbus luteus* (reported as *Barbus luteus*)**
Euglenozoa: *Trypanosoma* sp.
Ciliophora: *Apiosoma piscicola*, *Ichthyophthirius multifiliis*, *Trichodina domerguei*.
Myxozoa: *Myxobolus pfeifferi*.
Monogenea: *Dactylogyrus achmerowi*, *D. extensus*, *D. vastator*, *Diplozoon* sp., *Gyrodactylus elegans*, *Paradiplozoon kasimii* (reported as *Diplozoon kasimii*).
Cestoda: *Eubothrium salvelini*.
Nematoda: *Contracaecum* sp., *Cucullanus cyprini*, *Kalmanmolnaria intestinalis* (reported as *Philometra intestinalis*).
Acanthocephala: *Neoechinorhynchus* (*N.*) *iraqensis*, *Neoechinorhynchus* (*N.*) *rutili*.
Crustacea: *Argulus foliaceus*, *Ergasilus mosulensis*, *Lernaea cyprinacea*.
Coptodon zillii
Myzozoa: *Cryptosporidium* sp., *Eimeria* sp.
Ciliophora: *Trichodina borealis*, *T. domerguei*.
Ctenopharyngodon idella
Trematoda: *Diplostomum* sp.

Cestoda: Cestode larva.
Crustacea: *Lernaea cyprinacea*.

Cyprinion macrostomum
Ciliophora: *Chilodonella cyprini*, *Trichodina domerguei*.
Myxozoa: *Myxidium* sp., *Myxobolus ellipsoides*.
Monogenea: *Dactylogyrus vastator*, *Gyrodactylus elegans*.
Nematoda: *Rhabdochona* (*R.*) *hellichi*.
Acanthocephala: *Neoechinorhynchus* (*N.*) *iraqensis*.
Crustacea: *Ergasilus* sp.

Cyprinus carpio
Ciliophora: *Chilodonella cyprini*, *Trichodina domerguei*, *T. nigra*.
Trematoda: *Clinostomum complanatum*, *Diplostomum spathaceum*, *Diplostomum* sp.
Monogenea: *Dactylogyrus achmerowi*, *D. extensus*, *D. gobii*, *D. minutus*.
Nematoda: *Contracaecum* sp., *Kalmanmolnaria intestinalis* (reported as *Philometra intestinalis*).
Acanthocephala: *Neoechinorhynchus* (*N.*) *rutili*.
Crustacea: *Argulus* sp., *Ergasilus sieboldi*, *Lernaea cyprinacea*.

Garra rufa
Ciliophora: *Ichthyophthirius multifiliis*, *Trichodina domerguei*.
Monogenea: *Dactylogyrus extensus*.
Crustacea: *Ergasilus sieboldi*.

Hypophthalmichthys molitrix
Trematoda: *Diplostomum* sp.
Crustacea: *Argulus* sp., *Lernaea cyprinacea*.

***Leuciscus vorax* (reported as *Aspius vorax*)**
Ciliophora: *Ichthyophthirius multifiliis*, *Trichodina domerguei*.
Monogenea: *Dactylogyrus extensus*.
Nematoda: *Contracaecum* sp.
Crustacea: *Lernaea cyprinacea*.

Liza abu*: See *Planiliza abu

***Luciobarbus xanthopterus* (reported as *Barbus xanthopterus*)**
Myxozoa: *Myxobolus pfeifferi*.
Monogenea: *Dactylogyrus extensus*, *Gyrodactylus elegans*.
Nematoda: *Contracaecum* sp.
Acanthocephala: *Neoechinorhynchus* (*N.*) *rutili*.
Crustacea: *Lernaea cyprinacea*.

***Mesopotamichthys sharpeyi* (reported as *Barbus sharpeyi*)**
Ciliophora: *Ichthyophthirius multifiliis*, *Trichodina domerguei*.
Myxozoa: *Myxobolus pfeifferi*.
Monogenea: *Dactylogyrus extensus*, *D. vastator*, *Dactylogyrus* sp., *Gyrodactylus elegans*.
Cestoda: *Ligula intestinalis*.
Crustacea: *Lernaea cyprinacea*.

Mystus pelusius
Ciliophora: *Trichodina domerguei*, *T. nigra*.
Monogenea: *Dactylogyrus extensus*.
Crustacea: *Ergasilus sieboldi*, *Lernaea cyprinacea*.

