Literature review on fish parasites of Al-Furat fish farm, Babylon province, Iraq

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Abstract

The paper reviews all the reports concerning the parasitic fauna of the three species of carps cultured in Al-Furat fish farm, Babylon province, mid Iraq. These fishes included the common carp (*Cyprinus carpio*), the grass carp (*Ctenopharyngodon idella*) and the silver carp (*Hypophthalmichthys molitrix*) as well as the mullet (*Liza abu*) found in the same farm. The parasitic fauna included 60 valid parasite species: ten protozoans, three myxozoans, 29 monogeneans, one trematode, five cestodes, three nematodes, two acanthocephalans, six crustaceans and one mollusc. The common carp was found to harbour 56 species of parasites, the grass carp 25 species, the silver carp 25 species and the mullet six species. The parasitic species were revised and some were synonymised in accordance with latest internet taxonomical accounts. A host- parasite list was prepared for each host species which included all documented literature concerned with this farm.

Key words: Review, Carps, Al-Furat fish farm, Parasites, Iraq.

Introduction

Fish farming in Iraq started in 1955 when a small pond in Al-Zaafaraniya, at about 14 km south of Baghdad city centre was stocked with the common carp (Al-Hamed, 1960). A great advance was achieved in fish farming industry in Iraq during the

seventies and early eighteens of the last century when many fish farms were established especially in mid Iraq. Among these farms was Babylon fish farm, whose name was changed later to Al-Furat fish farm.

Fish farms are vulnerable to great hazards exerted by parasites and other disease agents, especially under extensive culture and inadequate administrative and control measures (Bauer *et al.*, 1969; Mhaisen, 1993b, c, 1996). With such conditions of crowd and bad management, many parasite species can spread easily among fishes, especially those parasites with direct life cycles (Mhaisen, 1983). The first review on parasites of carps in Iraq (Mhaisen *et al.*, 1991) indicated the presence of 26 valid parasite species from the common carp, 14 from the grass carp and 10 from the silver carp. The update numbers of parasite species of these fishes (Mhaisen, 2012) are 136, 38 and 30, respectively.

As literature on parasites of fishes of Al-Furat fish farm are scattered in different local journals, some unpublished theses and few conference proceedings, it was decided to gather data from such literature, revise parasite groups and scientific names and provide host- parasite list for fishes of this farm in order to make them available for parasitologists to enrich the present knowledge on this topic.

Description of Al-Furat Fish Farm

Al-Furat fish farm, previously known as Babylon fish farm, is the largest fish farm in Iraq. It is situated at about 11 kms to the north-west of Hilla city center in Babylon province, mid Iraq. The following description of this farm as well as the main activities practiced was obtained from the farm authority (Al-Zubaidy, 1998). The total area of this farm is 542.5 hectares (2170 donums) which includes 418 hectares of water area. This farm was constructed in 1980, and the year of its first fish marketing was 1984. It has been leased to the private sector in 1989 for 50 years in a form of renewable term.

The farm (Fig. 1) includes a hatchery with an annual production capacity of 60 million fingerlings, 46 nursery ponds with a total area of 7.5 hectares, four ponds for developing and raising fingerling with a total area of 35 hectares, nine breeding ponds each with an area of 36- 48.5 hectares and six ponds for the mothers with an area of 0.39- 0.5 hectare each. The depths of these ponds vary greatly. Generally, the depth of nursery ponds is around 80-100 cm and that of the developing ponds ranges from 1.5-3 meters. The ponds were constructed by burial and excavation while the large ponds were paved with stones. The water source of this farm comes from Hilla River. The water is conveyed by pumping in coated tubes. Draining of the water is performed by a median channel, which flows in the drainage from the south-east of the farm to the general drainage network in the region.

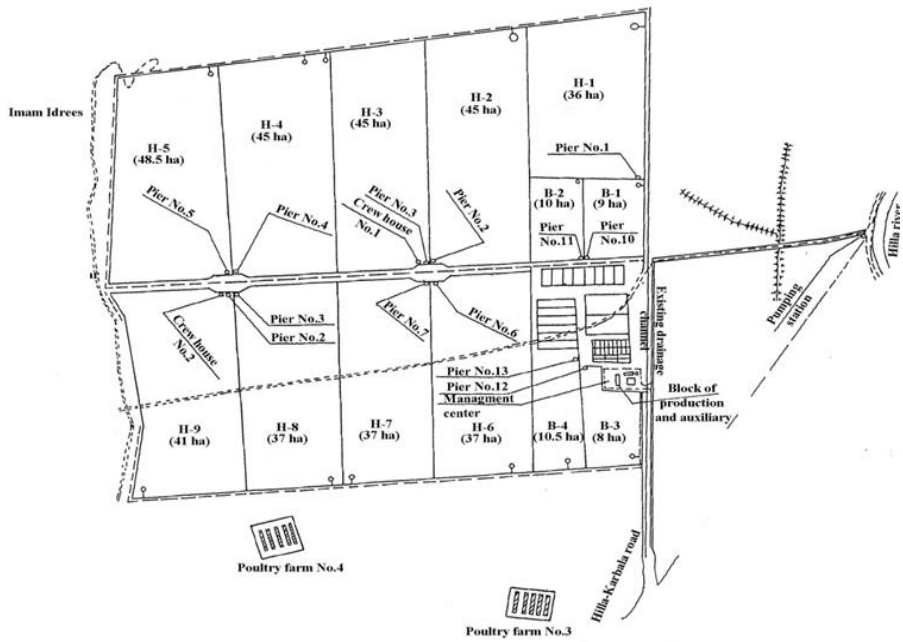

Fig. 1: Schematic diagram of Al-Furat fish farm, Babylon province, Iraq.

Al-Furat fish farm is an integrated productive farm which starts from egg production, fertilization, hatching, nursing of fries and fingerlings and their development till the marketable size. Three types of carps are cultured. These are the common carp (*Cyprinus carpio*), the grass carp (*Ctenopharyngodon idella*) and the silver carp (*Hypophthalmichthys molitrix*). The common carp is cultured with a high ratio of more than 95% of total cultivated species there.

For feeding of fishes, both artificial pellets and green foliage are used. The pellets consist of grains of various kinds (wheat, barley, corn, sunflower ... etc.). Dried fishes, bran and protein are also added to the pellets. Different types of chemical fertilizers, including nitrogen and phosphorus compounds, as well as organic fertilizers (remnants of poultry ruminants) are used for pond fertilization.

Fish harvesting is done by pulling large- sized nets with a mesh size of 2 cm. This is achieved in a specific area of the pond after lowering water level. The nets are pulled by a group of workers. Harvested fishes are transported to the marketing ponds by a portable container in a truck of one ton load. These marketing ponds, which are located near farm management building, are used either for the purpose of fish marketing for consumers in the provinces of Babylon, Karbala, Al-Qadisia and Baghdad, or for the purpose of stocking fishes until their distribution to the other ponds.

