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Checklists of Parasites of Fishes of Salah Al-Din Province, Iraq

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Abstract: Literature reviews of reports concerning the parasitic fauna of fishes of Salah Al-Din province, Iraq till the end of 2017 showed that a total of 115 parasite species are so far known from 25 valid fish species investigated for parasitic infections. The parasitic fauna included two myzozoans, one choanozoan, seven ciliophorans, 24 myxozoans, eight trematodes, 34 monogeneans, 12 cestodes, 11 nematodes, five acanthocephalans, two annelids and nine crustaceans. The infection with some trematodes and nematodes occurred with larval stages, while the remaining infections were either with trophozoites or adult parasites. Among the inspected fishes, *Cyprinion macrostomum* was infected with the highest number of parasite species (29 parasite species), followed by *Carasobarbus luteus* (26 species) and *Arabibarbus grypus* (22 species) while six fish species (*Alburnus caeruleus*, *A. sellal*, *Barbus lacerta*, *Cyprinion kais*, *Hemigrammocapoeta elegans* and *Mastacembelus mastacembelus*) were infected with only one parasite species each. The myxozoan *Myxobolus oviformis* was the commonest parasite species as it was reported from 10 fish species, followed by both the myxozoan *M. pfeifferi* and the trematode *Ascocotyle coleostoma* which were reported from eight fish host species each and then by both the cestode *Schyzocotyle acheilognathi* and the nematode *Contracaecum* sp. which were reported from seven fish host species each.

Keywords: Checklists, Parasites, Fishes, Salah Al-Din province, Iraq.

Introduction

Salah Al-Din province is one of the Iraqi provinces. It shares boundaries with the provinces of Baghdad, Al-Anbar, Ninawa, Erbil, Al-Tamim, Al-Sulaymaniya and Diyala (Fig. 1). It is located between 33.3° to 35.6° North latitude and 42.4° to 45° East longitude. The main inland waters of this province include the Tigris river which crosses the province from the north till the south, in addition to Al-Tharthar lake which separates this province from Al-Anbar province from its southwest border. The Tigris canal region joins the Tigris river at Samarra with Al-Tharthar lake. In addition, few man-made lakes are distributed in Al-Nibaey region in the southern part of this province (Ali et al., 1988c).

Mhaisen & Al-Nasiri (2012) gave the first literature review on parasites of fishes of Salah Al-Din province. They showed the occurrence of of 84 parasite species from fishes of that province. More researches on fish parasites of this province were later achieved covering different localities in this province. All so far known literature dealing with parasites of fishes of this province included those from Al-Tharthar lake- Tigris canal region (Ali & Shaaban, 1984; Hussien & Mahdi, 1986; Khalifa, 1989), fish farms at Samarra region (Ali & Hussien, 1986; Khalifa, 1986, 1989; Hussien & Al-Hamdane, 1992; Saleh, 2016; Taha et al., 2017), Tigris river at Samarra city (Muhammed, 1995), two man-made lakes at Al-Nibaey region (Ali et al., 1988a, b, c; Abul-Eis et al., 1989), Tigris river at Baiji city (Abdul-Ameer, 1989; Gussev et al., 1993), Tigris river at or near Tikrit city (Nawab Al-Deen, 1994; Muhammed, 1995; Al-Jawda et al., 2000; Al-Nasiri, 2008, 2009; Al-Nasiri & Mhaisen, 2009a, b; Al-

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Nasiri, 2010; Al-Ayash, 2011; Al-Ayash et al., 2011; Al-Nasiri et al., 2012; Al- Tikrity et al., 2012; Al-Jubori, 2013; Al-Nasiri, 2013; Al-Jubori & Al-Nasiri, 2014; Al-Nasiri & Balbuena, 2016; Al-Nasiri, 2017; Taha et al., 2017), Tigris river at Al-Duloiya town (Taha et al., 2017), fish markets in Tikrit city (Mahmood, 2012) and undetermined locality (Locke et al., 2015).

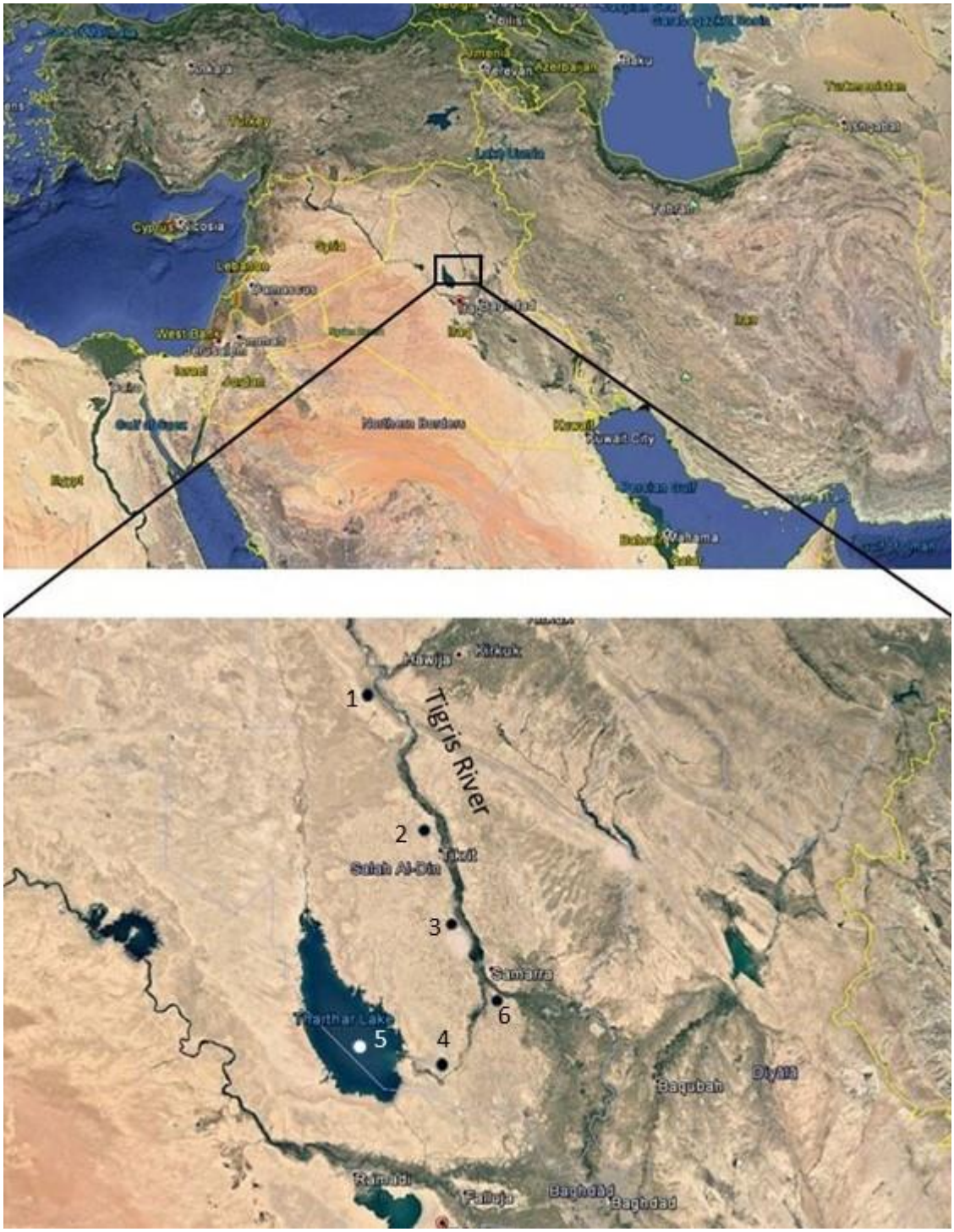

Figure 1: Map of Salah Al-Din province showing the sites from where fishes were collected for parasitological investigation. 1- Baiji, 2- Tikrit, 3- Samarra, 4- Al-Nibaey, 5- Al-Tharthar lake, 6- Al-Duloiya.

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

Sources and Methods

Thirty-four references (23 research papers, five unpublished M. Sc. theses, one Ph. D. thesis and five conference abstracts) dealing with the parasites of fishes of Salah Al-Din province till the end of 2017 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 parasite classification (Global Cestode Database, 2018; MonoDb, 2018; PESI, 2018; WoRMS, 2018) as well as some relevant taxonomic references (Lom & Dyková, 1992; Gibson et al., 1996; Eiras et al., 2005; Li et al., 2008; Anderson et al., 2009; Pugachev et al., 2009; Gibbons, 2010; 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 & 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 & Pauly, 2018). However, for *Alburnus sellal*, Eschmeyer (2018) was followed as it is known to respond quickly to revisions of fish scientific names in comparison with Froese & Pauly (2018). 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 Salah Al-Din Province

The following is a short historical account on different researches carried out on fishes of Salah Al-Din 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.

Herzog (1969) was the first one to report on parasites of fishes of Iraq. He revealed the occurrence of 16 parasite species as well as three fungal species from 16 fish hosts from many regions of Iraq, but the exact locality was not stated for some host species and no data seemed to be from Salah Al-Din province.

Ali & Shaaban (1984) surveyed five fish species in Al-Tharthar lake- Tigris canal region at Samarra region and detected the infection of two fish species with the nematode *Contracaecum* sp. larvae.

Ali & Hussien (1986) detected the infection of three fish species in some fish farms at Samarra region as well as Al-Rashidia and Al-Aubaidie regions with the fish lice *Argulus foliaceus*.

Hussien & Mahdi (1986) recorded the infection of three fish species with the trematode *Adpidogaster limacoides* from Al-Tharthar lake and Al-Tharthar lake- Tigris canal in Samarra region.

Khalifa (1986) inspected four fish species from several fish ponds around Baghdad area and also near Samarra city. He detected two cestode species: *Schyzocotyle acheilognathi* (which was reported as *Bothriocephalus gowkongensis*) and *Proteocephalus torulosus*.

Ali et al. (1988a) examined three fish species in two man-made lakes at Al-Nibaey region, 53 km north of Baghdad city and detected one ciliophoran, seven monogeneans, three cestodes, four nematodes and one crustacean in addition to one fungus.

Ali et al. (1988b) detected the fungus *Glugea anomala* from one fish species from some man-made lakes at Al-Nibaey region.

Ali et al. (1988c) detected the fungus *G. anomala* as well as one ciliophoran and one crustacean from three fish species from two man-made lakes at Al-Nibaey region.

Abdul-Ameer (1989) examined 12 fish species from Tigris river at Baiji city and detected 31 parasite species of which 16 species were reported for the first time in Iraq.

Abul-Eis et al. (1989) presented, in an abstract, the infection of three fish species from Al-Nibaey region with six monogeneans, three cestodes and six nematodes, but no host was demonstrated for each parasite species.

Khalifa (1989) inspected five fish species from several fish ponds in Baghdad area and Sammara region as well as from Al-Tharthar canal. He detected two ciliophorans, one trematode, two monogeneans, three cestodes, one nematode, one leech and three crustaceans, but the exact locality for most of these species was not determined.

Hussien & Al-Hamdane (1992) showed field observations on the fish louse *A. foliaceus* from three fish species taken from some private fish farms in Baghdad and Sammara regions.

Gussev et al. (1993) described four new species of the genus *Dactylogyrus* as well as two known species of the same genus from some fish species from Tigris river near Baiji city.

Nawab Al-Deen (1994) while surveying fishes from Mosul and Alton Kopri cities for nematodes, included one fish species (*Mastacembelus mastacembelus*) from Tigris river passing through Tikrit city to her study and detected one nematode species (*Procamallanus viviparous*) from that fish species.

Muhammed (1995) inspected 19 fish species from Tigris river at Mosul, Tikrit and Sammara cities for cestodes and detected 14 species but he did not state the exact locality for each infected host. Later on, he published some of his thesis' investigation and indicated that five of these 14 cestode species were from Mosul city (Rahemo & Mohammad, 2002, 2004), but again, in another published paper, extracted from the same thesis, Rahemo & Mohammad (2006) did not determine the exact locality of each infected host. One of us (Z.K.H.) tried his best to get localities of each infected fish from the same researcher (S. A. Muhammed), but he failed to get any result as that researcher was not cooperative with him.

Al-Jawda et al. (2000) collected 13 fish species from some stations in Tigris river north and south Tikrit city and recorded 21 parasite species (four myxozoans, three trematodes, three monogeneans, one cestode, two nematodes, two acanthocephalans, one leech and five crustaceans) in addition to one fungus species. Among these parasites, the acanthocephalan *Paulisentis fractus* was reported for the first time in Iraq.

Al-Nasiri (2008) inspected eight fish species caught from Tigris river at Tikrit city and reported 14 *Myxobolus* species among which four species (*M. chondrostomi*, *M. karelicus*, *M. orientalis* and *M. schulmani*) were reported for the first time from fishes of Iraq.

Al-Nasiri (2009) examined five fish species from Tigris river passing through Tikreet city and detected four diplozoid species among which one (*Paradiplozoon bliccae*) was reported for the first time in Iraq.

Al-Nasiri & Mhaisen (2009a) reported one diplozoid monogenean (*Paradiplozoon cyprini*) from one fish species for the first time in Iraq from Tigris river passing through a village at Tikrit city.

Al-Nasiri & Mhaisen (2009b) detected nine parasite species (one choanozoan, three ciliophorans, one myxozoan and four monogeneans) from six fish species from Tigris river, passing through Salah Al-Din province, among which two parasite species (*Trichodina elegeni* and *T. murmanica*) were reported for the first time in Iraq.