***Planiliza abu* (also reported as *Liza abu*)**
Myzozoa: *Cryptosporidium* sp., *Eimeria* sp.
Ciliophora: *Ichthyophthirius multifiliis*, *Trichodina borealis*, *T. domerguei*, *T. nigra*.
Myxozoa: *Myxobolus pfeifferi*.
Monogenea: *Dactylogyrus extensus*.

Cestoda: *Schyzocotyle acheilognathi* (reported as *Bothriocephalus acheilognathi*).
Nematoda: *Capillaria* sp., *Contracaecum* sp., *Kalmanmolnaria intestinalis* (reported as *Philometra intestinalis*), *Rhabdochona* sp.
Acanthocephala: *Neoechinorhynchus* (*N.*) *iraqensis*, *Neoechinorhynchus* (*N.*) *rutili*.
Crustacea: *Ergasilus sieboldi*, *Lernaea cyprinacea*.

Finally, by comparing number of parasitic species so far recorded from fishes of Al-Diwaniyah province, in the present article, with the parasitic fauna of fishes of two neighboring provinces; Al-Najaf Al-Ashraf (Mhaisen and Al-Rubaie, 2016a) and Babylon province, exclusive of fish farms (Mhaisen and Al-Rubaie, 2018), it is clear that the parasitic fauna of Al-Diwaniyah province (43 parasite species from 13 fish species) is much less than that of Babylon province (104 parasite species from 26 fish species), but higher than that of Al-Najaf Al-Ashraf province (20 parasite species from 14 fish species). However, the low number of studied fish host species in Al-Diwaniyah province for parasitic infections in comparison with that of Babylon province (13 versus 26) is low and indicates that much more fish species are needed to be investigated. Also, it seems from the present article that only one investigation (Abd and Abdul-Wahab, 2011) included few notes on four parasite species of three carp species from local fish markets and fish farms in Al-Shamiyah city in spite of the presence of 10 earthen fish farms and 25 farms for floating cages in Al-Diwaniyah province according to Ministry of Agriculture (2018). So far, four parasite species are known from farm fishes of Al-Diwaniyah province in comparison with 92 parasite species from farm fishes of Babylon province (Mhaisen and Al-Rubaie, 2016b). Hence, more parasite species are expected to be detected both from farm fishes and fishes in natural water bodies when more efforts will be paid. This is the task for future studies on the parasitic fauna of fishes of Al-Diwaniyah province.

ACKNOWLEDGEMENTS

Sincere thanks are due to Dr. Atheer H. Ali of the University of Basrah, Iraq and Dr. František Moravec of the Institute of Parasitology, Biology Centre of the Academy of Sciences of the Czech Republic for their comments on the nematode *Kalmanmolnaria intestinalis*. Thanks are also due to Dr. Mahdi T. Al-Qaisy, the Technical Deputy Minister, Ministry of Agriculture, Baghdad for providing us with recent information on fish culture in Iraq.

LITERATURE CITED

Abd, A. A.-A. and Abdul Wahab, H. M. 2011. Investigation of some diseases of carp at Al-Shamiya city/Iraq. *Kufa Journal of Veterinary Medical Sciences*, 2(2): 51-59.

Abdullah, S. M. A. 1990. Survey of the parasites of fishes of Dokan lake. M. Sc. Thesis, College of Science, University of Salahaddin, 115 pp. (In Arabic).

Al-Hamed, M. I. and Hermiz, L. 1973. Experiments on the control of anchor worm (*Lernaea cyprinacea*). *Aquaculture*, 2: 45-51.

Al-Hasani, Z. I. 1985. Occurrence of two known helminthic parasites in two vertebrate hosts collected from Basrah, Iraq. *Dirasat*, 12(7): 25.

Ali, M. D. and Shaaban, F. 1984. Some species of parasites of freshwater fish raised in ponds and in Tigris- Al-Tharthar canal region. Seventh Scientific Conference Iraqi Veterinary Medicine Association, Mosul: 23-25 Oct. 1984: 44-46. (Abstract).

Ali, N. M., Salih, N. E. and Abdul-Ameer, K. N. 1987a. Parasitic fauna of some freshwater fishes from Tigris River, Baghdad, Iraq. I: Protozoa. *Journal of Biological Science Research*, 18(2): 11-17.