The aquatic plants, distributed in the ponds and at their banks, especially the reed (*Phragmites* sp.) and papyrus (*Typha* sp.) are continuously controlled with a mechanical method (cutting) during ponds drying after the end of the marketing season. Also, buffalos in the farm feed on such plants. Control of the parasites and diseases affecting fishes was not urgently needed, except in one case of pond control during 1995 by using an insecticide to get rid of the anchor worm *Lernaea cyprinacea*.

A variety of invertebrates and vertebrates are found in the water of this farm. The invertebrates included molluscs (snails and bivalves), crustaceans (copepods, amphipods and decapods) and aquatic insects (water beetles, water scorpions and dragonflies). The vertebrates included some wild fishes, amphibians, reptiles, birds and mammals. Wild fishes found in the farm included *Aspius vorax*, *Barbus esocinus*, *B. grypus*, *B. sharpeyi*, *B. xanthopterus*, *Heteropneustes fossilis*, *Silurus triostegus*, *Gambusia affinis*, *Aphanius dispar* and *Liza abu*. Two amphibian species are known there. These included the frog *Rana ridibunda* and the toad *Bufo viridis*. Among the reptiles, both the water snake *Natrix tessellate* and the tortoise *Testudo graeca* are known. Eleven land birds as well as 18 species of aquatic birds are also known there. As the aquatic birds are important in fish life as predators and parasite transmitters (Mhaisen, 1983, 1996), their scientific names, according to Heinzel *et al.* (1974), are given here. These included *Phalacrocorax carbo*, *Ciconia ciconia*, *Anas platyrhynchos*, *Ardea cinerea*, *Vanellus indicus*, *V. leucurus*, *Tringa tetanus*, *Hoplopterus spinosus*, *Larus genei*, *L. canus*, *L. ichthyaetus*, *Himantopus himantopus*, *Pelecanus onocrotalus*, *Fulica atra*, *Gallinula chloropus*, *Porphyrio porphyrio*, *Ceryle rudis* and *Halcyon smyrensis*. Some dogs, foxes, jackals, cats as well as rats are also seen.

Parasitological Researches Achieved in Al-Furat Fish Farm

The first parasitological investigation in Al-Furat fish farm (Babylon fish farm at that time) was achieved by the senior author of this paper while accomplishing his sabbatical leave in the Department of Hydrobiology, Biological Research Center of the previous Scientific Research Council in Baghdad during the academic year 1987-1988. Eight reports were done. These included the description of two monogeneans (Ali *et al.*, 1988; Mhaisen *et al.*, 1988) and three ciliates (Ali *et al.*, 1989a) for the first time in Iraq, an account on seven parasite species of the silver carp (Ali *et al.*, Mhaisen, 1990b), 14 parasite species of the

common carp (Mhaisen & Abul-Eis, 1991) and six parasite species of the mugilid fish *L. abu* (Ali *et al.*, 1989c; Mhaisen *et al.*, 1989). In addition, another paper concerned with the helminthic fauna of some aquatic birds of this farm was published (Mhaisen & Abul-Eis, 1992) to demonstrate some relationships between the parasitic fauna of these birds with that of the fishes of this farm.

The next detailed survey was done by Al-Zubaidy (1998) who detected 57 parasite species from the three species of carps, of which 12 parasite species were reported for the first time in Iraq. This study also included the changes in some physicochemical features of the farm water, changes in infection parameters of some parasites, the blood picture of the common carp infected with some monogeneans as well as the experimentation of five plant extract (leaves of *Allium cepa*, *Eucalyptus* sp., *Nerium oleander*, *Clerodendron inerme* and *Ibicella lutea*) to control monogeneans on skin and gills of the common carp.

Mhaisen *et al.* (1993) reported three parasite species from the common carp of Babylon fish farm while surveying the parasites of carps from four farms in Babylon, Diala and Wasit provinces, mid Iraq.

Al-Dulaimi (2002) investigated the infection of the three carp species in Al-Furat fish farm with the anchor worm *L. cyprinacea* and some of the physicochemical changes in water of that farm. He also used three plant extracts (seeds of *Peganus harmala*, *Artemisia herba-alba* and *Pimpinella anisum*) to combat the infection of the common carp with this parasite.

From a comparative study between the infection of carps of Al-Furat fish farm and local fishes in Al-Diwania River, Al-Jadoaa (2002) detected 21 parasite species from the carps and 25 species from river fishes, while 16 parasite species were common in both localities. This study also included the detection of some macroscopical and microscopical changes in fishes due to some parasitic infections as well as the detection of

some changes in the blood picture of fishes infected with some parasitic species.

Al-Zamily (2002) examined specimens of *C. carpio* collected from Al-Furat fish farm and detected three species of ciliates, four *Dactylogyrus* spp., one *Gyrodactylus* sp. as well as the anchor worm. She treated fishes infected with the monogeneans with water extract of fruits of *Punica granatum*, *Citrullus colocynthis* and *Capsicum annum* as well as the seeds of *Coriandrum sativum*.

Kadim (2003) studied some of the physicochemical features of waters of Al-Furat fish farm and made a comparison with those of Al-Mahaweel drainage collector, Babylon province. He demonstrated the infection of *C. carpio* with adult *L. cyprinacea* and its larval forms. The pathological effects of *L. cyprinacea* on the skin of infected *C. carpio* was also investigated beside the treatment of *L. abu* from the drainage which was infected with the crustacean *Dermoergasilus varicoleus* by using water extracts of leaves of *Artemisia herba-alba* and seeds of *Petroselinum crispum*.

Two papers, extracted from Al-Zamily (2002), dealing with the treatment of *C. carpio* of Al-Furat fish farm, infected with the monogeneans, were published. These were that of Mhaisen *et al.* (2005) on the use of *C. annum* and *C. colocynthis* and Al-Zamily *et al.* (2006) on the use of *P. granatum*. In this respect, Al-Zubaidy *et al.* (2009) showed the results of treating the common carp of Al-Furat fish farm from its monogenean parasites by using water extract of leaves of *A. cepa*, *Eucalyptus* sp., *N. oleander*, *C. inerme* and *I. lutea*.

Al-Oumashi (2008) reported four *Dactylogyrus* spp. from gills of the common carp from Al-Furat fish farm (the author mentioned Al-Musaiab, Hilla as the locality of this farm) and contributed on the monthly changes in their infection with these four parasite species.

Al-Zubaidy (2009) presented a comparison in the prevalence and mean intensity of infection of *L. abu* from three localities: Al-Furat fish farm (23 % and 2.9), Hilla River (41.6 % and 3.2) and Al-Mahaweel drainage (8.7 % and 2.5) with the third larval stages of the nematode *Contracaecum* sp. He also demonstrated the changes in infection parameters with fish sex and length as well as the monthly changes in the prevalence. Another comparison was made by Al-Zubaidy (Unpublished) between the infection of *L. abu* from Al-Furat fish farm and Hilla River with the third larval form of *Contracaecum* sp. showed that the prevalence and density of infection in Al-Furat fish farm (4.7 % and 4.14, respectively) were lower than those from Hilla River (20.19 % and 5.52, respectively).