Al-Nasiri (2010) reported one monogenean (*Paradiplozoon amurense*) for the first time in Iraq from one host species from Tigris river at Tikrit city.

Al-Ayash (2011) reported eight parasite species (five cestodes, one nematode and two acanthocephalans) from 10 fish species from Tigris river at Tikrit.

Al-Ayash et al. (2011) published an article abstracted from Al-Ayash's (2011) thesis concerning eight parasite species from 10 fish species from Tigris river at Tikrit city.

Al-Nasiri et al. (2012) described a new species of crustacean (*Pseudolamproglena boxshalli*) from gills of one cyprinid fish from Tigris river in Tikreet.

Al-Tikrity et al. (2012) investigated the effect of monthly changes of physico- chemical factors of Tigris river waters passing through Tikrit city on the infection of three species of fishes with three helminth parasites.

Mahmood (2012) identified *Cryptosporidium* sp. from one cyprinid fish species from a local fish markets in Tikrit city.

Mhaisen & Al-Nasiri (2012) published the first literature review on parasites of fishes of Salah Al-Din province. They showed the occurrence of of 84 parasite species which included six ciliophorans, 21 myxozoans, six trematodes, 17 monogeneans, nine cestodes, ten nematodes, five acanthocephalans, two annelids and eight arthropods from fishes of that province.

Al-Jubori (2013) investigated the parasitic infections of 12 species of fishes from Tigris river passing through Tikrit city and recorded the occurrence of nine species of monogeneans, two trematodes, one cestode, three acanthocephalans and four crustaceans.

Al-Nasiri (2013) reported one myzozoan, one ciliophoran and five myxozoan species from five fish species from Tigris river passing through Tikrit city.

Al-Jubori & Al-Nasiri (2014) reported two monogeneans (*Paradiplozoon ergensi* and *P. rutili*) for the first time in Iraq from two fish species from Tigris river passing through Tikrit city.

Locke et al. (2015) performed distance-based analysis of cytochrome c oxidase 1 barcodes and, in some specimens, internal transcribed spacer (ITS-1, 5.8S, ITS-2) sequences for over 2000 diplostomids from Africa, the Middle East, Europe, Asia and the Americas. These included *Diplostomum spathaceum* and unidentified *Diplostomum* species from some Iraqi fish species, apparently from Tikrit.

Al-Nasiri & Balbuena (2016) described a new monogenean species (*Paradiplozoon iraqensis*) from *C. macrostomum* from Tigris river on its course through Tikrit city.

Saleh (2016) investigated the pathological effects of three helminth parasites on four fish species from Tigris river passing through Samarra city.

Al-Nasiri (2017) reported the monogenean (*Paradiplozoon magnam*) for the first time in Iraq from two fish species from Tigris river passing through Tikrit city.

Taha et al. (2017) carried out a scanning electron microscopic study on the acanthocephalan *Neoechinorhynchus iraqensis* infecting *Planiliza abu* from Tigris river at Salah Al-Din province.

Results and Discussion

Surveying literature concerning the parasites which were recorded from fishes of Salah Al-Din province till the end of 2017 showed the infection of 25 valid fish species with 115 parasite species. The full authority of each valid fish host is shown in Table 1. The parasitic fauna included two myzozoans, one choanozoan, seven ciliophorans, 24 myxozoans, eight trematodes, 34 monogeneans, 12 cestodes, 11 nematodes, five acanthocephalans, two annelids and nine crustaceans. GBIF (2018) and WoRMS (2018) were mainly followed for the systematics of these groups and their authorities. Names of fish hosts are quoted as they

appeared in the reviewed literature but the valid names were updated in accordance with two well-known electronic sites (Eschmeyer, 2018; Froese & Pauly, 2018) except for *A. sellal* where Eschmeyer (2018) only was followed. The full authority of each valid fish host species is shown in Table (1).

Table 1: List of fishes of Salah Al-Din province.

Class Actinopterygii
Order Cypriniformes
Family Cyprinidae
Acanthobrama marmid Heckel, 1843
Alburnus caeruleus Heckel, 1843
Alburnus sellal Heckel, 1843
Arabibarbus grypus (Heckel, 1843)
Barbus lacerta Heckel, 1843
Capoeta damascina (Valenciennes, 1842)
Capoeta trutta (Heckel, 1843)
Carasobarbus luteus (Heckel, 1843)
Carassius auratus (Linnaeus, 1758)
Chondrostoma regium (Heckel, 1843)
Cyprinion kais Heckel, 1843
Cyprinion macrostomum Heckel, 1843
Cyprinus carpio Linnaeus, 1758
Garra rufa (Heckel, 1843)
Hemigrammocapoeta elegans (Günther, 1868)
Leuciscus vorax (Heckel, 1843)
Luciobarbus barbulus (Heckel, 1843)
Luciobarbus esocinus Heckel, 1843
Luciobarbus xanthopterus Heckel, 1843
Mesopotamichthys sharpeyi (Günther, 1874)
Squalius lepidus Heckel, 1843
Varicorhinus sp.
Order Siluriformes
Family Siluridae
Silurus triostegus Heckel, 1843
Family Heteropneustidae
Heteropneustes fossilis (Bloch, 1794)
Order Synbranchiformes
Family Mastacembelidae
Mastacembelus mastacembelus (Banks & Solander, 1794)
Order Mugiliformes
Family Mugilidae
Planiliza abu (Heckel, 1843)

The following is a brief account on the major groups of the parasitic fauna of fishes of Salah Al-Din province.

Parasite-Host List

Species of the parasitic fauna of fishes of Salah Al-Din province are grouped here into 11 major groups (phyla for some species or classes for others) according to Kirjušina & 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. Parasite 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 parasites and disease agents of fishes of Iraq (Mhaisen, 2018) without mentioning this reference each time in order to economise space.

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; ITIS, 2018; PESI, 2018; WoRMS, 2018). Eleven major parasite groups are encountered in this study. These included the groups of Myzozoa, Choanozoa, Ciliophora, Myxozoa, Trematoda, Monogenea, Cestoda, Nematoda, Acanthocephala, Annelida and Crustacea.

Phylum Myzozoa

This phylum is known as Myxozoa by EOL (2018), GBIF (2018) and WoRMS (2018) but as Apicomplexa by NCBI (2018). It is represented in fishes of Salah Al-Din province with one species of the genus *Eimeria* as well as unidentified species of the genus *Cryptosporidium* as in the following systematic account.

Phylum Myzozoa
Class Conoidasida
Order Eucoccidiorida
Family Cryptosporidiidae
Cryptosporidium sp.
Family Eimeriidae
Eimeria sinensis Chen, 1956

Cryptosporidium sp. as oocysts were detected from smears from the intestinal contents of *C. carpio* by Mahmood (2012). The first unidentified *Cryptosporidium* from fishes of Iraq was reported from faecal smears of *P. abu* (reported as *L. abu*) from Tigris river in Mosul city (Al-Taee, 2008). So far, three fish species (inclusive of *C. carpio*) are known as hosts for unidentified *Cryptosporidium* species in Iraq.

Eimeria sinensis Chen, 1956 was reported from gills and skin of *P. abu* (reported as *L. abu*) by Al-Nasiri (2013) who did not mentioned the year of authority of this parasite. This was the first record of *E. sinensis* from fishes of Iraq and no more host species are so far known for this parasite in Iraq. In addition to *E. sinensis*, ten other identified species of *Eimeria* as well as some unidentified species of this genus from eight fish host species are so far known from fishes of Iraq.

Phylum Choanozoa

This phylum is represented in fishes of Salah Al-Din province with *Dermocystidium percae*, once regarded as a ciliated protozoan, but now it is considered as belonging to the phylum Choanozoa according to EOL (2018) and WoRMS (2018), to the kingdom Fungi according to ITIS (2018) and to the kingdom Chromista according to PESI (2018). According to Index Fungorum (EOL, 2018), the genus *Dermocystidium* is considered as incertae sedis.

Phylum Choanozoa
Class Ichthyosporea
Order Incertae sedis

Family Incertae sedis
Dermocystidium percae Reichenbach-Klinke, 1950

Dermocystidium percae was reported from gills and skin of *A. grypus* (reported as *B. grypus*) by Al-Nasiri & Mhaisen (2009b). *D. percae* was reported for the first time in Iraq from gills and skin of *C. carpio* from Al-Zaafaraniya fish farm, Baghdad by Sadek (1999). So far, four fish species are known for *D. percae* in Iraq.

Phylum Ciliophora

The phylum Ciliophora is represented in fishes of Salah Al-Din province with one species each of genera *Apiosoma* and *Ichthyophthirius* and four species of the genus *Trichodina* in addition to unidentified species of *Trichodina* as indicated in the following systematic account.

Phylum Ciliophora
Class Oligohymenophorea
Order Mobilida
Family Trichodinidae
Trichodina cottidarum Dogiel, 1955
Trichodina domerguei (Wallengren, 1897) Haider, 1964
Trichodina elegeni Shul'man-Albova, 1950
Trichodina murmanica Polyanski, 1955
Trichodina sp.
Order Sessilida
Family Epistylididae
Apiosoma megamicronucleatum (Timofeev, 1962)
Order Hymenostomatida
Family Ichthyophthiriidae
Ichthyophthirius multifiliis Fouquet, 1876

Apiosoma megamicronucleatum (Timofeev, 1962) was reported from skin of *P. abu* (reported as *L. abu*) by Al-Nasiri (2013) who did not mentioned the year of authority of this parasite. This was the first record of *A. megamicronucleatum* from fishes of Iraq and no more host species are so far known for this parasite in Iraq. In addition, eight other identified species of *Apiosoma* as well as some unidentified species of this genus from three fish host species are so far known from fishes of Iraq.

Ichthyophthirius multifiliis Fouquet, 1876 was reported from gills and skin of both *C. carpio* and *Luciobarbus xanthopterus* (reported as *Barbus xanthopterus*) by Khalifa (1989). *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.

Trichodina cottidarum Dogiel, 1955 was reported from skin of *C. carpio* by Al-Nasiri & Mhaisen (2009b). *T. cottidarum* was recorded for the first time in Iraq from gills of *C. carpio* from a manmade lake at Al-Zawraa park, Baghdad (Abdul-Ameer, 2004). So far, 14 fish species are known as hosts for *T. cottidarum* in Iraq.

Trichodina domerguei (Wallengren, 1897) Haider, 1964 was reported from skin of *Cyprinion macrostomum* by Ali et al. (1988a, c) and gills of *S. triostegus* by Abdul-Ameer (1989). 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.

Trichodina elegeni Shul'man-Albova, 1950 was reported from skin of *P. abu* (reported as *L. abu*) by Al-Nasiri & Mhaisen (2009b). The specific name of this parasite was misspelled as *elegini* instead of *elegeni* by Al-Nasiri & Mhaisen (2009b). This was the first record of this parasite from fishes of Iraq. So far, six fish host species are known for *T. elegeni* in Iraq.

Trichodina murmanica Polyanski, 1955 was reported from skin of *P. abu* (reported as *L. abu*) by Al-Nasiri & Mhaisen (2009b). This was the first record of this parasite from fishes of Iraq. So far, six fish host species are known for *T. murmanica* in Iraq.

Trichodina sp. was reported from skin of *C. carpio* by Khalifa (1989). In addition to 32 recognized *Trichodina* species so far recorded from fishes of Iraq, some unidentified species of *Trichodina* were so far recorded from eight fish species in Iraq.

Phylum Cnidaria- Class Myxozoa

The myxozoans includes external and internal parasites of different fish organs (Duijn, 1973). This group was used to be known as the sporozoans of the Protozoa. Myxozoans of fishes of Salah Al-Din province included one species each of genera *Myxidium* and *Thelohanellus* as well as 22 species of the genus *Myxobolus* as indicated in the following systematic account.

Phylum Cnidaria
Class Myxozoa
Order Bivalvulida
Family Myxidiidae
Myxidium rhodei Léger, 1905
Family Myxobolidae
Myxobolus acutus (Fujita, 1912) Landsberg & Lom, 1991
Myxobolus chondrostomi Donec, 1962
Myxobolus cyprinicola Reuss, 1906
Myxobolus dispar Thélohan, 1895
Myxobolus dogieli Bykhovskaya-Pavlovskaya & Bykhovski, 1940
Myxobolus ellipsoides Thélohan, 1892
Myxobolus karelicus Petrushevski, 1940
Myxobolus karuni Masoumian, Baska & Molnár, 1994
Myxobolus koi Kudo, 1919
Myxobolus macrocapsularis Reuss, 1906
Myxobolus muelleri Bütschli, 1882
Myxobolus musculi Keysselitz, 1908
Myxobolus nemachili Weiser, 1949
Myxobolus orientalis Shul'man, 1962
Myxobolus oviformis Thélohan, 1892
Myxobolus parvus Shu'lman, 1962
Myxobolus persicus Masoumian, Baska & Molnár, 1994
Myxobolus pfeifferi Thélohan, 1895
Myxobolus pseudodispar Gorbunova, 1936
Myxobolus sandrae Reuss, 1906
Myxobolus schulmani Donec, 1962
Myxobolus sphaericus (Fujita, 1924)
Thelohanellus catlae Chakrawarty & Basu, 1958

Myxidium rhodei Léger, 1905 was reported from gills of *C. macrostomum* by Al-Nasiri (2013). *M. rhodei* was recorded for the first time in Iraq from the liver of *M. sharpeyi* (reported as *B. sharpeyi*) from Haditha lake by Balasem et al. (1997). Ten fish host species are so far known for *M. rhodei* in Iraq.