Ali, N. M., Salih, N. E. and Abdul-Ameer, K. N. 1987b. Parasitic fauna of some freshwater fishes from Tigris River, Baghdad, Iraq. II: Trematoda. *Journal of Biological Science Research*, 18(2): 19-27.

Ali, N. M., Salih, N. E. and Abdul-Ameer, K. N. 1987c. Parasitic fauna of some freshwater fishes from Tigris River, Baghdad, Iraq. IV: Nematoda. *Journal of Biological Science Research*, 18(3): 35-45.

Ali, N. M., Salih, N. E. and Abdul-Ameer, K. N. 1988. Protozoa and Crustacea infesting three species of carp raised in ponds in Iraq. *Journal of Biological Science Research*, 19(2): 387-394.

Al-Jadoaa, N. A. A. 2002. The parasitic infections and pathological changes of some local and cultured fishes from Al-Qadisiya and Babylon provinces. Ph. D. Thesis, College of Education, Al-Qadisiya University, 158 pp. (In Arabic).

Al-Jadoaa, N. A. 2008. Study of the parasitic infection of *Liza abu* fish in drainage water at Al-Diwaniya province. *Journal of University of Babylon*, 15(1): 256-263. (In Arabic).

Al-Jadoa, N. A. and Al-Wualy, A. B. M. 2007. A comparative study of monogenetic parasites of *Barbus luteus* in Al-Daghara River and drainage water and new record in Iraq of cestodes worm *Eubothrium salvelini*. *Al-Qadisiyah Journal of Veterinary Medicine Sciences*, 6(1): 72-78. (In Arabic).

Al-Jawda, J. M., Balasem, A. N., Mhaisen, F. T. and Al-Khateeb, G. H. 2000. Parasitic fauna of fishes from Tigris River at Salah Al-Deen province, Iraq. *Iraqi Journal of Biological Science*, 19 and 20: 16-24.

Al-Mahi, A. M. Y. 2014. The usage of bio-accumulation of heavy metals in tissues of parasitic helminthes of two types of fresh waters fishes in Al-Qadisiya governorate. Ph. D. Thesis, College of Education, Al-Qadisiya University, 132 pp. (In Arabic).

Al-Mahi, A. M. Y. and Al-Mayali, H. M. 2015. Measurements of some heavy metals in intestinal helminthes of two kinds of fishes in Al-Diwaniya province. *Al-Qadisiyah Journal of Veterinary Medicine Sciences*, 14(1): 7-13. (In Arabic).

Al-Mahi, A. M. Y. and Al-Mayali, H. M. 2016. Identification of some intestinal helminthes in *Barbus grypus*, *Liza abu* and study of histopathological changes result from infection. *Journal of Al-Qadisiyah for Pure Science*, 21(1): 96-115. (In Arabic).

Al-Rubaie, A. L., Hussain, H. T. and Abdul-Ameer, K. N. 2007. The external parasites of the common carp (*Cyprinus carpio*) in Technical Institute of Al-Mussayab fish farm. *Journal of University of Babylon, Science*, 14(3): 46-50.

Al-Saadi, A. A. J. J. 1986. A survey of alimentary canal helminths of some species of fishes from Tharthar lake. M. Sc. Thesis, College of Science, University of Baghdad, 94 pp. (In Arabic).

Al-Waaly, A. B. M. 2005. A comparative study for parasites of *Barbus luteus* fishes in Al-Daghara River and drainage water. M. Sc. Thesis, College of Education, University of Al-Qadisyia, 101 pp. (In Arabic).

Al-Zubaidy, A. B. 1998. Studies on the parasitic fauna of carps in Al-Furat fish farm, Babylon province, Iraq. Ph. D. Thesis, College of Science, University of Babylon, 141 pp. (In Arabic).

Amin, O. M. 2013. Classification of the Acanthocephala. *Folia Parasitologica*, 60(4): 273-305.

Brabec, J., Waeschenbach, A., Scholz, T., Littlewood, D. T. J. and Kuchta, R. 2015. Molecular phylogeny of the Bothriocephalidea (Cestoda): Molecular data challenge morphological classification. *International Journal of Parasitology*, 45: 761-771.

Coad, B. W. 2010. Freshwater fishes of Iraq. Pensoft Publ., Sofia, 274 pp. + 16 pls. www.briancoad.com.