Results and Discussion

The results of surveying literature concerning the parasites recorded from fishes of Al-Furat fish farm indicated the presence of 60 valid parasite species. These included 10 protozoans, three myxozoans, 29 monogeneans, one trematode, five cestodes, three nematodes, two acanthocephalans, six crustaceans and one mollusc larva. The following is a brief account on these parasite groups.

Due to incomplete information concerning the taxonomy and nomenclature of parasite species reported from Al-Furat fish farm, a big effort was paid to get full information in this respect. Some major web sites such as EOL (2012), GNI (2012), ITIS (2012), PESI (2012) and WoRMS (2012) were used to fill any deficiency in such information.

To economize space, host name for each parasite species is given in an abbreviated form as CC for the common carp *C. carpio*, GC for the grass carp *C. idella*, SC for the silver carp *H. molitrix* and Mu for the mullet *L. abu*. Also, after the authority of each parasite scientific name, number of hosts in this farm/ number of hosts from the whole inland waters of Iraq, according to Mhaisen (2012), is given in curly brackets.

Kingdom Protozoa - Phylum Euglenozoa:

Only one species of this phylum was reported by Al-Zubaidy (1998) from the skin and gills of *C. carpio*. This was *Costia necatrix* which is now considered as a synonym of *Ichthyobodo necator*. The first report of *C. necatrix* in Iraq was from *Heteropneustes fossilis* from Basrah by Bhatti (1979). The systematic account of this only euglenozoan parasite of Al-Furat fish farm and its host is given below.

Kingdom Protozoa
Phylum Euglenozoa
Class Kinetoplastea
Order Bodonida
Family Bodonidae
Ichthyobodo necator (Henneguy, 1883) Pinto, 1928 {1/6} CC

Kingdom Protozoa - Phylum Myzozoa:

Only one species of this phylum was reported by Al-Zubaidy (1998) from the intestine of *C. carpio*. This was *Eimeria dogieli*. It is appropriate to mention here that this is the only report on this parasite in fishes of Iraq. However, seven other species of this genus are known in fishes of Iraq (Mhaisen, 2012). Mustafa (2005) reported *Goussia carpelli* from *L. abu* from Tigris River at Mosul. According to Bykhovskaya-Pavlovskaya *et al.* (1962), *G. carpelli* is a synonym of *E. carpelli*. The systematic account of the only one myzozoan parasite of Al-Furat fish farm and its host is given below.

Kingdom Protozoa
Phylum Myzozoa
Class Coccidea
Order Eucocciorida
Family Eimeriidae
Eimeria dogieli (Dogiel, 1948) Pellerdy, 1963 {1/1} CC

Kingdom Protozoa - Phylum Ciliophora:

This phylum includes eight species of external parasites living on skin and gills of four species of fishes in Al-Furat fish farm. These belong to genera *Chilodonella* and *Ichthyophthirius* (one species each), *Trichodina* (two species) and *Apiosoma* (four species).

Among these ciliated protozoans, *T. domerguei* and *I. multifiliis* are prevalent in fishes of Iraq as they infect 37 and 30 fish hosts, respectively (Mhaisen, 2012). Both are pathogenic to their hosts (Amlacher, 1970). The mugilid fish *L. abu* inhabiting fish farms in Iraq acts as carrier of trichodinal infections among cultured fishes (Mhaisen *et al.*, 1989; Mhaisen, 1993a). The latter parasite, *I. multifiliis* causes the white spot disease among fishes which is one of the dangerous diseases in fish farms (Bauer *et al.*, 1969). On the contrary, *C. cyprini* is less frequent among freshwater fishes of Iraq.

Four species of the genus *Apiosoma* were reported from fishes of Al-Furat fish farm. It is adequate to mention here that Al-Zubaidy (1998) reported these species under the genus *Glossatella*. These stalked ciliates attach their bodies through their foot to the skin, gills and buccal cavity of their host. Bauer *et al.* (1969) and Roberts (1978) indicated that species of *Apiosoma* can be extremely pathogenic. The systematic account of ciliophoran parasites of Al-Furat fish farm with their hosts is given below.

Kingdom Protozoa
Phylum Ciliophora
Class Oligohymenophorea
Order Mobilida
Family Trichodinidae
Trichodina domerguei (Wallengren, 1897) {4/37} CC, GC, SC, Mu
Trichodina nigra Lom, 1960 {3/8} CC, GC, SC
Order Sessilida
Family Epistylididae
Apiosoma amoebae (Grenfell, 1887) {3/4} CC, GC, SC
Apiosoma cylindriformis (Chen, 1955) {3/7} CC, GC, SC

Apiosoma piscicola (Blanchard, 1885) {3/3} CC, GC, SC
Apiosoma poteriformis (Timofeev, 1962) {2/2} CC, GC

Order Hymenostomatida
Family Ichthyophthiriidae
Ichthyophthirius multifiliis Fouquet, 1876 {3/30}
CC, GC, SC

Class Phyllopharyngea
Order Chlamydodontida
Family Chilodonellidae
Chilodonella cyprini (Moroff, 1902) Strand, 1928 {3/7}
CC, GC, SC

Kingdom Animalia - Phylum Myxozoa:

This group was used to be known as the sporozoans of the Protozoa, but know it belongs to the phylum Myxozoa of the kingdom Animalia (EOL, 2012; ITIS, 2012; PESI, 2012; WoRMS, 2012). In Al-Furat fish farm, this group is represented by three species of the genus *Myxobolus*. These include external and internal parasites of different fish organs (Duijn, 1973). According to Mhaisen *et al.* (1989), ovaries of *L. abu* from Babylon fish farm, infected with *M. pfeifferi* showed different degrees of petrification and degeneration. The systematic account of myxozoan parasites of Al-Furat fish farm with their hosts is given below.

Kingdom Animalia
Phylum Myxozoa
Class Myxosporea
Order Bivalvulida
Family Myxobolidae
Myxobolus mülleri Bütschli, 1882 {1/6} CC
Myxobolus oviformis Thélohan, 1882 {1/20} CC
Myxobolus pfeifferi Thélohan, 1895 {2/34} CC, GC, SC, Mu

Animalia - Phylum Platyhelminthes - Class Monogenea:

The class Monogenea of the flat worms Platyhelminthes, used to be known as monogenetic trematodes includes parasites of skin, fins and gills of fishes. A total of 29 valid species were recorded from this farm. These monogeneans belong to genera *Dactylogyrus* (15 species), *Gyrodactylus* (11 species), *Pseudacolpenteron*, *Paradiplozoon* and *Microcotyle* (one species each). Generally speaking, *Dactylogyrus* species are known as gill parasites and *Gyrodactylus* species as skin parasites, but with severe infection, species of the latter genus can also found on gills as well (Amlacher, 1970). The remaining genera are usually gill parasites but *P. pavlovskii* was also reported from fish fins. *Dactylogyrus solidus*, reported from *C. carpio* of this farm by Mhaisen & Abul-Eis (1991), is considered as a synonym of *D. extensus* by Gussev (1985) and Galli *et al.* (2010), but according to PESI (2012), both are considered as valid species. It is adequate to state here that *P. barbi* was reported under the name *Diplozoon barbi* by Al-Zubaidy (1998). The systematic account of monogenean parasites of Al-Furat fish farm with their hosts is given below.