Myxobolus acutus (Fujita, 1912) Landsberg & Lom, 1991 was reported as *Myxosoma acuta* from gills of *C. macrostomum* by Abdul-Ameer (1989). This was the first record of this parasite in Iraq. According to Eiras et al. (2005), *M. acuta* is a synonym of *M. acutus*. So far, three fish host species are known for *M. acutus* in Iraq.

Myxobolus chondrostomi Donec, 1962 was reported from liver of *A. grypus* (reported as *B. grypus*) by Al-Nasiri (2008) who did not mentioned the authority of this parasite. That was the first record of this parasite from fishes of Iraq. Now, *M. chondrostomi* has so far two fish host species in Iraq.

Myxobolus cyprinicola Reuss, 1906 was reported from kidneys and intestine of *A. grypus* (reported as *B. grypus*) by Al-Nasiri (2008) who did not mentioned the authority of this parasite, and from intestinal wall of *Varicorhinus* sp. by Al-Nasiri (2008). Its first record in Iraq was from gills and fins of *C. carpio* from Dokan lake (Abdullah, 1997). *M. cyprinicola* has so far 12 fish host species in Iraq.

Myxobolus dispar Thélohan, 1895 was recorded from the external surface of intestine of *Chondrostomum regium* (misspelled as *M. regius*) by Abdul-Ameer (1989) as well as from liver of the same fish by Al-Jawda et al. (2000), kidneys and spleen of *Leuciscus vorax* (reported as *Aspius vorax*) by Al-Jawda et al. (2000), gills of *Luciobarbus barbulus* (reported as *Barbus barbulus*) by Al-Jawda et al. (2000) and from gills, kidneys and spleen of *Mesopotamichthys sharpeyi* (reported as *Barbus sharpeyi*) by Al-Jawda et al. (2000). The first occurrence of this parasite in Iraq was that of Abdul-Ameer (1989). Now, it has so far 13 fish host species in Iraq.

Myxobolus dogieli Bykhovskaya-Pavlovskaya & Bykhovski, 1940 was reported from gills, kidneys and spleen of *A. grypus* (reported as *B. grypus*) by Al-Jawada et al. (2000) and from the external surface of heart, ovaries and liver of *P. abu* (reported as *L. abu*) by Abdul-Ameer (1989). The first occurrence of this parasite in Iraq was that of Abdul-Ameer (1989). Now, it has so far nine fish host species in Iraq.

Myxobolus ellipsoides Thélohan, 1892 was reported from liver of *Carasobarbus luteus* (reported as *Barbus luteus*) by Al-Nasiri (2008) who did not mentioned the authority of this parasite. This parasite was recorded for the first time in Iraq from gills, intestine, spleen and liver of *C. macrostomum* from Al-Diwania river in Al-Qadisiya province (Al-Jadoaa, 2002). So far four fish hosts are known for *M. ellipsoides* in Iraq.

Myxobolus karelicus Petruschevskii 1940 was reported from ovaries of *P. abu* (reported as *L. abu*) by Al-Nasiri (2008) who did not mentioned the authority of this parasite. This was the only report on *M. karelicus* from fishes of Iraq.

Myxobolus karuni Masoumian, Baska & Molnár, 1994 was reported from gills of *A. grypus* (reported *B. grypus*) by Al-Nasiri (2013). This parasite was recorded for the first time in Iraq from gills and intestine of *A. grypus* (reported as *B. grypus*) from Lesser Zab river (Abdullah, 2002). Five fish host species are so far known for this parasite in Iraq.

Myxobolus koi Kudo, 1919 was reported from liver of *C. luteus* (reported as *B. luteus*) by Al-Nasiri (2008) who did not mentioned the authority of this parasite. This parasite was recorded for the first time in Iraq from skin, gills, intestine and liver of *Silurus glanis* from Tigris river at Mosul (Al-Niaemei, 1997). So far, five fish host species are known for *M. koi* in Iraq.

Myxobolus macrocapsularis Reuss, 1906 was reported from liver of *C. luteus* (reported as *B. luteus*) by Al-Nasiri (2008) who did not mentioned the authority of this parasite. This parasite was recorded for the first time in Iraq from gills of *L. barbulus* (reported as *B.*

barbulus) from Dokan lake (Abdullah, 1997). So far, six fish host species are known for *M. macrocapsularis* in Iraq.

Myxobolus muelleri Bütschli, 1882 was reported from liver of *A. grypus* (reported *B. grypus*) by Al-Nasiri & Mhaisen (2009b), ovaries of *P. abu* (reported as *L. abu*) by Al-Nasiri 2008) and intestine of *Varicorhinus* sp. by Al-Nasiri (2008). The first record of *M. muelleri* in Iraq was from gills of *L. xanthopterus* (reported as *B. xanthopterus*) by Herzog (1969). So far, *M. muelleri* has ten host species in Iraq.

Myxobolus musculi Keysselitz, 1908 was reported from gills of both *C. regium* and *C. macrostomum* by Al-Nasiri (2013) who did not mentioned the year of authority of this parasite. This was its first record in Iraq. It is appropriate to mention here that this parasite was not incorporated into Eiras et al. (2005) list due to the unavailability of sufficient characters needed to compare this species with other *Myxobolus* species. *M. musculi* has so far seven fish host species in Iraq.

Myxobolus nemachili Weiser, 1949 was reported from liver of *A. grypus* (reported as *B. grypus*) by Al-Nasiri (2008) who did not mentioned the authority of this parasite and from ovaries, external surface of intestine and heart of *P. abu* (reported as *L. abu*) by Abdul-Ameer (1989) as well as ovaries of the same fish by Al-Nasiri (2008). The first occurrence of *M. nemachili* in Iraq was that of Abdul-Ameer (1989). Now, *M. nemachili* has eight fish host species in Iraq.

Myxobolus orientalis Shul'man, 1962 was reported from the intestinal wall of *A. grypus* (reported as *B. grypus*) by Al-Nasiri (2008) who did not mentioned the authority of this parasite. This was its first record in Iraq. Only two fish host species are so far known for *M. orientalis* in Iraq.

Myxobolus oviformis Thélohan, 1892 was reported from air bladder, gills, heart, kidneys, liver and spleen of *A. grypus* (reported as *B. grypus*) by Al-Jawda et al. (2000), gills, kidneys and skin of *Capoeta damascina* (reported as *Barbus belayewi*) by Al-Jawda et al. (2000), heart, kidneys and spleen of *C. trutta* (reported as *Varicorhinus trutta*) by Al-Jawda et al. (2000), gills, kidneys, liver, skin and spleen of *C. luteus* (reported as *B. luteus*) by Al-Jawda et al. (2000) and Al-Nasiri (2013), spleen of *C. regium* by Al-Jawda et al. (2000), gills, heart, kidneys and spleen of *L. vorax* (reported as *A. vorax*) by Al-Jawda et al. (2000), gills, gall bladder, heart, kidneys and spleen of *L. barbulus* (reported as *B. barbulus*) by Al-Jawda et al. (2000), gills, kidneys, liver and spleen of *M. sharpeyi* (reported as *B. sharpeyi*) by Al-Jawda et al. (2000), heart, kidneys, liver and spleen of *P. abu* (reported as *L. abu*) by Al-Jawda et al. (2000) and from gills, kidneys and spleen of *Squalius lepidus* (reported as *Leuciscus lepidus*) by Al-Jawda et al. (2000). It is appropriate to indicate here that the year of authority of *M. oviformis* was given as 1882 instead of 1892 in all above references. *M. oviformis* was recorded for the first time in Iraq from bulbus arteriosus and gill arch of *L. vorax* (reported as *A. vorax*), gill arch of *Luciobarbus esocinus* (reported as *Barbus esocinus*), bulbus arteriosus of *A. grypus* (reported as *B. grypus*) and bulbus arteriosus of *M. sharpeyi* (reported as *B. sharpeyi*) by Herzog (1969). So far, *M. oviformis* has 21 fish host species in Iraq.

Myxobolus parvus Shu'lman, 1962 was reported from testes of *L. xanthopterus* (reported as *B. xanthopterus*) by Al-Nasiri (2008) who did not mentioned the authority of this parasite. This parasite was recorded for the first time in Iraq from gills of *C. carpio* from Dokan lake (Abdullah, 1997). Seven fish host species are so far known for *M. parvus* in Iraq.

Myxobolus persicus Masoumian, Baska & Molnár, 1994 was reported from gills of *C. luteus* (reported as *B. luteus*) by Al-Nasiri (2013). This parasite was reported for the first time in Iraq from skin and gills of *A. grypus* (reported as *B. grypus*) and from skin, gills and kidneys of *C. macrostomum* from Lesser and Greater Zab rivers (Abdullah, 2002). Only three fish host species are so far known as hosts for *M. persicus* in Iraq.

Myxobolus pfeifferi Thélohan, 1895 was reported from gills of *C. macrostomum* by Abdul-Ameer (1989) and then from different organs of seven fish species by Al-Jawda et al. (2000). These fishes were: *A. grypus* (reported as *B. grypus*), *C. damascina* (reported as *B. belayewi*), *C. luteus* (reported as *B. luteus*), *L. vorax* (reported as *A. vorax*), *L. barbulus* (reported as *B. barbulus*), *M. sharpeyi* (reported as *B. sharpeyi*) and *S. lepidus* (reported as *L. lepidus*). *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.

Myxobolus pseudodispar Gorbunova, 1936 was reported from the intestinal wall of *C. regium* by Al-Nasiri (2008) who did not mentioned the authority of this parasite. This parasite was recorded for the first time in Iraq from kidneys of *A. marmid* and kidneys, liver and spleen of *C. luteus* (reported as *B. luteus*) from a man-made lake at Al-Amiriya region, Baghdad (Al-Nasiri, 2000). Three fish host species are so far known for *M. pseudodispar* in Iraq.

Myxobolus sandrae Reuss, 1906 was reported from liver of *L. xanthopterus* (reported as *B. xanthopterus*) by Al-Nasiri (2008) who did not mentioned the authority of this parasite. This parasite was recorded for the first time in Iraq from skin, gills and intestinal wall of *P. abu* (reported as *L. abu*) from Dokan lake (Abdullah, 1997). This parasite was not incorporated into Eiras et al. (2005) list. Only two fish host species are so far known for *M. sandrae* in Iraq.

Myxobolus schulmani Donec, 1962 was reported from the liver of *A. grypus* (reported as *B. grypus*) by Al-Nasiri (2008) who did not mentioned the authority of this parasite. This was the first record of *M. schulmani* in Iraq. Three fish host species are so far known for *M. schulmani* in Iraq.

Myxobolus sphaericus (Fujita, 1924) was reported as *Myxobolus sphaerica* from gills of *C. regium* (misspelled as *C. regius*) by Abdul-Ameer (1989) and from the intestine of *A. grypus* (reported as *B. grypus*) by Al-Nasiri (2008) also as *M. sphaerica*. The first record of this parasite in Iraq was that of Abdul-Ameer (1989). According to Eiras et al. (2005), *M. sphaericus* was originally described as *Lentospora sphaerica*. Twelve fish host species are so far known for *M. sphaericus* in Iraq.

Thelohanellus catlae Chakrawarty & Basu, 1958 was recorded from gills and external surface of intestine of *C. macrostomum* by Abdul-Ameer (1989). That was the first record of *T. catlae* in Iraq. Four fish host species are so far known for *T. catlae* in Iraq.

Finally, it is appropriate to mention here that *Glugea anomala* which was reported from some fish species of Salah Al-Din province by Ali et al. (1988b, c) is considered as belonging to the kingdom Fungi according to WoRMS (2018), so, it is not included in the present article. The same thing applies for *G. luciopercae* by Ali et al. (1988a).

Phylum Platyhelminthes- Class Trematoda

The class Trematoda of fishes of Salah Al-Din province includes one species each of the genera *Ascocotyle*, *Aspidogaster*, *Clinostomum*, *Diplostomum*, *Pseudochetosoma* and *Sphaerostoma* in addition to some specimens which were determined to the generic level (*Diplostomum* and *Sanguinicola*). Gibson et al. (2002), Jones et al. (2005) and Bray et al. (2008) were followed for arrangement of the major taxonomic groups of trematodes. However, recent updates in WoRMS (2018) were also taken in consideration. These trematodes are as indicated in the following systematic account.

Phylum Platyhelminthes
Class Trematoda

Superfamily Aspidogastriodea
Family Aspidogastridae
Aspidogaster limacoides Diesing, 1835
Superfamily Schistosomatoidea
Family Clinostomidae
Clinostomum complanatum (Rudolphi, 1819) Braun, 1899
Superfamily Diplostomoidea
Family Diplostomidae
Diplostomum spathaceum (Rudolphi, 1819) Olsson, 1876
Diplostomum sp.
Superfamily Gymnphalloidea
Family Sanguinicolidae
Sanguinicola sp.
Superfamily Opisthorchioidea
Family Heterophyidae
Ascocotyle coleostoma (Looss, 1896) Looss, 1899
Superfamily Microphalloidea
Family Zoogonoidae
Pseudochetosoma salmonicola Dollfus, 1951
Family Opecoelidae
Sphaerostoma bramae (Müller, 1776)

Ascocotyle coleostoma (Looss, 1896) Looss, 1899 was reported by Al-Jawda et al. (2000) as metacercaria from gills and skin of *A. sellal* (reported as *A. capito*), skin and gills of *C. damascina* (reported as *B. belayewi*), skin of *C. luteus* (reported as *B. luteus*), gills and skin of *C. regium*, skin of *L. vorax* (reported as *A. vorax*), skin of *M. sharpeyi* (reported as *B. sharpeyi*), gills and skin of *P. abu* (reported as *L. abu* and skin of *S. lepidus* (reported as *L. lepidus*). This parasite was reported for the first time in Iraq from gills of *H. fossilis* and *P. abu* (reported as *L. abu*) from Diyala river (Ali et al., 1986b). *A. coleostoma* has so far 34 fish host species in Iraq.