Enad, R. W. 2009. Study infection of the common carp fishes with Monogenea in Diwaniyah shore. Higher Diploma Research Project, Al-Musayab Technical College, Foundation of Technical Education, 63 pp. (In Arabic).

EOL. 2018. Encyclopedia of Life on-line database, http//www.eol.org. (Accessed 30 Dec. 2018).

Eschmeyer, W. N. (ed.). 2018. Species by family/ subfamily in the Catalog of Fishes. http:// research.calacademy.org/research/ichthy-ology/Catalog/SpeciesByFamily.asp. (Updated 3 Dec. 2018).

Fattohy, Z. I. 1975. Studies on the parasites of certain teleostean fishes from the river Tigris, Mosul, Iraq. M. Sc. Thesis, College of Science, University of Mosul, 136 pp.

Froese, R. and Pauly, D. (eds.). 2018. FishBase. World Wide Web electronic publication. www.fishbase.org. (Version 10/ 2018).

GBIF. 2018. Global Biodiversity Information Facility, on-line database, http://www.gbif.org. (Accessed 30 Dec. 2018).

Gibson, D. I., Timofeeva, T. A. and Gerasev, P. I. 1996. A catalogue of the nominal species of the monogenean genus *Dactylogyrus* Diesing, 1850 and their host genera. *Systematic Parasitology*, 35: 3-48.

Global Cestode Database. 2018. A survey of the tapeworms (Cestoda: Platyhelminthes) from vertebrate bowels of the earth. http://tapewormdb.uconn.edu (Accessed 30 Dec.2018).

Herzog, P. H. 1969. Untersuchungen über die parasiten der süßwasserfische des Irak. *Archiv für Fischereiwissenschaft*, 20(2/3): 132-147.

Hussain, H. T. 2005. Ectoparasitic infection of the common carp and silver carp fingerlings stocked under winter in Al-Shark Al-Awsat fish farm, Babylon province. M. Tech.

Thesis, Al-Musayab Technical College, Foundation of Technical Education, 106 pp. (In Arabic).

Hussain, H. T. 2008. Study on the external ectoparasites of mosquito fish (*Gambusia affinis*) in Al-Hilla River, Babylon province. *Journal of University of Babylon, Pure and Applied Science*, 15(1): 245-248.

ITIS. 2018. Integrated Taxonomic Information System on-line database, http://www.itis.gov. (Accessed 30 Dec. 2018).

Karawan, A. Ch., Abed, A. A. and Ali, M. J. 2012. Study of some internal parasites isolated from some pure water fishes *Liza abu* in Al-Dewania city. *Al-Anbar Journal of Veterinary Science*, 5(2): 142-147. (In Arabic).

Khalifa, K. A. 1982. Occurrence of parasitic infections in Iraqian fish ponds. *In*: Proceedings of the Abstracts of 2nd Scientific Conference, Arab Biological Union, Fés, Morocco, March: 333. (Abstract).

Khamees, N. R. 1983. A study of the parasites of *Carasobarbus luteus* (Heckel), *Liza abu* (Heckel) and *Aspius vorax* Heckel from Mehaijeran canal, south of Basrah. M. Sc. Thesis, College of Agriculture, University of Basrah, 148 pp. (In Arabic).

Khotenovsky, I. A. 1985. Suborder Octomacrinea Khotenovsky (Fauna of the USSR, Monogenea, New Series No. 132). Nauka Publ. House, Petersburg, 262 pp. (In Russian).

Kirjušina, M. and Vismanis, K. 2007. Checklist of the parasites of fishes of Latvia. FAO Fish. Tech. Pap. No. 369/3. FAO, Rome, 106 pp.

Lim, S., Timofeeva, T. A. and Gibson, D. I. 2001. Dactylogyridean monogeneans of the siluriform fishes of the Old World. *Systematic Parasitology*, 50: 159-197.

Mhaisen, F. T. 2002. Literature review and check lists of acanthocephalans of fishes of Iraq. *Al-Mustansiriya Journal of Science*, 13(1): 13-25.

Mhaisen, F. T. 2004. Worm cataract in freshwater fishes of Iraq. *Ibn Al-Haitham Journal for Pure and Applied Science*, 17(3): 25-33.

Mhaisen, F. T. 2018. Index-catalogue of parasites and disease agents of fishes of Iraq. (mhaisenft@yahoo.co.uk).