Kingdom Animalia
Phylum Platyhelminthes
Class Monogenea
Order Dactylogyridea
Family Dactylogyridae

Dactylogyrus achmerowi Gussev, 1955 {1/11} CC

Dactylogyrus arcuatus Yamaguti, 1942 {2/6} CC, GC

Dactylogyrus cornu Linstow, 1878 {1/13} CC

Dactylogyrus ergensi Molnár, 1964 {1/1} CC

Dactylogyrus extensus Müller & Van Cleave, 1932 {2/16} CC, SC

Dactylogyrus hypophthalmichthys Akhmerov, 1952 {1/1} SC

Dactylogyrus inexpectatus Isjumova in Gussev, 1955 {3/4} CC, GC, SC

Dactylogyrus lamellatus Akhmerov, 1952 {2/3} CC, GC

Dactylogyrus latituba Gussev, 1955 {3/4} CC, GC, SC

Dactylogyrus minutus Kulwiec, 1927 {1/12} CC

Dactylogyrus navicularis Gussev, 1955 {1/1} CC

Dactylogyrus propinquus Bykhovskii, 1931 {1/1} CC

Dactylogyrus sahuensis Ling, 1965 {1/1} CC

Dactylogyrus skrjabini Akhmerov, 1954 {2/5} CC, SC

Dactylogyrus vastator Nybelin, 1924 {2/32} CC, GC

Dactylogyrus spp. {1/8} CC

Pseudacolpenteron pavlovskii Bychowsky & Gussev, 1955 {2/2} CC, SC

Order Gyrodactylidea
Family Gyrodactylidae

Gyrodactylus baicalensis Bogolepova, 1950 {1/8} CC

Gyrodactylus ctenopharngodontis Ling in Gussev, 1952 {1/1} GC

Gyrodactylus elegans von Nordmann, 1832 {3/22} CC, GC, SC

Gyrodactylus kherulensis Ergens, 1974 {2/2} CC, GC

Gyrodactylus malmbergi Ergens, 1961 {2/2} CC, SC

Gyrodactylus markewitschi Kulakovskaya in Markevich, 1952 {1/5} CC

Gyrodactylus medius Kathariner, 1895 {1/2} CC

Gyrodactylus paralatus Gussev, 1955 {2/2} CC, SC

Gyrodactylus salaris Malmberg, 1957 {1/1} CC

Gyrodactylus sprostonae Ling, 1962 {1/5} CC

Gyrodactylus vicinus Bykhowskii, 1957 {1/3} CC

Gyrodactylus spp. {1/6} CC

Order Mazocraeidea
Family Diplozoidae
Paradiplozoon barbi (Reichenbach-Klinke, 1951) {1/7} CC

Family Microcotylidae
Microcotyle donavini van Beneden & Hesse, 1863 {1/10} Mu

Animalia - Phylum Platyhelminthes - Class Trematoda:

The class Trematoda, used to be known as the digenetic trematodes, of fishes of Al-Furat fish farm is representative with only one species, *Diplostomum spathaceum* which occur as a metacercarial stage in fish eyes. This larval form causes worm cataract to infected fishes (Mhaisen, 2004) and its adult form lives in the alimentary canal of fish- eating aquatic birds (Hoffman, 1998). Mhaisen & Abul-Eis (1992) did not found the adult form in eight aquatic birds inhabiting this farm, but Al-Allousi (1985) detected it from *Larus ridibundus* from Al-Baghdadi and Baiji districts, mid Iraq. According to Mhaisen *et al.* (1990a), adult stages of *D. spathaceum* were detected from the alimentary canal of both *L. ichthyaetus* and *L. canus* from Shatt Al-Arab River, Basrah. The systematic account of the only trematode parasite of Al-Furat fish farm with its host is given below.

Kingdom Animalia
Phylum Platyhelminthes
Class Trematoda
Order Diplostomatida
Family Diplostomidae
Diplostomum spathaceum (Rud., 1819) Olsson, 1876 {3/31} CC

Animalia - Phylum Platyhelminthes - Class Cestoda:

Five tapeworms of the class Cestoda were reported from fishes of Al-Furat fish farm. These belong to genera *Bothriocephalus*, *Gryporhynchus* and *Ligula* (one species each) and *Proteocephalus* (two species). All reported cestode species were adults, living in the intestine of their hosts, apart from *Ligula intestinalis* which was reported as larval stage living in the abdominal cavity of its hosts. It is appropriate to mention here that Al-Zubaidy (1998) reported *Bothriocephalus opsari-ichthydis* from *C. carpio* of this farm, but according to Molnár (1977), it is considered as a synonym of *B. acheilognathi*. The systematic account of cestodes of Al-Furat fish farm with their hosts is given below.

Kingdom Animalia
Phylum Platyhelminthes
Class Cestoda
Order Bothriocephalidea
Family Bothriocephalidae
Bothriocephalus acheilognathi Yamaguti, 1934 {2/19} CC, GC
Order Cyclophyllidea
Family Gryporhynchidae
Gryporhynchus cheilancristrotus (Wedl, 1855) {1/1} CC

Order Diphyllobothriidea
Family Diphyllobothriidae
Ligula intestinalis (L., 1758) {2/13} CC, GC

Order Proteocephalidea
Family Proteocephalidae
Proteocephalus osculatus (Goeze, 1782) Nybelin, 1942 {1/8} CC

Proteocephalus torulosus (Batsch, 1786) Nufer, 1905 {1/2} CC

Animalia - Phylum Nematoda:

Only three thread worms were reported from fishes of Al-Furat fish farm. These belong to genera *Contracaecum*, *Cucullanus* and *Rhabdochona* (one species each). Larvae of *Contracaecum* were found in the intestine, liver and body cavity of infected fishes. These larvae are very common in freshwater fishes of Iraq as they were, so far, reported from 38 fish host species (Mhaisen, 2012). The adult worms of such larvae are found in some aquatic birds in Iraq (Al-Hadithi & Habish, 1977). The remaining nematodes were adults and found in the alimentary canal of their hosts. *R. hellichi* was misspelled as *R. belichii* by Al-Jadoaa (2002). The systematic account of nematodes of Al-Furat fish farm with their hosts is given below.

Kingdom Animalia
Phylum Nematoda
Class Secernentea
Order Ascaridida
Family Anisakidae
Contracaecum sp. {2/38} CC, Mu

Family Cucullanidae
Cucullanus cyprini Yamaguti, 1941 {1/14} CC

Order Spirurida
Family Rhabdochonidae
Rhabdochona hellichi (Sramek, 1901) {3/8} CC, GC, SC

Animalia - Phylum Acanthocephala:

Only two thorny or spiny- headed worms were reported from fishes of Al-Furat fish farm. Both species belong to the genus *Neoechinorhynchus*. These included *N. iraqensis* and *N. rutili*. These are adult parasites living in the intestine of their hosts. According to Mhaisen (2002), all records in Iraq dealing with *N. agilis* are in fact wrong records, as *N. agilis* is in fact a marine species and hence such reports really represent *N. iraqensis*. Previous records of *N. agilis* from Al-Furat fish farm included those of Al-Zubaidy (1998) from *C. carpio* and Ali *et al.* (1989c) from *L. abu*. The systematic account of acanthocephalans of Al-Furat fish farm with their hosts is given below.