Aspidogaster limacoides Diesing, 1835 was reported from the intestine of three fish species by Hussien & Mahdi (1986). These fishes included *L. vorax* (reported as *A. vorax*), *L. xanthopterus* (reported as *B. xanthopterus*) and *M. sharpeyi* (reported as *B. sharpeyi*). This was the first record of *A. limacoides* in Iraq. So far, 14 fish host species are known for this parasite in Iraq.

Clinostomum complanatum (Rud., 1819) Braun, 1899 was recorded as metacercaria from the gill cavity of *C. macrostomum* by Al-Jubori (2013). This parasite was reported for the first time in Iraq from gills of *C. luteus* from Mehaijeran creek, Baarah (Khamees, 1983). So far, *C. complanatum* has 27 fish host species in Iraq.

Diplostomum spathaceum (Rudolphi, 1819) Olsson, 1876 was recorded as metacercaria from eyes of *Cyprinion kais* by Al-Jubori (2013). 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.

Diplostomum sp. was reported by Al-Jawda et al. (2000) from eye lenses of three fish species: *C. damascina* (reported as *B. belayewi*), *C. luteus* (reported as *B. luteus*) and *C. regium*. It is reliable to state here that Locke et al. (2015) considered *Diplostomum* sp. from *C. macrostomum* from Iraq as *Diplostomum* sp. 14 and that from *Alburnus caeruleus* as *Diplostomum* sp. 16. In addition to eight recognized *Diplostomum* species so far recorded

from fishes of Iraq, some unidentified species of *Diplostomum* were so far recorded from 27 fish host species in Iraq.

Pseudochetosoma salmonicola Dollfus, 1951 was reported by Al-Jawda et al. (2000) from the gall bladder of three fish species: *A. grypus* (reported as *B. grypus*), *L. vorax* (reported as *A. vorax*) and *L. barbulus* (reported as *B. barbulus*). This parasite was recorded for the first time in Iraq from the gall bladder of *A. marmid* from Tigris river passing through Mosul city (Fattohy, 1975). So, far 12 fish host species in Iraq.

Sanguinicola sp.: Eggs of this parasite were reported from gills and kidneys of both *C. carpio* and *M. sharpeyi* (reported as *B. sharpeyi*) by Khalifa (1989). This was the first record of this parasite in Iraq and no more records are so far known for this parasite in Iraq.

Sphaerostoma bramae (Müller, 1776) was reported as *Distomum globiporum* from the gall bladder of. *L. vorax* (reported as *A. vorax*) by Abdul-Ameer (1989). According to Dawes (1946), *D. globiporum* is considered as one of the synonyms of *S. bramae*. This was the first record of this parasite in Iraq (as *D. globiporum*) and the only record so far known for this parasite in Iraq.

Phylum Platyhelminthes- Class Monogenea

The class Monogenea of fishes of Salah Al-Din province included one species each of genera *Diplozoon*, *Eudiplozoon*, *Microcotyle* and *Thaparocleidus*, three species of *Gyrodactylus*, 11 species of *Paradiplozoon* and 16 species of *Dactylogyrus*. Names of *Gyrodactylus* species and their authorities were checked with MonoDb (2018) while those 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 Rusian authorities of some of the following monogeneans. List of monogeneans of fishes of Salah Al-Din province is indicated in the following systematic account.

Phylum Platyhelminthes
Class Monogenea
Order Dactylogyridea
Family Ancyrocephalida
Thaparocleidus vistulensis (Siwak, 1932) Lim, 1996
Family Dactylogyridae
Dactylogyrus barbioides Gusev, Ali, Abdul-Ameer, Amin & Molnár, 1993
Dactylogyrus barbuli Gusev, Ali, Abdul-Ameer, Amin & Molnár, 1993
Dactylogyrus cornu Linstow, 1878
Dactylogyrus extensus Mueller & Van Cleave, 1932
Dactylogyrus inutilis Bychowsky, 1949
Dactylogyrus jamansajensis Osmanov, 1958
Dactylogyrus kulwieci Bychowsky, 1933
Dactylogyrus latituba Gusev, 1955
Dactylogyrus macrostomi Gusev, Ali, Abdul-Ameer, Amin & Molnár, 1993
Dactylogyrus orbus Gusev, Ali, Abdul-Ameer, Amin & Molnár, 1993
Dactylogyrus pavlovskyi Bychowsky, 1949
Dactylogyrus pulcher Bychowsky, 1957
Dactylogyrus rohdeianus Jalali, Papp & Molnár, 1995
Dactylogyrus tuba Linstow, 1878
Dactylogyrus varicorhini Bychovsky, 1957
Dactylogyrus vastator Nybelin, 1924
Order Gyrodactylidea

Family Gyrodactylidae
Gyrodactylus baicalensis Bogolepova, 1950
Gyrodactylus elegans von Nordmann, 1832
Gyrodactylus markewitschi Kulakovskaya, 1952
Order Mazocraeidea
Family Diplozoidae
Diplozoon paradoxum von Nordmann, 1832
Eudiplozoon nipponicum (Goto, 1891) Khotenovsky, 1985
Paradiplozoon amurense (Akhmerov, 1974)
Paradiplozoon barbi (Reichenbach-Klinke, 1951)
Paradiplozoon bliccae (Reichenbach-Klinke, 1961)
Paradiplozoon cyprini Khotenovsky, 1982
Paradiplozoon ergensi (Pejěoch, 1968)
Paradiplozoon iraqensis Al-Nasiri & Balbuena, 2016
Paradiplozoon kasimii (Rahemo, 1980) Khotenovsky, 1982
Paradiplozoon magnum Lim & Khotenovsky, 1985
Paradiplozoon pavlovskii (Bychowsky & Nagibina, 1959)
Paradiplozoon rutili (Gläser, 1967) Khotenovsky, 1982
Paradiplozoon vojteki (Pejěoch, 1968) Khotenovsky, 1982
Family Microcotylidae
Microcotyle donavini van Beneden & Hesse, 1863

Dactylogyrus barbioides Gusev, Ali, Abdul-Ameer, Amin & Molnár, 1993 was described as a new species from gills of *A. grypus* (reported as *B. grypus*) by Gussev et al. (1993). So, this represents its first record in Iraq. So far, six fish host species are known for *D. barbioides* in Iraq.

Dactylogyrus barbuli Gusev, Ali, Abdul-Ameer, Amin & Molnár, 1993 was described as a new species from gills of *L. barbulus* (reported as *B. barbulus*) by Gussev et al. (1993). So, this represents its first record in Iraq. So far, six fish host species are known for *D. barbuli* in Iraq.

Dactylogyrus cornu Linstow, 1878 was reported from gills of *C. damascina* (reported as *B. belayewi*) by Al-Jawda et al. (2000). *D. cornu* was recorded for the first time in Iraq from gills of five fish species: *A. grypus* (as *B. grypus*), *C. damascina* (as *B. belayewi*), *C. luteus*, *C. regium* and *L. xanthopterus* (as *B. xanthopterus*) from Diyala river by Ali et al. (1986a). Thirteen fish host species are so far known for *D. cornu* in Iraq.

Dactylogyrus extensus Mueller & Van Cleave, 1932 was detected from gills of *C. luteus* by Ali et al. (1988a). Abul-Eis et al. (1989) also reported this parasite from Salah Al-Din province but no host was determined in that report. 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 & 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.

Dactylogyrus inutilis Bychowsky, 1949 was reported from gills of *L. xanthopterus* (reported as *B. xanthopterus*) by Gussev et al. (1993). This was its first report from fishes of Iraq. Only four fish host species are so far known for this parasite in Iraq.

Dactylogyrus jamansajensis Osmanov, 1958 was detected from gills of *C. luteus* from manmade lakes, north of Baghdad by Ali et al. (1988a). This was its first record in Iraq. Abul-Eis et al. (1989) reported this parasite from Salah Al-Din province but no host was determined in that report. Now, it has five host species in Iraq.

Dactylogyrus kulwieci Bychowsky, 1933 was reported from gill of both *Luciobarbus esocinus* (reported as *Barbus esocinus*) and *L. xanthopterus* (reported as *B. xanthopterus*) by Abdul-Ameer (1989). This was its first record in Iraq. Six fish host species are so far known for *D. kulwieci* in Iraq.

Dactylogyrus latituba Gusev, 1955 was detected from gills of *C. macrostomum* by Ali et al. (1988a). This was its first record in Iraq. Abul-Eis et al. (1989) reported this parasite from Salah Al-Din province but no host was determined in that report. Now, it has four host species in Iraq.

Dactylogyrus macrostomi Gusev, Ali, Abdul-Ameer, Amin & Molnár, 1993 was described as a new species from gills of *C. macrostomum* by Gussev et al. (1993). So, this represents its first record in Iraq. Only two fish host species are so far known for *D. macrostomi* in Iraq.

Dactylogyrus orbus Gusev, Ali, Abdul-Ameer, Amin & Molnár, 1993 was described as a new species from gills of *Barbus lacerta* by Gussev et al. (1993). So, this represents its first record in Iraq. No more host species are so far known for *D. orbus* in Iraq.

Dactylogyrus pavlovskyi Bychowsky, 1949 was reported from gills of both *A. grypus* (reported as *B. grypus*) and *M. sharpeyi* (reported as *B. sharpeyi*) by Gussev et al. (1993). This was its first record in Iraq. Eleven fish host species are so far known for *D. pavlovskyi* in Iraq.

Dactylogyrus pulcher Bychowsky, 1957 was reported from gills of both *C. trutta* (reported as *V. trutta*) and *C. macrostomum* by Abdul-Ameer (1989). This represents its first record in Iraq. Five host species are so far known for *D. pulcher* in Iraq.

Dactylogyrus rohdeianus Jalali, Papp & Molnár, 1995 was reported from gills of *C. luteus* (reported as *B. luteus*) by Al-Nasiri & Mhaisen (2009b) who misspelled the specific name as *rhodeianus* instead of *rohdeianus*. The first record of this parasite in Iraq was from gills of both of both *C. luteus* (reported as *B. luteus*) and *M. sharpeyi* (reported as *B. sharpeyi*) from Al-Husainia creek, Karbala province by Al-Saadi (2007). No more hosts are so far known for *D. rohdeianus* in Iraq.

Dactylogyrus tuba Linstow, 1878 was detected from gills of *C. luteus* by Ali et al. (1988a). This was its first record in Iraq. Abul-Eis et al. (1989) reported this parasite from Salah Al-Din province but no host was determined in that report. Three host species are so far known for *D. tuba* in Iraq.

Dactylogyrus varicorhini Bychovsky, 1957 was reported from gills of both *C. trutta* (reported as *V. trutta*) and *C. luteus* (reported as *B. luteus*) by Abdul-Ameer (1989). This was its first record in Iraq. So far, six fish host species are known for *D. varicorhini* in Iraq.

Dactylogyrus vastator Nybelin, 1924 was reported from gills of *C. carpio* by Al-Nasiri & Mhaisen (2009b), gills of *L. barbulus* (reported as *B. barbulus*) by Al-Jawda et al. (2000) and gills of *L. xanthopterus* (reported as *B. xanthopterus*) by Al-Jawda et al. (2000). The first record of this parasite from Iraq was from skin and gills of *C. macrostomum* from Tigris river at Baghdad (Ali et al., 1987b). 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.

Diplozoon paradoxum von Nordmann, 1832 was reported from gills of *C. macrostomum* by Al-Nasiri (2009) and Al-Jubori (2013). This parasite was reported for the first time in Iraq from gills of *C. luteus* (reported as *B. luteus*) from Al-Husainia creek (Al-Saadi, 2007). Five fish host species are so far known for *D. paradoxum* in Iraq. It is appropriate to mention here that Abul-Eis et al. (1989) reported the larval stage, Diporpa sp., from Salah Al-Din province but no host was determined in that report.

Eudiplozoon nipponicum (Goto, 1891) Khotenovsky, 1985 was reported from gills of *C. carpio* and *L. vorax* (reported as *A. vorax*) by Al-Jubori (2013). This monogenean was reported for the first time in Iraq, as *Diplozoon nipponicum* Goto, 1891, from gills of *C.*

carpio from manmade lake near Baghdad city (Al-Nasiri, 2003). *E. nipponicum* and its synonym *D. nipponicum* have so far four fish host species in Iraq.

Gyrodactylus baicalensis Bogolepova, 1950 was detected from gills of both *C. luteus* and *C. macrostomum* by Ali et al. (1988a). Abul-Eis et al. (1989) also reported this parasite from Salah Al-Din province but no host was determined in that report. This parasite was reported for the first time in Iraq was from skin, buccal cavity and gills of *C. carpio* from Al-Suwaira and Al-Latifiya fish farms (Salih et al., 1988). So far, *G. baicalensis* has ten fish host species in Iraq.

Gyrodactylus elegans von Nordmann, 1832 was reported from gills of *C. damascina* (reported as *B. belayewi*) by Al-Jawda et al. (2000). 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 & Shaaban (1984). *G. elegans* has so far 23 fish host species in Iraq.

Gyrodactylus markewitschi Kulakovskaya, 1952 was reported from gills of *C. trutta* (reported as *V. trutta*) by Abdul-Ameer (1989). This was the first record of this parasite from fishes of Iraq. Eleven host fish species are so far known for *G. markewitschi* in Iraq.