Mhaisen, F. T. and Abdullah, S. M. A. 2016. Checklists of parasites of farm fishes of Kurdistan region, Iraq. *Iraqi Journal of Agriculture Research*, 21(2): 204-216.

Mhaisen, F. T. and Abdullah, S. M. A. 2017. Parasites of fishes of Kurdistan region, Iraq: Checklists. *Biological and Applied Environmental Research*, 1(2): 131-218.

Mhaisen, F. T. and Abul-Eis, E. S. 1991. Parasites of the common carp *Cyprinus carpio* in the Babylon fish farm, Hilla, Iraq. *Thalassographica*, 14: 27-33.

Mhaisen, F. T. and Al-Rubaie, A. L. 2016a. Checklists of fish parasites of Al-Najaf Al-Ashraf province, Iraq. *Al-Kufa University of Journal of Biology*, Special second international

scientific conference for the life sciences, Faculty of Education for Women\ University of Kufa: 86-95.

Mhaisen, F. T. and Al-Rubaie, A. L. 2016b. Checklists of parasites of farm fishes of Babylon province, Iraq. *Journal of Parasitology Research*, vol. 2016, Article ID 7170534, 15 pages. doi: 10.1155/2016/7170534.

Mhaisen, F. T. and Al-Rubaie, A. L. 2018. Checklists of fish parasites of Babylon province of Iraq, exclusive of farm fishes. *Biological and Applied Environmental Research*, 2(1): 57-110.

Mhaisen, F. T. Abdul-Ameer, K. N. and Hamdan, Z. K. 2018a. Checklists of parasites of fishes of Salah Al-Din province, Iraq. *Biological and Applied Environmental Research*, 2(2): 180-218.

Mhaisen, F. T., Ali, A. H. and Khamees, N. R. 2017a. Checklists of fish parasites of Basrah marshlands, Iraq. *Biological and Applied Environmental Research*, 1(2): 237-278.

Mhaisen, F. T., Ali, A. H. and Khamees, N. R. 2018b. Marine fish parasitology of Iraq: A review and checklists. *Biological and Applied Environmental Research*, 2(2): 231-297.

Mhaisen, F. T., Ali, N. M., Abul-Eis, E. S. and Kadim, L. S. 1988. First record of *Dactylogyrus achmerowi* Gussev, 1955 with an identification key for the dactylogyrids of fishes of Iraq. *Journal of Biological Science Research*, 19(Suppl.): 887-900.

Mhaisen, F. T., Al-Jawda, J. M., Asmar, K. M. and Ali, M. H. 2017b. Checklists of fish parasites of Al-Anbar province, Iraq. *Biological and Applied Environmental Research*, 1(1): 17-56.

Mhaisen, F. T., Balasem, A. N., Al-Khateeb, G. H. and Asmar, K. R. 1997. Recording of five monogenetic trematodes for the first time from fishes of Iraq. *In*: Proceedings of the Abstracts of the 14th Scientific Conference of the Iraqi Biological Society, Najaf, Iraq, March 1997.

Mhaisen, F. T., Balasem, A. N., Al-Khateeb, G. H. and Asmar, K. R. 2003. Recording of five monogenetic trematodes for the first time from fishes of Iraq. *Bulletin of the Iraq Natural History Museum*, 10(1): 31-38.

Ministry of Agriculture. 2018. Statistical data on fish farms in different provinces of Iraq up to 31 December 2018. Ministry of Agriculture, Baghdad, Iraq.

Mohammad, M. K. 2016. The parasitic fauna of the exotic fish *Tilapia zillii* in the Middle and South of Iraq. *International Journal of Current Microbiology and Applied Science*, 5(3): 93-96.

Rahemo, Z. I. F. 1980. *Diplozoon kasimii* new species from a freshwater teleost fish, *Cyprinion macrostomum* Heckel. *Bulletin of the Biological Research Center*, 12(1): 109-114.

Rahemo, Z. I. F. 1982. Two new species of *Ergasilus* (Copepoda: Cyclopoida) from the gills of two Iraqi freshwater fishes. *Bulletin of Basrah Natural History Museum*, 5: 39-59.

Salih, N. E., Ali, N. M. and Abdul-Ameer, K. N. 1988. Helminthic fauna of three species of carp raised in ponds in Iraq. *Journal of Biological Science Research*, 19(2): 369-386.