Kingdom Animalia
Phylym Acanthocephala
Class Eoacanthocephala
Order Neoechinorhynchida
Family Neoechinorhynchidae

Neoechinorhynchus iraqensis Amin, Al-Sady, Mhaisen & Bassat, 2001 {2/24} CC, Mu
Neoechinorhynchus rutili (Müller, 1780) {3/16} CC, GC, SC

Animalia - Phylum Arthropoda - Subphylum Crustacea:

Six species of crustaceans (subphylum Crustacea of the phylum Arthropoda) were found on fishes of Al-Furat fish farm. These included one branchiuran fish lice *Argulus foliaceus* and five species of copepods which belong to genera *Paraergasilus*, *Lamproglena* and *Lernaea* (one species each) as well as two species of *Ergasilus*. *Argulus* and *Lernaea* infect fish skin but they sometimes attach themselves to fish fins and gills, while species of *Ergasilus*, *Lamproglena* and *Pseudolamproglena* were found on fish gills. *A. foliaceus* is well known for its destructive effects on fishes in general and fish fingerlings in particular (Bauer *et al.*, 1969). The anchor worm *L. cyprinacea* is the commonest parasite among fishes of this farm and it occurs in most fish farms of Iraq due to inadequate quarantine

measures (Mhaisen, 1982, 1983). The systematic account of arthropods of Al-Furat fish farm with their hosts is given below.

Kingdom Animalia
Phylum Arthropoda
Subphylum Crustacea
Class Maxillopoda
Subclass Branchiura
Order Arguloidea
Family Argulidae
Argulus foliaceus (L., 1758) {3/14} CC, GC, SC
Subclass Copepoda
Order Poecilostomatoida
Family Ergasilidae
Ergasilus mosulensis Rahemo, 1982 {3/19} CC, GC, SC
Ergasilus sieboldi von Nordmann, 1832 {3/25} CC, GC, SC
Paraergasilus inflatus Ho, Khamees & Mhaisen, 1996 {1/7} SC
Order Cyclopoida
Family Lernaeidae
Lamproglena pulchella von Nordmann, 1832 {1/19} CC
Lernaea cyprinacea L., 1758 {4/25} CC, GC, SC, Mu

Animalia - Phylum Mollusca:

Glochidium larva of one freshwater mussel *Unio pictorum*, of the phylum Mollusca, was recorded from gills of fishes of Al-Furat fish farm by Al-Zubaidy (1998) and Al-Jadoaa (2002). This larva is common in gills of fishes from both inland waters and fish farms of Iraq (Mhaisen, 2012). Its systematic account with its hosts is given below.

Phylum Mollusca
Class Bivalvia
Order Unionoida
Family Unionidae
Unio pictorum Zhadin, 1938 {2/24} CC, SC

Host- Parasite List

Host- parasite lists provide information indicating which parasites infect different hosts. For Al-Furat fish farm, the following host- parasite list is compiled. For each host, the scientific names of all recorded parasites are alphabetically enlisted under their major parasitic groups. References of previous records were chronologically documented for each parasite species.

1- The Common Carp *Cyprinus carpio*:

Euglenozoa: *Ichthyobodo necator* (Al-Zubaidy, 1998 reported as *Costia necatrix*).
Myzozoa: *Eimeria dogieli* (Al-Zubaidy, 1998).
Ciliophora: *Apiosoma amoebae* (Al-Zubaidy, 1998 reported as *Glossatella amoebae*), *A. cylindriformis* (Al-Zubaidy, 1998 reported as *Glossatella cylindriformis*), *A. piscicola* (Al-Zubaidy, 1998 reported as *Glossatella piscicola*; Al-Jadoaa, 2002), *A. poteriformis* (Al-Zubaidy, 1998 reported as *Glossatella poteriformis*), *Chilodonella cyprini* (Al-Zubaidy, 1998; Al-Jadoaa, 2002; Al-Zamily, 2002), *Ichthyophthirius multifiliis* (Mhaisen & Abul-Eis, 1991; Al-Zubaidy, 1998; Al-Jadoaa, 2002, Al-Zamily, 2002), *Trichodina domerguei* (Mhaisen & Abul-Eis, 1991; Al-Zubaidy, 1998; Al-Jadoaa, 2002, Al-Zamily, 2002), *T. nigra* (Al-Zubaidy, 1998; Al-Jadoaa, 2002).
Myxozoa: *Myxobolus mülleri* (Al-Zubaidy, 1998), *M. oviformis* (Al-Zubaidy, 1998), *M. pfeifferi* (Mhaisen & Abul-Eis, 1991; Al-Zubaidy, 1998; Al-Jadoaa, 2002).
Monogenea: *Dactylogyrus achmerowi* (Mhaisen *et al.*, 1988; Mhaisen & Abul-Eis, 1991; Al-Zubaidy, 1998; Al-Jadoaa, 2002; Al-Zamily, 2002; Mhaisen *et al.*, 2005; Al-Zamily *et al.*, 2006; Al-Oumashi, 2008), *D. arcuatus* (Mhaisen & Abul-Eis, 1991; Al-Zubaidy, 1998; Al-Oumashi, 2008), *D. cornu* (Al-Zubaidy, 1998), *D. ergensi* (Al-Zubaidy, 1998), *D. extensus* (Mhaisen & Abul-Eis, 1991; Al-Jadoaa, 2002; Al-Zamily, 2002; Mhaisen *et*

al., 2005; Al-Zamily *et al.*, 2006; Al-Oumashi, 2008), *D. inexpectatus* (Al-Zubaidy, 1998; Al-Jadoaa, 2002), *D. lamellatus* (Al-Zubaidy, 1998), *D. latituba* (Al-Zubaidy, 1998), *D. minutus* (Al-Zubaidy, 1998; Al-Zamily, 2002; Mhaisen *et al.*, 2005; Al-Zamily *et al.*, 2006), *D. navicularis* (Al-Zubaidy, 1998), *D. propinquus* (Al-Zubaidy, 1998), *D. sahuensis* (Al-Zubaidy, 1998), *D. skrjabini* (Al-Zubaidy, 1998), *D. solidus*, as a synonym of *D. extensis* (Mhaisen & Abul-Eis, 1991), *D. vastator* (Al-Zubaidy, 1998; Al-Zamily, 2002; Mhaisen *et al.*, 2005; Al-Zamily *et al.*, 2006; Al-Oumashi, 2008), *Dactylogyrus* spp. (Al-Zubaidy *et al.*, 2009), *Gyrodactylus baicalensis* (Mhaisen & Abul-Eis, 1991; Al-Zubaidy, 1998; Al-Jadoaa, 2002), *G. elegans* (Mhaisen & Abul-Eis, 1991; Mhaisen *et al.*, 1993; Al-Zubaidy, 1998; Al-Jadoaa, 2002; Al-Zamily, 2002; Mhaisen *et al.*, 2005; Al-Zamily *et al.*, 2006), *G. kherulensis* (Ali *et al.*, 1988; Mhaisen & Abul-Eis, 1991; Al-Zubaidy, 1998), *G. malmbergi* (Al-Zubaidy, 1998), *G. markewitschi* (Al-Zubaidy, 1998), *G. medius* (Al-Zubaidy, 1998), *G. paralatus* (Al-Zubaidy, 1998), *G. salaris* (Al-Zubaidy, 1998; Al-Jadoaa, 2002), *G. sprostonae* (Al-Zubaidy, 1998), *G. vicinus* (Al-Zubaidy, 1998), *Gyrodactylus* spp. (Al-Zubaidy *et al.*, 2009), *Paradiplozoon barbi* (Al-Zubaidy, 1998 reported as *Diplozoon barbi*), *Pseudacolpenteron pavlovskii* (Mhaisen & Abul-Eis, 1991; Al-Zubaidy, 1998).