Microcotyle donavini van Beneden & Hesse, 1863 was reported from gills of *P. abu* (reported as *L. abu*) by Al-Nasiri & Mhaisen (2009b). This parasite was recorded for the first time in Iraq from gills of *P. abu* (reported as *L. abu*) from Babylon fish farm (Ali et al., 1989). Ten host fish species are so far known for *M. donavini* in Iraq.

Paradiplozoon amurense (Akhmerov, 1974) was reported from gills of *C. luteus* (reported as *B. luteus*) by Al-Jubori (2013) and from gills of *C. macrostomum* by Al-Nasiri (2010) and Al-Jubori (2013). The specific name of this monogenean was misapplied as *amurensis* instead of *amurense* by both above-named researchers. The first record of this parasite in Iraq was that of Al-Nasiri (2010). Three fish host species are so far known for *P. amurense* in Iraq.

Paradiplozoon barbi (Reichenbach-Klinke, 1951) was reported as *Diplozoon barbi* from gills of both *C. macrostomum* and *C. carpio* by Al-Nasiri (2009). This parasite was reported for the first time in Iraq from gills of *Chondrostoma nasus*, *C. regium*, and *C. carpio* from Tigris river at Baghdad by Rasheed (1989) as *Diplozoon barbi*. Also, all the subsequent records in the Iraqi literature, except the checklists of Mhaisen & Abdul-Ameer (2014), referred to this parasite as *D. barbi*. According to Khotenovsky (1985), *D. barbi* is a synonym of *P. barbi*. Eight host species are so far known for this parasite and its synonym in Iraq.

Paradiplozoon bliccae (Reichenbach-Klinke, 1961) was reported from gills of *C. macrostomum* by Al-Nasiri (2009) and Al-Jubori (2013), *C. carpio* by Al-Nasiri (2009) and *P. abu* (reported as *L. abu*) by Al-Jubori (2013). The first record of this parasite in Iraq was that of Al-Nasiri (2009). Three fish host species are so far known for *P. bliccae* in Iraq.

Paradiplozoon cyprini Khotenovsky, 1982 was reported from gills of *A. grypus* (reported as *B. grypus*) by Al-Nasiri & Mhaisen (2009a, b), gills of *C. luteus* (reported as *B. luteus*) by Al-Jubori (2013) and gills of *C. macrostomum* by Al-Jubori (2013). The first record of this parasite in Iraq was that of Al-Nasiri & Mhaisen (2009a). Seven fish host species are so far known for *P. cyprini* in Iraq.

Paradiplozoon ergensi (Pejěoch, 1968) was reported from gills of *L. vorax* (reported as *A. vorax*) by Al-Jubori (2013) and Al-Jubori & Al-Nasiri (2014). The first record of this parasite in Iraq was that of Al-Jubori (2013). Four host species are so far known for *P. ergensi* in Iraq.

Paradiplozoon iraqensis Al-Nasiri & Balbuena, 2016 was described as a new species from gills of *C. macrostomum* by Al-Nasiri & Balbuena (2016). So far, two fish host species are known for *P. iraqensis* in Iraq.

Paradiplozoon kasimii (Rahemo, 1980) Khotenovsky, 1982 was reported as *Diplozoon kasimii* from gills of *C. macrostomum* by Abdul-Ameer (1989). 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 by Rahemo (1980). Khotenovsky (1985) transferred *D. kasimii* to the genus *Paradiplozoon* and considered it as a species inquirenda. Now, *P. kasimii* has 13 fish host species in Iraq.

Paradiplozoon magnum Lim & Khotenovsky, 1985 was reported from gills of both *C. trutta* and *Hemigrammocapoeta elegans* by Al-Nasiri (2017). This was its first record in Iraq and so far no more hosts are known for *P. magnum* in Iraq.

Paradiplozoon pavlovskii (Bychowsky & Nagibina, 1959) was also reported as *Diplozoon pavlovskii* from gills of both *C. luteus* (reported as *B. luteus*) and *C. regium* by Abdul-Ameer (1989) and as *P. pavlovskii* from *C. macrostomum* by Al-Nasiri (2009) and Al-Jubori (2013) and *C. carpio* by Al-Nasiri (2009). This parasite was recorded for the first time in Iraq from gills of *L. vorax* (reported as *Aspius vorax*) from Mehaijeran creek, a side branch of Shatt Al-Arab river, Basrah province by Khamees (1983) under the name *D. pavlovskii*. So far, *P. pavlovskii* and its synonym (*D. pavlovskii*) have 13 host species in Iraq.

Paradiplozoon rutili (Gläser, 1967) Khotenovsky, 1982 was reported from gills of both *C. macrostomum* and *L. vorax* (reported as *A. vorax*) by Al-Jubori (2013) and Al-Jubori & Al-Nasiri (2014). The first record of this parasite in Iraq was that of Al-Jubori (2013) and so far no more hosts are known for *P. rutili* in Iraq.

Paradiplozoon vojteki (Pejěoch, 1968) Khotenovsky, 1982 was reported from gills of both *C. luteus* (reported as *B. luteus*) and *L. vorax* (reported as *A. vorax*) by Al-Jubori (2013). This parasite was reported for the first time in Iraq from gills of *L. xanthopterus* (reported as *B. xanthopterus*) from Al-Husainia creek (Al-Saadi, 2007). Four fish host species are so far known for *P. vojteki* in Iraq.

Thaparocleidus vistulensis (Siwak, 1932) Lim, 1996 was reported as *Ancylodiscoides vistulensis* (Siwak, 1931) from gills of *S. triostegus* by Abdul-Ameer (1989). This was the first record of *T. vistulensis* in Iraq (as *A. vistulensis*). According to WoRMS (2018), both *A. vistulensis* and *Silurodiscoides vistulensis* are considered as synonyms of *T. vistulensis*. Nine fish host species are known for *T. vistulensis* and its synonym *A. vistulensis* in Iraq.

Phylum Platyhelminthes- Class Cestoda

The class Cestoda of fishes of Salah Al-Din province included one species each of genera *Caryophyllaeus*, *Diphyllobothrium*, *Glanitaenia*, *Ligula*, *Proteocephalus*, *Schyzocotyle* and *Senga*, two species each of genera *Khawia* and *Postgangesia* in addition to unspecified species of the genus *Caryophyllaeus*. Names of all cestodes followed Global Cestode Database (2018). These cestodes are indicated in the following systematic account.

Phylum Platyhelminthes
Class Cestoda
Order Bothriocephalidea
Family Bothriocephalidae
Schyzocotyle acheilognathi (Yamaguti, 1934) Brabec, Waeschenbach, Scholz, Littlewood & Kuchta, 2015
Senga magna (Zmeev, 1936) Yamaguti, 1959
Order Caryophyllidea
Family Caryophyllaeidae
Caryophyllaeus auriculatus (Kulakovskaya, 1961) Scholz, Oros, Choudhury, Brabec & Waeschenbach, 2015
Caryophyllaeus sp.
Family Lytocestidae
Khawia armeniaca (Cholodkovsky, 1915) Kulakovskaya, 1961
Khawia rossittensis (Szidat, 1927) Markevich, 1951

Order Diphyllobothriidea
Family Diphyllobothriidae
Diphyllobothrium latum (L., 1758) Cobbold, 1858
Ligula intestinalis (Linnaeus, 1758) Bloch, 1782
Order Proteocephalidea
Family Proteocephalidae
Glanitaenia osculata (Goeze, 1782) de Chambrier, Zehnder, Vaucher & Mariaux, 2004
Postgangesia hemispherous (Rahemo & Al-Naiaeemi, 2001)
Postgangesia inarmata de Chambrier, Al-Kallak & Mariaux, 2003
Proteocephalus torulosus (Batsch, 1786)

Caryophyllaeus auriculatus (Kulakovskaya, 1961) Scholz, Oros, Choudhury, Brabec & Waeschenbach, 2015 was reported as *Monobothrium auriculatum* from the intestine of both *A. grypus* (reported as *B. grypus*) and *L. barbulus* (reported as *B. barbulus*) by Al-Ayash (2011) and Al-Ayash et al. (2011) as well as from the intestine of *C. luteus* by Saleh (2016). According to Global Cestode Database (2018), *M. auriculatum* is considered as a synonym of *C. auriculatus*. The first record of this cestode (also as *M. auriculatum*) in Iraq was from the intestine of *L. xanthopterus* (reported as *B. xanthopterus*) from Euphrates river at Al-Musaiab city by Al-Sa'adi (2007). *C. auriculatus* and its synonym *M. auriculatum* have so far four fish host species in Iraq.

Caryophyllaeus sp. was reported from the intestine of *C. carpio* by Khalifa (1989). The first *Caryophyllaeus* species reported from fishes of Iraq was *Caryophyllaeus laticeps* (Pallas, 1781) Mueller, 1787 from the intestine and body cavity of both *Alburnus caeruleus* and *L. xanthopterus* (reported as *B. xanthopterus*) from Tharthar lake by Al-Saadi (1986). Four other identified *Caryophyllaeus* species were reported later from fishes of Iraq in addition to the record of some unidentified *Caryophyllaeus* species from two fish host species (inclusive of that of Khalifa, 1989).

Diphyllobothrium latum (L., 1758) Cobbold, 1858 plerocercoid larva was reported from the body cavity of both *A. marmid* and *C. macrostomum* by Ali et al. (1988a). Abul-Eis et al. (1989) also reported this cestode from Salah Al-Din province but no host was determined in that report. The first record of this cestode larva from Iraq was found in the body cavity attached to the outer surface of the gut wall of *Acanthobrama centisquama* from Tigris river at Baghdad by Ali et al. (1987c). Four fish host species are so far known for *D. latum* in Iraq.

Glanitaenia osculata (Goeze, 1782) de Chambrier, Zehnder, Vaucher & Mariaux, 2004 was reported as *Proteocephalus osculatus* (Goeze, 1782) Nybelin, 1942 from intestine of *L. vorax* (reported as *A. vorax*) by Al-Jawda et al. (2000) and Al-Ayash (2011). According to Global Cestode Database (2018), *P. osculatus* is considered as a synonym of *G. osculata*. The first record of *G. osculata* (as *P. osculatus*) from Iraq was from the alimentary canal of *L. vorax* (reported as *A. vorax*) from Al-Tharthar lake by Al-Saadi (1986). So far eight fish host species are known for *G. osculata* and *P. osculatus* in Iraq.

Khawia armeniaca (Cholodkovsky, 1915) Kulakovskaya, 1961 was reported from the intestine of *L. xanthopterus* (reported as *B. xanthopterus*) by Al-Ayash (2011) and Al-Ayash et al. (2011). The first record of this cestode was from the intestine of *M. sharpeyi* from Al-Hammar marsh by Al-Daraji (1986). Eight fish host species are so far known for *K. armeniaca* in Iraq.

Khawia rossittensis (Szidat, 1927) Markevich, 1951 was reported from intestine of both *C. macrostomum* and *L. vorax* (reported as *A. vorax*) by Al-Ayash (2011) and Al-Ayash et al. (2011). This was the first record of this cestode in Iraq and no more hosts are so far known for *K. rossittensis* in Iraq.

Ligula intestinalis (Linnaeus, 1758) Bloch, 1782 plerocercoid larva was reported from body cavity of *A. marmid* by Ali et al. (1988a), *Alburnus caeruleus* by Khalifa (1989) and *C. macrostomum* by Ali et al. (1988a). Abul-Eis et al. (1989) also reported this cestode larva from Salah Al-Din province but no host was determined in that report. 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* in Iraq.

Postgangesia hemispherous (Rahemo & Al-Naiaeemi, 2001) was reported from the intestine of *S. triostegus* by Al-Ayash (2011), Al-Ayash et al. (2011) and Al-Tikrity et al. (2012). This worm was originally described as *Proteocephalus hemispherous* by Rahemo & Al-Niaeemi (2001) from the intestine of *S. glanis* from Tigris river passing through Mosul city. Scholz et al. (2007) transferred this cestode to *Postgangesia* as *Postgangesia hemispherous* (Rahemo & Al-Niaeemi, 2001) Scholz, Hanzelová, Škeříková, Shimazu & Rolbiecki, 2007. So far, only two host fish species are known for this cestode in Iraq.

Postgangesia inarmata de Chambrier, Al-Kallak & Mariaux, 2003 was reported from the intestine of both *C. carpio* and *S. triostegus* by Saleh (2016). According to Scholz et al. (2007), *Silurotaenia siluri* (Batsch, 1786) Nybelin, 1942 which was reported for the first time in Iraq from *S. triostegus* from Diyala river by Ali et al. (1987a) is transferred to *Postgangesia* as *P. inarmata*. Three fish host species are so far known for *P. inarmata* and *S. siluri* in Iraq.

Proteocephalus torulosus (Batsch, 1786) was reported from both *A. grypus* (reported as *B. grypus*) and *C. carpio* by Khalifa (1986). The first record of this cestode was from the intestine of *C. carpio* from a fish farm near Baghdad city by Khalifa (1982). Two fish host species are so far known for *P. torulosus* in Iraq.