Shakir, A. M. 2018. Study of age, growth and parasites for two fish species in Euphrates River passing through Al-Qadisiyah and Al-Muthanna provinces. M. Sc. Thesis, College of Agriculture, University of Al-Muthanna, 109 pp. (In Arabic).

Shakir, A. M. and Al-Asadiy, Y. D. K. 2018. Detection of parasites infecting *Coptodon zillii* and *Planiliza abu* caught from Euphrates River and their records as new hosts for three identified parasite species. *Al-Muthanna Journal for Agricultural Sciences*, 6(4): 76-83. (In Arabic).

Shamsuddin, M., Nader, I. A. and Al-Azzawi, M. J. 1971. Parasites of common fishes from Iraq with special reference to larval form of *Contracaecum* (Nematoda: Heterocheilidae). *Bulletin of the Biological Research Center*, 5: 66-78.

Sokolov, S. G. 2006. Dracunculoid nematodes (Spirurida: Dracunculoidea) of fishes from the Volga River delta. *Parazitologiya*, 40(4): 355-362. (In Russian).

Solon, J. (Ed.) 2018. Iraq Provincial Reconstruction Team: Observations, insights, and lessions. Center for Army Lessons Learned (CALL), Leavenworth, Kansas, Handbook No. 11-03: 155pp. www.leavenworth.army.mil.

WoRMS 2018. World Register of Marine Species at http://www. marinespecies.org. (Accessed 30 Dec. 2018).

Yassin, A. M. 2010. Isolation and identification of the parasites of *Liza abu* and *Cyprinus carpio* in Al-Shenafya River. *Journal of Wassit University for Science and Medicine*, 3(1): 34-43. (In Arabic).

Bull. Iraq nat. Hist. Mus.
June, (2019) 15 (3): 293-318

قوائم مرجعية لطفيليات الأسماك في محافظة الديوانية، العراق

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تأريخ الاستلام: ٣٠/ ١٢/ ٢٠١٨ ، تأريخ القبول: ٢٤/ ٢/ ٢٠١٩ ، تأريخ النشر: ٢٧/ ٦/ ٢٠١٩

الخلاصة

أظهر إستعراض المراجع المعنية بالمجموعة الحيوانية المتطفلة على أسماك محافظة الديوانية، العراق حتى نهاية العام ٢٠١٨ وجود ٤٣ نوعا طفيليا لحد الآن مسجلة في ١٣ نوعا شرعيا من الأسماك التي تم فحصها بحثا عن الإصابات الطفيلية. إشتملت المجموعة المتطفلة على نوع واحد من اليوغلينيات الحيوانية، نوعين من المايزوزوا، ستة أنواع من حاملات الأهداب، ثلاثة أنواع من البوغيات المخاطية، ثلاثة أنواع من المخرّمات، تسعة أنواع من أحادية المنشأ، أربعة أنواع من الديدان الشريطية، ستة أنواع من الديدان الخيطية، ثلاثة أنواع من الديدان شوكية الرأس وستة أنواع من القشريات. كانت الإصابة بالمخرّمات ونوعين من الديدان الشريطية ونوع واحد من الديدان الخيطية قد حصلت بالأطوار اليرقية، بينما كانت بقية الإصابات إما بالطور الخضري أو بالطفيلي البالغ. من بين الأسماك المفحوصة، كانت سمكة الحمري مصابة بأكبر عدد من الأنواع الطفيلية (٢٠ نوعا طفيليا)، تلتها سمكة الخشني (١٧ نوعا) وسمكة الكارب الإعتيادي (١٦ نوعا)، بينما كان نوعان (الكارب العشبي والكارب الفضي) مصابين بأقل عدد من الأنواع الطفيلية (ثلاثة أنواع لكل منهما). كان حامل الأهداب *Trichodina domerguei* والقشري *Lernaea cyprinacea* أكثر الأنواع الطفيلية شيوعا لكون كل منهما قد ورد تسجيله من تسعة أنواع من الأسماك وتبعهما أحادي المنشأ *Dactylogyrus extensus* والدودة الخيطية *Contracaecum* sp. حيث تم ورودهما من ثمانية، وستة أنواع من المضيّفات، على التوالي، في حين سجل أقل عدد من الأنواع المضيّفة (نوع واحد من المضيّفات) في حالة الإصابة بـ ٢٢ نوعا من الطفيليات.