Trematoda: *Diplostomum spathaceum* (Al-Jadoaa, 2002).

Cestoda: *Bothriocephalus acheilognathi* (Mhaisen *et al.*, 1993; Al-Zubaidy, 1998 reported as *B. opsariichthydis*), *Gryporhynchus cheilancristrotus* (Al-Zubaidy, 1998), *Ligula intestinalis* (Al-Zubaidy, 1998), *Proteocephalus osculatus* (Al-Zubaidy, 1998), *P. torulosus* (Al-Zubaidy, 1998).

Nematoda: *Contracaecum* sp. (Al-Zubaidy, 1998; Al-Jadoaa, 2002; Al-Zubaidy, 2009), *Cucullanus cyprini* (Al-Zubaidy, 1998), *Rhabdochona hellichi* (Al-Jadoaa, 2002).

Acanthocephala: *Neoechinorhynchus iraqensis* (Al-Zubaidy, 1998 reported as *N. agilis*), *N. rutili* (Al-Zubaidy, 1998; Al-Jadoaa, 2002).

Crustacea: *Argulus foliaceus* (Mhaisen & Abul-Eis, 1991; Al-Zubaidy, 1998), *Ergasilus mosulensis* (Al-Zubaidy, 1998), *E. sieboldi* (Mhaisen & Abul-Eis, 1991; Al-Zubaidy, 1998; Al-Jadoaa), *Lamproglena pulchella* (Al-Zubaidy, 1998), *Lernaea cyprinacea* (Mhaisen & Abul-Eis, 1991; Mhaisen *et al*., 1993; Al-Zubaidy, 1998; Al-Dulaimi, 2002; Al-Jadoaa, 2002; Al-Zamily, 2002; Kadim, 2003).
Mollusca: *Unio pictorum* (Al-Zubaidy, 1998; Al-Jadoaa, 2002).

2- The Grass Carp *Ctenopharyngodon idella*:

Ciliophora: *Apiosoma amoebae* (Ali *et al*., 1989a; Mhaisen *et al*., 1990b; Al-Zubaidy, 1998 reported as *Glossatella amoebae*), *A. cylindriformis* (Ali *et al*., 1989a; Mhaisen *et al*., 1990b; Al-Zubaidy, 1998 reported as *Glossatella cylindriformis*), *A. piscicola* (Al-Zubaidy, 1998 reported as *Glossatella piscicola*), *A. poeriformis* (Ali *et al*., 1989a; Mhaisen *et al*., 1990b; Al-Zubaidy, 1998 reported as *Glossatella poteriformis*), *Chilodonella cyprini* (Al-Zubaidy, 1998; Al-Jadoaa, 2002), *Ichthyophthirius multifiliis* (Al-Zubaidy, 1998; Al-Jadoaa, 2002), *Trichodina domerguei* (Mhaisen *et al*., 1990b; Al-Zubaidy, 1998; Al-Jadoaa, 2002), *T. nigra* (Al-Jadoaa, 2002).
Myxozoa: *M. pfeifferi* (Al-Jadoaa, 2002).
Monogenea: *Dactylogyrus arcuatus* (Al-Jadoaa, 2002), *D. extensus* (Al-Jadoaa, 2002), *D. inexpectatus* (Al-Zubaidy, 1998; Al-Jadoaa, 2002), *D. lamellatus* (Mhaisen *et al*., 1990b; Al-Zubaidy, 1998), *D. latituba* (Al-Zubaidy, 1998), *D. vastator* (Al-Zubaidy, 1998), *Gyrodactylus ctenopharyngodontis* (Mhaisen *et al*., 1990b; Al-Zubaidy, 1998), *G. elegans* (Al-Zubaidy, 1998; Al-Jadoaa, 2002), *G. kherulensis* (Al-Zubaidy, 1998).
Cestoda: *Bothriocephalus acheilognathi* (Mhaisen *et al*., 1990b), *Ligula intestinalis* (Mhaisen *et al*., 1990b; Al-Zubaidy, 1998; Al-Jadoaa, 2002).
Nematoda: *Rhabdochona hellichi* (Al-Jadoaa, 2002).
Acanthocephala: *N. rutili* (Al-Jadoaa, 200).
Crustacea: *Argulus foliaceus* (Al-Zubaidy, 1998), *Ergasilus mosulensis* (Al-Zubaidy, 1998), *E. sieboldi* (Al-Zubaidy, 1998; Al-Jadoaa, 2002), *Lernaea cyprinacea* (Mhaisen *et al*., 1990b; Al-Zubaidy, 1998; Al-Dulaimi, 2002; Al-Jadoaa, 2002).

3- The Silver Carp *Hypophthamichthys molitrix*:

Ciliophora: *A. amoebae* (Ali *et al.*, 1989a, b; Al-Zubaidy, 1998 reported as *Glossatella amoebae*), *A. cylindriformis* (Ali *et al.*, 1989a, b; Al-Zubaidy, 1998 reported as *Glossatella cylindriformis*), *A. piscicola* (Ali *et al.*, 1989a, b; Al-Zubaidy, 1998 reported as *Glossatella piscicola*), *Chilodonella cyprini* (Al-Zubaidy, 1998), *Ichthyophthirius multifiliis* (Al-Zubaidy, 1998; Al-Jadoaa, 2002), *Trichodina domerguei* (Ali *et al.*, 1989b; Al-Zubaidy, 1998), *T. nigra* (Al-Zubaidy, 1998; Al-Jadoaa, 2002).
Myxozoa: *Myxobolus pfeifferi* (Al-Zubaidy, 1998; Al-Jadoaa, 2002).
Monogenea: *Dactylogyrus extensus* (Al-Jadoaa, 2002), *D. hypophthalmichthys* (Ali *et al.*, 1989b; Al-Zubaidy, 1998), *D. inexpectatus* (Al-Jadoaa, 2002), *D. latituba* (Al-Zubaidy, 1998), *D. skrjabini* (Ali *et al.*, 1989b; Al-Zubaidy, 1998), *Gyrodactylus elegans* (Al-Jadoaa, 2002), *G. malmbergi* (Al-Zubaidy, 1998), *G. paralatus* (Al-Zubaidy, 1998), *Pseudacolpenteron pavlovskii* (Al-Zubaidy, 1998).
Nematoda: *Rhabdochona hellichi* (Al-Jadoaa, 2002).
Acanthocephala: *N. rutili* (Al-Jadoaa, 2002).
Crustacea: *Argulus foliaceus* (Al-Zubaidy, 1998), *Ergasilus mosulensis* (Al-Zubaidy, 1998), *E. sieboldi* (Al-Zubaidy, 1998), *Lernaea cyprinacea* (Ali *et al.*, 1989b; Al-Zubaidy, 1998; Al-Dulaimi, 2002; Al-Jadoaa, 2002), *Paraergasilus inflatus* (Al-Zubaidy, 1998).
Mollusca: *Unio pictorum* (Al-Zubaidy, 1998).