Schyzocotyle acheilognathi (Yamaguti, 1934) Brabec, Waeschenbach, Scholz, Littlewood & Kuchta, 2015 was reported as *Bothriocephalus gowkongensis* from the intestine of *C. carpio* by Khalifa (1986, 1989) and from *M. sharpeyi* (reported as *B. sharpeyi*) by Khalifa (1986). Also, this cestode was reported as *B. acheilognathi* from the intestine of seven fish species *Carassius auratus* by Al-Ayash (2011) and Al-Ayash et al. (2011), *C. regium* by Al-Jubori (2013), *C. carpio* by Al-Jubori (2013), *L. vorax* (reported as *A. vorax*) by Al-Ayash (2011) and Al-Ayash et al. (2011), *M. sharpeyi* (reported as *B. sharpeyi*) by Khalifa, (1986), *S. triostegus* by Al-Ayash (2011) and *S. lepidus* (reported as *L. lepidus*) by Al-Ayash (2011) and Al-Ayash et al. (2011). The first report of this cestode (as *B. acheilognathi*) in Iraq was from the intestine of *C. carpio* from some fish ponds near Baghdad (Khalifa, 1982). According to Global Cestode Database (2018), *B. acheilognathias* 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 Iraq.

Senga magna (Zmeev, 1936) Yamaguti, 1959 was reported as *Polyonchobothrium magnum* from intestine of *C. macrostomum* by Ali et al. (1988a). This was the first record of this cestode (as *P. magnum*). Abul-Eis et al. (1989) also reported this cestode (also as *P. magnum*) from Salah Al-Din province but no host was determined in that report. According to Global Cestode Database (2018), *P. magnum* is considered as a synonym of *S. magna*. So far four fish host species are so far known for *S. magna* and *P. magnum* in Iraq.

Phylum Nematoda

The phylum Nematoda of fishes of Salah Al-Din province included one species each of genera *Philometra* and *Procamallanus*, two species of *Cucullanus* and three species of *Rhabdochona* in addition to some unspecified species of genera *Capillaria*, *Contracaecum*, *Porrocaecum* and *Spiroxys* as in the following systematic account. Anderson et al. (2009) and

Gibbons (2010) were used to check names and authorities of these nematodes as well as their different taxonomical groups.

Phylum Nematoda
Class Adenophorea
Order Enoplida
Superfamily Trichinelloidea
Family Capillaridae
Capillaria sp.
Class Secernentea
Order Ascaridida
Superfamily Ascaridoidea
Family Anisakidae
Contracaecum sp.
Porrocaecum sp.
Superfamily Seuratoidea
Family Cucullanidae
Cucullanus cyprini Yamaguti, 1941
Cucullanus pseudeutropi Agrawal, 1967
Order Spirurida
Superfamily Camallanoidea
Family Camallanidae
Procamallanus viviparous Ali, 1956
Superfamily Dracunculoidea
Family Philometridae
Philometra abdominalis Nybelin, 1928
Superfamily Gnathostomatoidea
Family Gnathostomatidae
Spiroxys sp.
Superfamily Thelazioidea
Family Rhabdochonidae
Rhabdochona (*Rhabdochona*) *denudata* (Dujardin, 1845) Railliet & Henry, 1915
Rhabdochona hellichi (Šrámek, 1901)
Rhabdochona (*Rhabdochona*) *tigridis* Rahemo, 1978

Capillaria sp. was reported from liver of *C. macrostomum* by Abdul-Ameer (1989). The first unidentified *Capillaria* species recorded from Iraq was that from intestine of *M. sharpeyi* from Al-Hammar marsh by Al-Daraji (1986). Ten fish species were so far recorded as hosts for unidentified *Capillaria* species in Iraq.

Contracaecum species larvae were detected from body cavity and viscera of *A. marmid* by Ali et al. (1988a) and Abdul-Ameer (1989), *A. grypus* (reported as *B. grypus*) by Ali & Shaaban (1984), Khalifa (1989) and Al-Jawda et al. (2000), body cavity and external surface of intestine of *C. trutta* (reported as *V. trutta*) by Abdul-Ameer (1989), body cavity and external surface of intestine of *C. regium* by Abdul-Ameer (1989), body cavity and viscera of *L. vorax* (reported as *A. vorax*) by Ali & Shaaban (1984), Abdul-Ameer (1989 and Al-Jawda et al. (2000), body cavity and liver of *L. xanthopterus* (reported as *B. xanthopterus*) by Abdul-Ameer (1989) and Khalifa (1989) and body cavity and muscular layer of stomach of *S. triostegus* by Abdul-Ameer (1989). Abul-Eis et al. (1989) also reported this nematode from Salah Al-Din province but no host was determined in that report. *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.

Cucullanus cyprini Yamaguti, 1941 was reported from the intestine of *S. lepidus* (reported as *L. lepidus*) by Al-Ayash (2011) and Al-Ayash et al. (2011). The first record of *C. cyprini* from Iraq was from the intestine of both *A. 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.

Cucullanus pseudeutropi Agrawal, 1967 was reported from intestine of both *L. vorax* (reported as *A. vorax*) and *L. esocinus* (reported as *B. esocinus*) by Abdul-Ameer (1989). This was the first record of *C. pseudeutropi* in Iraq. Four fish host species are so far known for this nematode in Iraq.

Philometra abdominalis Nybelin, 1928 was reported from the body cavity of *C. luteus* by Ali et al. (1988a). Abul-Eis et al. (1989) also reported this nematode from Salah Al-Din province but no host was determined in that report. The first record of this nematode in Iraq was from the body cavity of *C. luteus* from Diyala river by Ali et al. (1987a). Only two fish host species are so far known for *P. abdominalis* in Iraq.

Porrocaecum sp. larvae were reported from body cavity of *C. trutta* (reported as *V. trutta*) by Abdul-Ameer (1989). This was the first record of *Porrocaecum* species in Iraq. Only two host fish species are so far known for this nematode in Iraq.

Procamallanus viviparous Ali, 1956 was reported from the intestine of *M. mastacembelus* (reported as *M. simach*) by Nawab Al-Deen (1994). This nematode was reported for the first time in Iraq from stomach of *Mystus pelusius* (reported as *M. halepensis*) from Tigris river at Baghdad by Ali et al. (1987d) who misspelled the specific name as *viviparus* instead of *viviparous*. Eight fish species are so far known as hosts for this nematode in Iraq.

Rhabdochona (*Rhabdochona*) *denudata* (Dujardin, 1845) Railliet & Henry, 1915 was described as *Rhabdochona mesopotamica* Rahemo & Kasim, 1979 from the intestine of *C. macrostomum* by Abdul-Ameer (1989). Abul-Eis et al. (1989) also reported this nematode (also as *R. mesopotamica*) from Salah Al-Din province but no host was determined in that report. According to Moravec et al. (1991), *R. mesopotamica* which was detected from the intestine of *C. macrostomum* from Tigris river passing through Mosul city by Fattohy (1975) and was then described as a new species by Rahemo & Kasim (1979), is considered as a junior synonym of *R. denudata*. Ten fish species are so far known as hosts for this parasite in Iraq.

Rhabdochona hellichi (Šrámek, 1901) was reported from the intestine of both *A. grypus* (reported as *B. grypus*) and *L. xanthopterus* (reported as *B. xanthopterus*) by Abdul-Ameer (1989) 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. (1987d). Eight fish species are so far known for this parasite in Iraq.

Rhabdochona (*R.*) *tigridis* Rahemo, 1978 was reported as *R. grandipapillata* Rahemo & Kasim, 1979 from the intestine of both *C. macrostomum* and *Garra rufa* by Abdul-Ameer (1989). Abul-Eis et al. (1989) reported this nematode (also as *R. grandipapillata*) from Salah Al-Din province but no host was determined in that report. Moravec et al. (2009) considered *R. grandipapillata* which was described as a new species as a synonym of *R.* (*R.*) *tigridis*. Four fish species are so far known as hosts for this nematode in Iraq.

Spiroxys sp. was reported from heart of *C. damascina* (reported as *B. belayewi*) by Al-Jawda et al. (2000). The first record of *Spiroxys* species in Iraq was from the external wall of the intestine and meseneteries of *L. vorax* (reported as *A. vorax*) from Greater Zab river by

Nawab Al-Deen (1994). Six host species are so far known for unidentified *Spiroxys* species in Iraq.

Phylum Acanthocephala

The phylum Acanthocephala of fishes of Salah Al-Din province included one species of the genus *Paulisentis* and four species of *Neoechinorhynchus* as in the following systematic account. Names and authorities of these acanthocephalans were checked in accordance with Amin (2013).

Phylum Acanthocephala
Class Eoacanthocephala
Order Neoechinocephalida
Family Neoechinocephalidae
Neoechinorhynchus (*N.*) *cristatus* Lynch, 1936
Neoechinorhynchus (*N.*) *iraqensis* Amin, Al-Sady, Mhaisen & Bassat, 2001
Neoechinorhynchus (*N.*) *rutili* (Müller, 1780) Hamann, 1892
Neoechinorhynchus (*N.*) *zabensis* Amin, Abdullah & Mhaisen, 2003
Paulisentis fractus Van Cleave & Bangham, 1949

Neoechinorhynchus cristatus Lynch, 1936 was reported from the intestine of *C. trutta* (reported as *V. trutta*) by Abdul-Ameer (1989) and Al-Jubori (2013) and intestine of *P. abu* (reported as *L. abu*) by Al-Jubori (2013). The first record of this parasite in Iraq was that of Abdul-Ameer (1989). Three fish species are so far known as hosts for *N. cristatus* in Iraq.

Neoechinorhynchus iraqensis Amin, Al-Sady, Mhaisen & Bassat, 2001 was reported as *N. agilis* from the intestine of *P. abu* (reported as *L. abu*) by Abdul-Ameer (1989) and later on as *N. iraqensis* by Al-Jawda et al. (2000), Al-Ayash (2011), Al-Ayash et al. (2011), Al-Tikrity et al. (2012), Al-Jubori (2013), Saleh (2016) and Taha et al. (2017). Also, this acanthocephalan was reported from *L. vorax* by Saleh (2016). Mhaisen (2002) gave the story of this acanthocephalan in Iraq which was misidentified as *N. agilis* from *P. abu* (reported as *Mugil hishni*) from Shatt Al-Arab river, Basrah firstly by Habash & Daoud (1979) and then was described as a new species from the intestine of *P. abu* (reported as *L. abu*) from Euphrates river near Al-Faluja barrage (Amin et al., 2001). *N. iraqensis* and the misidentified *N. agilis* have so far 24 fish host species in Iraq.

Neoechinorhynchus rutili (Müller, 1780) Hamann, 1892 was reported from the intestine of *C. trutta* (reported as *V. trutta*) by Abdul-Ameer (1989). 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.

Neoechinorhynchus zabensis Amin, Abdullah & Mhaisen, 2003 was reported from the intestine of five fish species: *C. damascina* (reported as *B. belayewi*) by Al-Ayash (2011), Al-Ayash et al. (2011) and Al-Tikrity et al. (2012), *C. trutta* by Al-Jubori (2013), *C. auratus* by Al-Ayash (2011) and Al-Ayash et al. (2011), *P. abu* (reported as *L. abu* by Al-Ayash (2011), Al-Ayash et al. (2011), Al-Tikrity et al. (2012) and Al-Jubori (2013) and *S. triostegus* by Al-Ayash (2011) and Al-Ayash et al. (2011). This parasite was described as a new species from the intestine of both *C. damascina* and *C. trutta* from Greater Zab river and Lesser Zab river by Amin et al. (2003). *N. zabensis* has so far seven fish host species in Iraq.

Paulisentis fractus Van Cleave & Bangham, 1949 was reported from intestine of *L. barbulus* (reported as *B. barbulus*) by Al-Jawda et al. (2000). The first record of this parasite in Iraq was from the intestine of *P. abu* (reported as *L. abu*) from Garmat Ali river, Basrah by Abdul-Rahman (1999). Three fish host species are so far known for *P. fractus* in Iraq.

Phylum Annelida

The phylum Annelida is represented in fishes of Salah Al-Din province with one species each of genera *Hemiclepsis* and *Piscicola* as in the following systematic account.

Phylum Annelida
Class Clitellata
Order Rhynchobdellida
Family Glossiphoniidae
Hemiclepsis marginata (O. F. Müller, 1774)
Piscicola geometra (Linnaeus, 1761) Blainville, 1818

Hemiclepsis marginata (O. F. Müller, 1774) Blainville, 1818 was reported from the skin of *C. carpio* by Khalifa (1989). The first record of this parasite was from skin of *C. carpio*, *L. xanthopterus* (reported as *B. xanthopterus*) and *M. sharpeyi* (reported as *B. sharpeyi*) from a fish pond near Baghdad by Khalifa (1985). Four fish species are so far known as hosts for *H. marginata* in Iraq.

Piscicola geometra (Linnaeus, 1761) Blainville, 1818 was reported from the skin of *A. grypus* (reported as *B. grypus*) by Al-Jawda et al. (2000). This parasite was recorded for the first time in Iraq from skin and fins of *L. vorax* (reported as *A. vorax*) from the Euphrates river at Al-Anbar province by Mhaisen et al. (1997). Three fish species are so far known as hosts for *P. geometra* in Iraq.

Phylum Arthropoda- Subphylum Crustacea

The phylum Arthropoda is represented in fishes of Salah Al-Din province with one species each of genera *Argulus*, *Lamproglena*, *Lernaea* and *Tracheliastes*, two species of *Pseudolamproglena* and three species of *Ergasilus*. WoRMS (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 account.

Phylum Arthropoda
Subphylum Crustacea
Class Ichthyostraca
Order Arguloidea
Family Argulidae
Argulus foliaceus (Linnaeus, 1758) Jurine, 1806
Class Hexanauplia
Order Poecilostomatoida
Family Ergasilidae
Ergasilus mosulensis Rahemo, 1982
Ergasilus peregrinus Heller, 1865
Ergasilus sieboldi von Nordmann, 1832
Family Lernaeidae
Lamproglena pulchella von Nordmann, 1832
Lernaea cyprinacea Linnaeus, 1758
Pseudolamproglena annulata Boxshall, 1976
Pseudolamproglena boxshalli Al-Nasiri, Ho & Mhaisen, 2012
Order Siphonostomatoida
Family Lernaeopodidae
Tracheliastes polycolpus Nordmann, 1832

Argulus foliaceus (Linnaeus, 1758) Jurine, 1806 was detected from *A. grypus* (reported as *B. grypus*) by Ali & Hussien (1986) and Hussien & Al-Hamdane (1992), *C. luteus* by Ali et al. (1988a, c), *C. carpio* by Ali & Hussien (1986), Khalifa (1989), Hussien & Al-Hamdane (1992) and Al-Jawda et al. (2000), *L. esocinus* (reported as *B. esocinus*) by Ali & Hussien (1986) and Hussien & Al-Hamdane (1992) and *L. xanthopterus* (reported as *B. xanthopterus*) by Khalifa (1989). This crustacean was reported for the first time in Iraq from skin of both *C. luteus* (reported as *B. luteus*) and *C. carpio* from Al-Habbaniyah lake (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 in Iraq.

Ergasilus mosulensis Rahemo, 1982 was reported from gills of *C. luteus* (reported as *B. luteus*) by Abdul-Ameer (1989). 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 by Rahemo (1982). It has so far 24 fish host species in Iraq.

Ergasilus peregrinus Heller, 1865 was reported from gills of *C. luteus* (reported as *B. luteus*) by Al-Jubori (2013), gills of both *L. vorax* (reported as *A. vorax*) by Abdul-Ameer (1989) and gills of *P. abu* (reported as *L. abu*) by Abdul-Ameer (1989). The first record of this crustacean from Iraq was that of Abdul-Ameer (1989). Nine fish species are so far known as hosts for *E. peregrinus* in Iraq.

Ergasilus sieboldi von Nordmann, 1832 was reported from gills of *C. luteus* (reported as *B. luteus*) by Al-Jawda et al. (2000) and gills of *L. xanthopterus* (reported as *B. xanthopterus*) by Khalifa (1989). 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 26 fish host species in Iraq.

Lamproglena pulchella von Nordmann, 1832 was reported from gills of *G. rufa* by Abdul-Ameer (1989) and gills of *L. vorax* (reported as *A. vorax*) by Al-Jubori (2013). This crustacean was firstly reported from Iraq from gills of both *C. regium* and *C. trutta* (reported as *V. trutta*) from Tigris river at Mosul city (Rahemo, 1977). So far, *L. pulchella* has 21 fish host species in Iraq.

Lernaea cyprinacea Linnaeus, 1758 was reported from gills, skin and in some cases in buccal cavity of four fish species: *C. damascina* (reported as *B. belayewi*) by Al-Jawda et al. (2000), *C. carpio*, *L. xanthopterus* (reported as *B. xanthopterus*) and *M. sharpeyi* (reported as *B. sharpeyi*) by Khalifa (1989). This crustacean was reported for the first time in Iraq from seven fish species from Al-Zaafaraniya fish culture station, Baghdad by Al-Hamed & Hermiz (1973). It is the commonest crustacean parasite among fishes of Iraq as it has so far 31 host species in different fish farms and hatcheries as well as in various inland waters of Iraq.

Pseudolamproglena annulata Boxshall, 1976 was reported from gills of *C. luteus* (reported as *B. luteus* by Abdul-Ameer (1989), Al-Jawda et al. (2000) and Al-Jubori (2013) and gills of *C. macrostomum* by Abdul-Ameer, (1989). This crustacean was described as a new species from gills of *C. macrostomum* from Tigris river at Mosul city by Boxshall (1976). So far, 11 fish host species are known for *P. annulata* in Iraq.

Pseudolamproglena boxshalli Al-Nasiri, Ho & Mhaisen, 2012 was described as a new species from gills of *C. macrostomum* by Al-Nasiri et al. (2012). It was then recorded by Al-Jubori (2013) from five fish species: *C. trutta*, *C. luteus* (reported as *B. luteus*), *C. macrostomum*, *C. carpio* and *L. xanthopterus* (reported as *B. xanthopterus*. So far, five fish host species are known for *P. boxshalli* in Iraq.

Tracheliastes polycolpus Nordmann, 1832 was reported from fins and skin of *C. damascina* (reported as *B. belayewi*) by Al-Jawda et al. (2000). This crustacean was recorded for the first time in Iraq from pelvic and caudal fins of *C. macrostomum* from Greater Zab river by Ali (1989). So far, *T. polycolpus* has four fish host species in Iraq.

Table 2 gives a parasite-host list of all concerned parasites according to their major groups so far recorded from fishes of Salah Al-Din province. Under each major groups, parasite species are alphabetically arranged and for each parasite species, hosts are also alphabetically arranged. Only the valid names of the fishes are indicated in this table.

Table 2: List of parasite species from fishes of Salah Al-Din province, Iraq.

Parasite major groups	Fish host species
Phylum Myzozoa	
Cryptosporidium sp.	*Cyprinus carpio*
Eimeria sinensis	*Planiliza abu*
Phylum Choanozoa	
Dermocystidium percae	*Arabibarbus grypus*
Phylum Ciliophora	
Apiosoma megamicronucleatum	*Planiliza abu*
Ichthyophthirius multifiliis	*Cyprinus carpio, Luciobarbus xanthopterus*
Trichodina cottidarum	*Cyprinus carpio*
Trichodina domerguei	*Cyprinion macrostomum, Silurus triostegus*
Trichodina elegeni	*Planiliza abu*
Trichodina murmanica	*Planiliza abu*
Trichodina sp.	*Cyprinus carpio*
Phylum Cnidaria- Class Myxozoa	
Myxidium rhodei	*Cyprinion macrostomum*
Myxobolus acutus	*Cyprinion macrostomum*
Myxobolus chondrostomi	*Arabibarbus grypus*
Myxobolus cyprinicola	*Arabibarbus grypus, Varicorhinus* sp.
Myxobolus dispar	*Chondrostoma regium, Leuciscus vorax, Luciobarbus barbulus, Mesopotamichthys sharpeyi*
Myxobolus dogieli	*Arabibarbus grypus, Planiliza abu*
Myxobolus ellipsoids	*Carasobarbus luteus*
Myxobolus karelicus	*Planiliza abu*
Myxobolus karuni	*Arabibarbus grypus*
Myxobolus koi	*Carasobarbus luteus*
Myxobolus macrocapsularis	*Carasobarbus luteus*
Myxobolus muelleri	*Arabibarbus grypus, Planiliza abu, Varicorhinus* sp.
Myxobolus musculi	*Chondrostoma regium, Cyprinion macrostomum*
Myxobolus nemachili	*Arabibarbus grypus, Planiliza abu*
Myxobolus orientalis	*Arabibarbus grypus*
Myxobolus oviformis	*Arabibarbus grypus, Capoeta damascina, C. trutta, Carasobarbus luteus, Chondrostoma regium, Leuciscus vorax, Luciobarbus barbulus, Mesopotamichthys sharpeyi, Planiliza abu, Squalius lepidus*
Myxobolus parvus	*Luciobarbus xanthopterus*
Myxobolus persicus	*Carasobarbus luteus*
Myxobolus pfeifferi	*Arabibarbus grypus, Capoeta damascina, Carasobarbus luteus, Cyprinion macrostomum, Leuciscus vorax, Luciobarbus barbulus, Mesopotamichthys sharpeyi, Squalius Lepidus*
Myxobolus pseudodispar	*Chondrostoma regium*
Myxobolus sandrae	*Luciobarbus xanthopterus*
Myxobolus schulmani	*Arabibarbus grypus*
Myxobolus sphaericus	*Arabibarbus grypus, Chondrostoma regium*

Thelohanellus catlae	*Cyprinion macrostomum*
Phylum Platyhelminthes- Class Trematoda	
*Ascocotyle coleostoma**	*Alburnus sellal, Capoeta damascina, Carasobarbus luteus, Chondrostoma regium, Leuciscus vorax, Mesopotamichthys sharpeyi, Planiliza abu, Squalius lepidus*
Aspidogaster limacoides	*Leuciscus vorax, Luciobarbus xanthopterus, Mesopotamichthys sharpeyi*
*Clinostomum complanatum**	*Cyprinion macrostomum*
*Diplostomum spathaceum**	*Cyprinion kais*
Diplostomum sp.*	*Capoeta damascina, Carasobarbus luteus, Chondrostoma regium*
Pseudochetosoma salmonicola	*Arabibarbus grypus, Leuciscus vorax, Luciobarbus barbulus*
Sanguinicola sp.**	*Cyprinus carpio, Mesopotamichthys sharpeyi*
Sphaerostoma bramae	*Leuciscus vorax*
Phylum Platyhelminthes- Class Monogenea	
Dactylogyrus barbioides	*Arabibarbus grypus*
Dactylogyrus barbuli	*Luciobarbus barbulus*
Dactylogyrus cornu	*Capoeta damascina*
Dactylogyrus extensus	*Carasobarbus luteus*
Dactylogyrus inutilis	*Luciobarbus xanthopterus*
Dactylogyrus jamansajensis	*Carasobarbus luteus*
Dactylogyrus kulwieci	*Luciobarbus esocinus, L. xanthopterus*
Dactylogyrus latituba	*Cyprinion macrostomum*
Dactylogyrus macrostomi	*Cyprinion macrostomum*
Dactylogyrus orbus	*Barbus lacerta*
Dactylogyrus pavlovskyi	*Arabibarbus grypus, Mesopotamichthys sharpeyi*
Dactylogyrus pulcher	*Capoeta trutta, Cyprinion macrostomum*
Dactylogyrus rohdeianus	*Carasobarbus luteus*
Dactylogyrus tuba	*Carasobarbus luteus*
Dactylogyrus varicorhini	*Capoeta trutta, Carasobarbus luteus*
Dactylogyrus vastator	*Cyprinus carpio, Luciobarbus barbulus, L. xanthopterus*
Diplozoon paradoxum	*Cyprinion macrostomum*
Eudiplozoon nipponicum	*Cyprinus carpio, Leuciscus vorax*
Gyrodactylus baicalensis	*Carasobarbus luteus, Cyprinion macrostomum*
Gyrodactylus elegans	*Capoeta damascina*
Gyrodactylus markewitschi	*Capoeta trutta*
Microcotyle donavini	*Planiliza abu*
Paradiplozoon amurense	*Carasobarbus luteus, Cyprinion macrostomum*
Paradiplozoon barbi	*Cyprinion macrostomum, Cyprinus carpio*
Paradiplozoon bliccae	*Cyprinion macrostomum, Cyprinus carpio, Planiliza abu*
Paradiplozoon cyprinid	*Arabibarbus grypus, Carasobarbus luteus, Cyprinion macrostomum*
Paradiplozoon ergensi	*Leuciscus vorax*
Paradiplozoon iraqensis	*Cyprinion macrostomum*
Paradiplozoon kasimii†	*Cyprinion macrostomum*
Paradiplozoon magnum	*Capoeta trutta, Hemigrammocapoeta elegans*
Paradiplozoon pavlovskii	*Carasobarbus luteus, Chondrostoma regium, Cyprinion macrostomum, Cyprinus carpio*
Paradiplozoon rutile	*Cyprinion macrostomum, Leuciscus vorax*
Paradiplozoon vojteki	*Carasobarbus luteus, Leuciscus vorax*
Thaparocleidus vistulensis	*Silurus triostegus*
Phylum Platyhelminthes- Class Cestoda	
Caryophyllaeus auriculatus	*Arabibarbus grypus, Carasobarbus luteus, Luciobarbus*

	barbulus
Caryophyllaeus sp.	*Cyprinus carpio*
*Diphyllobothrium latum**	*Acanthobrama marmid, Cyprinion macrostomum*
Glanitaenia osculate	*Leuciscus vorax*
Khawia armeniaca	*Luciobarbus xanthopterus*
Khawia rossittensis	*Cyprinion macrostomum, Leuciscus vorax*
*Ligula intestinalis**	*Acanthobrama marmid, Alburnus caeruleus, Cyprinion macrostomum*
Postgangesia hemispherous	*Silurus triostegus*
Postgangesia inarmata	*Cyprinus carpio, Silurus triostegus*
Proteocephalus torulosus	*Arabibarbus grypus, Cyprinus carpio*
Schyzocotyle acheilognathi	*Carassius auratus, Chondrostoma regium, Cyprinus carpio, Leuciscus vorax, Mesopotamichthys sharpeyi, Silurus triostegus, Squalius lepidus*
Senga magna	*Cyprinion macrostomum*
Phylum Nematoda	
Capillaria sp.	*Cyprinion macrostomum*
Contracaecum sp.*	*Acanthobrama marmid, Arabibarbus grypus, Capoeta trutta, Chondrostoma regium, Leuciscus vorax, Luciobarbus xanthopterus, Silurus triostegus*
Cucullanus cyprinid	*Squalius Lepidus*
Cucullanus pseudeutropi	*Leuciscus vorax, Luciobarbus esocinus*
Philometra abdominalis	*Carasobarbus luteus*
Porrocaecum sp.*	*Capoeta trutta*
Procamallanus viviparous	*Mastacembelus mastacembelus*
Rhabdochona (*R.*) *denudate*	*Cyprinion macrostomum*
Rhabdochona hellichi	*Arabibarbus grypus, Luciobarbus xanthopterus*
Rhabdochona (*R.*) *tigridis*	*Cyprinion macrostomum, Garra rufa*
Spiroxys sp.	*Capoeta damascina*
Phylum Acanthocephala	
Neoechinorhynchus (*N.*) *cristatus*	*Capoeta trutta, Planiliza abu*
Neoechinorhynchus (*N.*) *iraqensis*	*Leuciscus vorax, Planiliza abu*
Neoechinorhynchus (*N.*) *rutile*	*Capoeta trutta*
Neoechinorhynchus (*N.*) *zabensis*	*Capoeta damascina, C. trutta, Carassius auratus, Planiliza abu, Silurus triostegus*
Paulisentis fractus	*Luciobarbus barbulus*
Phylum Annelida	
Hemiclepsis marginata	*Cyprinus carpio*
Piscicola geometra	*Arabibarbus grypus*
Phylum Arthropoda- Subphylum Crustacea	
Argulus foliaceus	*Arabibarbus grypus, Carasobarbus luteus, Cyprinus carpio, Luciobarbus esocinus, L. xanthopterus*
Ergasilus mosulensis	*Carasobarbus luteus*
Ergasilus peregrinus	*Carasobarbus luteus, Leuciscus vorax, Planiliza abu*
Ergasilus sieboldin	*Carasobarbus luteus, Luciobarbus xanthopterus*
Lamproglena pulchella	*Garra rufa, Leuciscus vorax*
Lernaea cyprinacea	*Capoeta damascina, Cyprinus carpio, Luciobarbus xanthopterus, Mesopotamichthys sharpeyi*
Pseudolamproglena annulata	*Carasobarbus luteus, Cyprinion macrostomum*
Pseudolamproglena boxshalli	*Capoeta trutta, Carasobarbus luteus, Cyprinion macrostomum, Cyprinus carpio, Luciobarbus xanthopterus*
Tracheliastes polycolpus	*Capoeta damascina*

* Larva, ** Egg of the parasite, † Species inquirenda.