4- The Mullet *Liza abu*:

Ciliophora: *Trichodina domerguei* (Mhaisen *et al.*, 1989).
Myxozoa: *Myxobolus pfeifferi* (Mhaisen *et al.*, 1989).
Monogenea: *Microcotyle donavini* (Ali *et al.*, 1989c).
Nematoda: *Contracaecum* sp. (Ali *et al.*, 1989c; Al-Zubaidy, 2009; Al-Zubaidy, Unpublished).
Acanthocephala: *Neoechinorhynchus iraqensis* (Ali *et al.*, 1989c reported as *N. agilis*).
Crustacea: *Lernaea cyprinacea* (Mhaisen *et al.*, 1989).

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References

Al-Allousi, J.A.A. (1985). A survey of alimentary canal helminthes of two birds: Gull (*Larus ridibundus*) and wood-pigeon (*Columbia palumpus*) from Baghdadi and Baiji regions. M. Sc. Thesis, Coll. Sci., Univ. Baghdad: 124 pp. (In Arabic).

Al-Dulaimi, F.H.A. (2002). Distribution of infection with *Lernaea cyprinacea* L. in carps and its control by using some plant extracts. M. Sc. Thesis, Coll. Sci., Univ. Babylon: 84 pp. (In Arabic).

Al-Hadithi, I.A.W. and Habish, A.H. (1977). Observations on nematode parasite *Contracaecum* sp. in some Iraqi fishes. Bull. Basrah Nat. Hist. Mus., 4: 17-25.

Al-Hamed, M.I. (1960). Carp culture in Iraq. Iraqi J. Agric. Res., 1(2): 14-23. (In Arabic).

Ali, N.M.; Mhaisen, F.T. and Abul-Eis, E.S. (1989 a). Three stalked ciliates (Scyphidia: Peritrichia) new to the parasitic fauna of the fishes of Iraq. Proc. 5th Sci. Conf., Sci. Res. Counc., 5(2): 218-224.

Ali, N.M.; Mhaisen, F.T.; Abul-Eis, E.S. and Kadim, L.S. (1988). First occurrence of the monogenetic trematode *Gyrodactylus kherulensis* Ergens, 1974 in Iraq on the gills of the common carp *Cyprinus carpio*. J. Biol. Sci. Res., 19(3): 659-664.

Ali, N.M.; Mhaisen, F.T.; Abul-Eis, E.S. and Kadim, L.S. (1989 b). Parasites of the silver carp *Hypophthalmichthys molitrix* from Babylon fish farm, Hilla, Iraq. Riv. Idrobiol., 28(1-2): 151-154.

Ali, N.M.; Mhaisen, F.T.; Abul-Eis, E.S. and Kadim, L.S. (1989 c). Helminth parasites of the mugilid fish *Liza abu* (Heckel) inhabiting Babylon fish farm, Hilla, Iraq. Proc. 5th Sci. Conf., Sci. Res. Counc., 5(2): 225-233.

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

Al-Oumashi, G.B. (2008). A study on carp infection dynamics by worm (*Dactylogyrus*) in Al-Forat fish farm. Al-Qadisiya J. Pure Sci., 13(2): 8-13. (In Arabic).

Al-Zamily, N.A. (2002). Efficiency of some plant extracts in eradication of monogenetic trematodes parasitizing skin and gills of the common carp (*Cyprinus carpio* L.). M.Sc. Thesis, Coll. Educ. (Ibn Al-Haitham), Univ. Baghdad: 90 pp. (In Arabic).

Al-Zamily, N.A.; Mhaisen, F.T. and Al-Kaisey, M.T. (2006). Efficiency of the water extract of pomegranate fruit shells in treating the common carp infected with skin and gill trematodes. Ibn Al-Haitham J. Pure Appl. Sci., 19(4A): 1-12. (In Arabic).

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

Al-Zubaidy, A.B. (2009). Prevalence and densities of *Contracaecum* sp. larvae in *Liza abu* (Heckel, 1843) from different Iraqi water bodies. J. King Abdulaziz Univ., Mar. Sci., 20: 3-17.

Al-Zubaidy, A.B. (Unpublished). Studies on the food, size and endoparasites of *Liza abu* from river and farm in Babylon, middle of Iraq.

Al-Zubaidy, A.B.; Mhaisen, F.T. and Al-Zubaidy, F.S. (2009). Study on the parasitic fauna of carps in Al-Furat fish farm, Iraq. 1: Treatment of the common carp (*Cyprinus carpio*) infected with monogenetic trematodes by using some plant extracts. J. King Abdulaziz Univ., Mar. Sci., 20: 155-170. (In Arabic).

Amlacher, E. (1970). Textbook of fish diseases (Engl. transl.). T.F.H. Publ., Jersey City: 302 pp.

Bauer, O.N.; Musselius, V.A. and Strelkov, Yu. A. (1969). Diseases of pond fishes. Izdat. Kolos, Moscow: 220 pp. (In Russian).

Bhatti, M.N. (1979). A note on the occurrence of costiasis disease in the stinging catfish, *Heteropneustes fossilis* (Bloch) from Basrah waters. Arab Gulf, 11(1): 216.

Bykhovskaya-Pavlovskaya, I.E.; Gusev, A.V.; Dubinina, M.N.; Izyumova, N.A; Smirnova, T.S.; Sokolovskaya, I.L.; Shtein, G.A.; Shul'man, S.S. and Epshtein, V.M. (1962). Key to parasites of freshwater fish of the U.S.S.R. Akad. Nauk, S.S.S.R., Moscow: 727 pp. (In Russian).

Duijn, van C. Jnr. (1973). Diseases of fishes, 3rd edn., Illife Books, London: 372 pp.

EOL (2012). Encyclopedia of Life on-line database, http//www.eol.org. Retrieved March, 24, 2012.

Galli, P.; Pugachev, O.N. and Kristsky, D. (2010). Guide to monogenoidea of freshwater fish of Palaeartic and Amur regions. Ledizioni Ledipublishing, Milano: 567 pp.

GNI (2012). Global Names Index online database, http://www.gni.globalnames. org. Retrieved March, 24, 2012.