Host-Parasite List

Names of all fish host species infected with parasites in Salah Al-Din province (25 valid fish names and 13 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 & Pauly (2018).

Acanthobrama marmid
Cestoda: *Diphyllobothrium latum*, *Ligula intestinalis*.
Nematoda: *Contracaecum* sp.

Alburnus caeruleus
Cestoda: *Ligula intestinalis*.

Alburnus capito*: See *Alburnus sellal

***Alburnus sellal* (reported as *Alburnus capito*)**
Trematoda: *Ascocotyle coleostoma*.

***Arabibarbus grypus* (also reported as *Barbus grypus*)**
Choanozoa: *Dermocystidium percae*.
Myxozoa: *Mxobolus chondrostomi*, *M. cyprinicola*, *M. dogieli*, *M. karuni*, *M. muelleri*, *M. nemachili*, *M. orientalis*, *M. oviformis*, *M. pfeifferi*, *M. schulmani*, *M. sphaericus* (reported as *M. sphaerica*).
Trematoda: *Pseudochetosoma salmonicola*.
Monogenea: *Dactylogyrus barbioides*, *D. pavlovskyi*, *Paradiplozoon cyprini*.
Cestoda: *Caryophyllaeus auriculatus* (reported as *Monobothrium auriculatum*), *Proteocephalus torulosus*.
Nematoda: *Contracaecum* sp., *Rhabdochona hellichi*.
Annelida: *Piscicola geomerta*.
Crustacea: *Argulus foliaceus*.

Aspius vorax*: See *Leuciscus vorax

Barbus barbulus*: See *Luciobarbus barbulus

Barbus belayewi*: See *Capoeta damascina

Barbus esocinus*: See *Luciobarbus esocinus

Barbus grypus*: See *Arabibarbus grypus

Barbus lacerta
Monogenea: *Dactylogyrus orbus*.

Barbus luteus*: See *Carasobarbus luteus

Barbus sharpeyi*: See *Mesopotamichthys sharpeyi

Barbus xanthopterus*: See *Luciobarbus xanthopterus

***Capoeta damascina* (reported as *Barbus belayewi*)**
Myxozoa: *Myxobolus oviformis, M. pfeifferi*.
Trematoda: *Ascocotyle coleostoma, Diplostomum* sp.
Monogenea: *Dactylogyrus cornu, Gyrodactylus elegans*.
Nematoda: *Spiroxys* sp.
Acanthocephala: *Neoechinorhynchus zabensis*.
Crustacea: *Lernaea cyprinacea, Tracheliastes polycolpus*.

***Capoeta trutta* (also reported as *Varicorhinus trutta*)**
Myxozoa: *Myxobolus oviformis*.
Monogenea: *Dactylogyrus pulcher, D. varicorhini, Gyrodactylus markewitschi, Paradiplozoon magnum*.
Nematoda: *Contracaecum* sp., *Porrocaecum* sp.
Acanthocephala: *Neoechinorhynchus cristatus, N. rutili, N. zabensis*.
Crustacea: *Pseudolamproglena boxshalli*.

***Carasobarbus luteus* (also reported as *Barbus luteus*)**
Myxozoa: *Myxobolus ellipsoides, M. koi, M. macrocapsularis, M. oviformis, M. persicus, M. pfeifferi*.
Trematoda: *Ascocotyle coleostoma, Diplostomum* sp.
Monogenea: *Dactylogyrus extensus, D. jamansajensis, D. rohdeianus, D. tuba, D. varicorhini, Gyrodactylus baicalensis, Paradiplozoon amurense, P. cyprini, P. pavlovskii* (reported as *Diplozoon pavlovskii*), *P. vojteki*.
Cestoda: *Caryophyllaeus auriculatus* (reported as *Monobothrium auriculatum*).
Nematoda: *Philometra abdominalis*.
Crustacea: *Argulus foliaceus, Ergasilus mosulensis, E. peregrinus, E. sieboldi, Pseudolamproglena annulata, P. boxshalli*.

Carassius auratus
Cestoda: *Schyzocotyle acheilognathi* (reported as *Bothriocephalus acheilognathi*).
Acanthocephala: *Neoechinorhynchus zabensis*.

Chondrostoma regium
Myxozoa: *Myxobolus dispar, M. musculi, M. oviformis, M. pseudodispar, M. sphaericus* (reported as *M. sphaerica*).
Trematoda: *Ascocotyle coleostoma, Diplostomum* sp.
Monogenea: *Paradiplozoon pavlovskii* (reported as *Diplozoon pavlovskii*).
Cestoda: *Schyzocotyle acheilognathi* (reported as *Bothriocephalus acheilognathi*).
Nematoda: *Contracaecum* sp.

Cyprinion kais
Trematoda: *Diplostomum spathaceum*.

Cyprinion macrostomum
Ciliophora: *Trichodina domerguei*.
Myxozoa: *Myxidium rhodei, Myxobolus acutus* (reported as *Myxosoma acuta*), *M. musculi, M. pfeifferi, Thelohanellus catlae*.
Trematoda: *Clinostomum complanatum*.
Monogenea: *Dactylogyrus latituba, D. macrostomi, D. pulcher, Diplozoon paradoxum, Gyrodactylus baicalensis, Paradiplozoon amurense, P. barbi* (reported as *Diplozoon barbi*), *P. bliccae, P. cyprini, P. iraqensis, P. kasimii* (reported as *Diplozoon kasimii*), *P. pavlovskii, P. rutili*.

Cestoda: *Diphyllobothrium latum*, *Khawia rossittensis*, *Ligula intestinalis*, *Senga magna* (reported as *Polyonchobothrium magnum*).
Nematoda: *Capillaria* sp., *Rhabdochona* (*R.*) *denudata* (reported as *R. mesopotamica*), *Rhabdochona* (*R.*) *tigridis* (reported as *R. grandipapillata*).
Crustacea: *Pseudolamproglena annulata*, *P. boxshalli*.

Cyprinus carpio
Myzozoa: *Cryptosporidium* sp.
Ciliophora: *Ichthyophthirius multifiliis*, *Trichodina cottidarum*, *Trichodina* sp.
Trematoda: *Sanguinicola* sp.
Monogenea: *Dactylogyrus vastator*, *Eudiplozoon nipponicum*, *Paradiplozoon barbi* (reported as *Diplozoon barbi*), *P. bliccae*, *P. pavlovskii*.
Cestoda: *Caryophyllaeus* sp., *Postgangesia inarmata*, *Proteocephalus torulosus*, *Schyzocotyle acheilognathi* (reported as *Bothriocephalus acheilognathi* and *B. gowkongensis*).
Hirudinea: *Hemiclepsis marginata*.
Crustacea: *Argulus foliaceus*, *Lernaea cyprinacea*, *Pseudolamproglena boxshalli*.

Garra rufa
Nematoda: *Rhabdochona* (*R.*) *tigridis* (reported as *R. grandipapillata*).
Crustacea: *Lamproglena pulchella*.

Hemigrammocapoeta elegans
Monogenea: *Paradiplozoon magnum*.

Leuciscus lepidus*: See *Squalius lepidus

***Leuciscus vorax* (also reported as *Aspius vorax*)**
Myxozoa: *Myxobolus dispar*, *M. oviformis*, *M. pfeifferi*.
Trematoda: *Ascocotyle coleostoma*, *Aspidogaster limacoides*, *Pseudochetosoma salmonicola*, *Sphaerostoma bramae* (reported as *Distoma globiporum*).
Monogenea: *Eudiplozoon nipponicum*, *Paradiplozoon ergensi*, *P. rutili*, *P. vojteki*.
Cestoda: *Glanitaenia osculata* (reported as *Proteocephalus osculatus*), *Khawia rossittensis*, *Schyzocotyle acheilognathi* (reported as *Bothriocephalus acheilognathi*).
Nematoda: *Contracaecum* sp., *Cucullanus pseudeutropi*.
Acanthocephala: *Neoechinorhynchus iraqensis*.
Crustacea: *Ergasilus peregrinus*, *Lamproglena pulchella*.

Liza abu*: See *Planiliza abu

***Luciobarbus barbulus* (also reported as *Barbus barbulus*)**
Myxozoa: *Myxobolus dispar*, *M. oviformis*, *M. pfeifferi*.
Trematoda: *Pseudochetosoma salmonicola*.
Monogenea: *Dactylogyrus barbuli*, *D. vastator*.
Cestoda: *Caryophyllaeus auriculatus* (reported as *Monobothrium auriculatum*).
Acanthocephala: *Paulisentis fractus*.

***Luciobarbus esocinus* (also reported as *Barbus esocinus*)**
Monogenea: *Dactylogyrus kulwieci*.
Nematoda: *Cucullanus pseudeutropi*.
Crustacea: *Argulus foliaceus*.

***Luciobarbus xanthopterus* (also reported as *Barbus xanthopterus*)**
Ciliophora: *Ichthyophthirius multifiliis*.

Myxozoa: *Myxobolus parvus, M. sandrae*.
Trematoda: *Aspidogaster limacoides*.
Monogenea: *Dactylogyrus inutilis, D. kulwieci, D. vastator*.
Cestoda: *Khawia armeniaca*.
Nematoda: *Contracaecum* sp., *Rhabdochona hellichi*.
Crustacea: *Argulus foliaceus, Ergasilus sieboldi, Lernaea cyprinacea, Pseudolamproglena boxshalli*.

***Mastacembelus mastacembelus* (erroneously reported as *M. simach*)**
Nematoda: *Procamallanus viviparous*.

Mastacembelus simach*: See *Mastacembelus mastacembelus

***Mesopotamichthys sharpeyi* (also reported as *Barbus sharpeyi*)**
Myxozoa: *Myxobolus dispar, M. oviformis, M. pfeifferi*.
Trematoda: *Ascocotyle coleostoma, Aspidogaster limacoides, Sanguinicola* sp.
Monogenea: *Dactylogyrus pavlovskyi*.
Cestoda: *Schyzocotyle acheilognathi* (reported as *Bothriocephalus acheiolgnathi* and as *B. gowkongensis*).
Crustacea: *Lernaea cyprinacea*.

***Planiliza abu* (also reported as *Liza abu*)**
Myzozoa: *Eimeria sinensis*.
Ciliophora: *Apiosoma megamicronucleatum, Trichodina elegeni, T. murmanica*.
Myxozoa: *Myxobolus dogieli, M. karelicus, M. muelleri, M. nemachili, M. oviformis*.
Trematoda: *Ascocotyle coleostoma*.
Monogenea: *Microcotyle donavini, Paradiplozoon bliccae*.
Acanthocephala: *Neoechinorhynchus cristatus, N. iraqensis* (also reported as *N. agilis*), *N. zabensis*.
Crustacea: *Ergasilus peregrinus*.

Silurus triostegus
Ciliophora: *Trichodina domerguei*.
Monogenea: *Thaparocleidus vistulensis* (reported as *Ancylodiscoides vistulensis*).
Cestoda: *Postgangesia hemispherous, P. inarmata, Schyzocotyle acheilognathi* (reported as *Bothriocephalus acheilognathi*).
Nematoda: *Contracaecum* sp.
Acanthocephala: *Neoechinorhynchus zabensis*.

***Squalius lepidus* (reported as *Leuciscus lepidus*)**
Myxozoa: *Myxobolus oviformis, M. pfeifferi*.
Trematoda: *Ascocotyle coleostoma*.
Cestoda: *Schyzocotyle acheilognathi* (reported as *Bothriocephalus acheilognathi*).
Nematoda: *Cucullanus cyprini*.

Varicorhinus trutta*: See *Capoeta trutta

***Varicorhinus* sp.**
Myxozoa: *Myxobolus cyprinicola, M. muelleri*.

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