Gussev, A.V. (1985). Parasitic metazoans: Class Monogenea. In: Bauer, O.N. (Ed.). Key to the parasites of freshwater fish fauna of U.S.S.R., vol. 2. Nauka, Petersburg: 424 pp. (In Russian).

Heinzel, H.; Fitter, R. and Parslow, J. (1974). The birds of Britain and Europe with North Africa and the Middle East, 3rd edn., Collins, London: 320 pp.

Hoffman, G.L. (1998). Parasites of North American freshwater fishes, 2nd edn. Cornell Univ. Press, London: 539 pp.

ITIS (2012). Integrated Taxonomic Information System on-line database, http://www.itis.gov. Retrieved March, 24, 2012.

Kadim, R.A. (2003). Investigation of crustacean parasites on some species of fishes in Al-Furat fish farm and Al-Mahaweel drainage collector in Babylon province. M. Sc. Thesis, Coll. Sci., Univ. Babylon: 103 pp. (In Arabic).

Mhaisen, F.T. (1982). The anchor worm, *Lernaea cyprinacea*, in Basrah University fish farm. Iraqi J. Mar. Scs., 1(1): 3-11.

Mhaisen, F.T. (1983). Diseases and parasites of fishes. Basrah Univ. Press: 227 pp. (In Arabic).

Mhaisen, F.T. (1993a). The role of wild fishes in fish farms of Iraq from parasitological and pathological points of view. Iraqi J. Vet. Med., 17: 126-136.

Mhaisen, F.T. (1993b). A review on the parasites and diseases in fishes of ponds and farms of Iraq. Iraqi J. Vet. Sci., 6(2): 20-28. (In Arabic).

Mhaisen, F.T. (1993 c). Parasites and diseases of fishes of Iraq and means of their control. Joint Symposium of the Arab Union of Fish Producers and Arab Union Councils of Scientific Research. Baghdad: 23-24 Dec. 1991: 125-132. (In Arabic).

Mhaisen, F.T. (1996). Natural enemies of farm fishes with special emphasis on fish farms of Iraq. Al-Tharwa Al-Samakia (Fisheries), 14: 92-98 (In Arabic).

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

Mhaisen, F.T. (2004). Worm cataract in freshwater fishes of Iraq. Ibn Al-Haitham J. Pure Appl. Sci., 17(3): 25-33.

Mhaisen, F.T. (2012). Index- catalogue of parasites and disease agents of fishes of Iraq (mhaisenft@yahoo.co.uk).

Mhaisen, F.T. and Abul-Eis, E.S. (1991). Parasites of the common carp (*Cyprinus carpio*) in Babylon fish farm, Hilla, Iraq (unpublished data cited in Mhaisen *et al.*, 1991).

Mhaisen, F.T. and Abul-Eis, E.S. (1992). Parasitic helminths of eight species of aquatic birds in Babylon fish farm, Hilla, Iraq. Zool. Mid. East, 7: 115-119.

Mhaisen, F.T.; Al-Kaisey, M.T. and Al-Zamily, N.A. (2005). Effect of the water extracts of red pepper and colocynth in treating the common carp infected with skin and gill trematodes. Iraqi J. Sci. Technol., 2(2): 5-14. (In Arabic).

Mhaisen, F.T.; Khamees, N.R. and Al-Daraji, S.A.M. (1991). Parasites and disease agents of carps in Iraq: A check-list. Basrah J. Agric. Sci., 4(1 & 2): 133-139.

Mhaisen, F.T.; Khamees, N.R. and Al-Sayab, A.A. (1990a). Flat worms (Platyhelminthes) of two species of gulls (*Larus ichthyaetus* and *L. canus*) from Basrah, Iraq. Zool. Mid. East, 4: 113-116.

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

Mhaisen, F.T.; Ali, N.M.; Abul-Eis, E.S. and Kadim, L.S. (1989). Protozoan and crustacean parasites of the mugilid fish *Liza abu* (Heckel) inhabiting Babylon fish farm, Hilla, Iraq. J. Biol. Sci. Res., 20(3): 517-525.

Mhaisen, F.T.; Ali, N.M.; Abul-Eis, E.S. and Kadim, L.S. (1990b). Parasitological investigation on the grass carp (*Ctenopharyngodon idella*) of Babylon fish farm, Hilla, Iraq. Iraqi J. Biol. Scs., 10(1): 89-96.

Mhaisen, F.T.; Balasem, A.N.; Al-Khateeb, G.H.; Al-Shaikh, S.M.J. and Al-Jawda, J.M. (1993). Survey of parasites of farm fishes in three provinces in mid Iraq. Al-Tharwa Al-Samakia (Fisheries), 13: 84-87. (In Arabic).

Molnár, K. (1977). On the synonyms of *Bothriocephalus acheilognathi* Yamaguti, 1934. Parasitol. Hung., 10: 61-62.

Mustafa, Y.A.S. (2005). Intestinal parasites of mugilid fish *Liza abu* in Mosul and study of experimental infection with *Goussia carpelli* in common carp *Cyprinus carpio* and the effect of methionine on the infection. M. Sc. Thesis, Coll. Vet. Med., Univ. Mosul: 83 pp. (In Arabic).

PESI. (2012). Pan-European Species dictionaries Infrastructure. http://www.eu-nomen.eu/portal/ taxon.php? Retrieved March, 24, 2012.

Roberts, R.J. (ed.). (1978). Fish pathology. Bailliere Tindall, London: 318 pp.

WoRMS. (2012). World Register of Marine Species at http://www.marinespecies.org. Retrieved March, 24, 2012.

عرض مرجعي حول طفيليات الأسماك في مزرعة أسماك الفرات، محافظة بابل، العراق

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الخلاصة

البحث يسترجع كل التقارير المتعلقة بالمجموعة الحيوانية المتطفلة على أنواع أسماك الكارب الثلاثة في مزرعة أسماك الفرات، محافظة بابل، وسط العراق. شملت هذه الأسماك الكارب الإعتيادي والكارب العشبي والكارب الفضي فضلا عن سمكة الخشني الموجودة في المزرعة ذاتها. تم تسجيل 60 نوعا شرعيا من الطفيليات هي عشرة أنواع من الحيوانات الإبتدائية، ثلاثة أنواع من الحيوانات المخاطية، 29 نوعا من المونوجينيا، نوعا واحدا من المخرّمات، خمسة أنواع من الديدان الشريطية، ثلاثة أنواع من الديدان الخيطية، نوعين من الديدان شوكية الرأس، ستة أنواع من القشريات ونوعا واحدا من النواعم. تبين أن الكارب الإعتيادي مصاب بـــ 56 نوعا من الطفيليات، الكارب العشبي بـــ 25 نوعا، الكارب الفضي بـــ 25 نوعا والخشني بستة أنواع. تم نقد الأنواع المتطفلة وإرداف البعض وفقا لأحدث المراجع التصنيفية عبر الشبكة الدولية للمعلومات، كما تم إعداد قائمة بالمضيفات طبقا لطفيلياتها لكل نوع من الأسماك بموجب جميع المصادر الموثقة المعنية بتلك المزرعة.