

Ciliophoran and myxozoan parasites of fishes from the Euphrates River at Al-Musaib City, Babylon Province, Mid Iraq

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Abstract

During the period from July 2006 till the end of June 2007, a total of 472 fish specimens belonging to eight families and 24 species from the Euphrates River at Al-Musaib city, Babylon province, mid Iraq were inspected for parasites. Among the total of 65 parasite species recorded from these fishes, three ciliates (phylum Ciliophora) and two myxosporeans (phylum Myxozoa) were recorded. The ciliates included *Ichthyophthirius multifiliis*, *Trichodina cottidarum* and *T. domerguei* while the myxosporeans included *Myxobolus oviformis* and *M. pfeifferi*. All these parasites were detected from the gills only. Apart from few exceptions, the percentage incidence of infection with all these parasites was generally low. Among all these parasites, *I. multifiliis* infected the highest number of hosts (14 host species), while *M. oviformis* infected only one host. Among these fishes, both *Cyprinion kais* and *Liza abu* were infected with the highest number of parasite species (four species) while six fish species were infected with only one parasite species. In addition, a total of 13 new host records in Iraq were reported for four species of these parasites.

Keywords

Ciliophora, Ciliata, Myxozoa, Myxosporea, Freshwater Fishes, Euphrates River, Iraq

1. Introduction

Among the external parasites infecting freshwater fishes, ciliophorans, myxozoans, monogeneans and crustaceans are the major important agents affecting fish life (Amlacher, 1970; Hoffman, 1998). Members of all these groups have direct life cycle which enable them to easily spread from one fish to another (Dogiel, 1961). These parasites are important fish pathogens, especially for carp fingerlings under extensive fish culture practice and their direct life cycles and fish crowding are good conditions for their easy spread among fishes (Bauer *et al.*, 1969).

Ciliophorans infect fish skin, fins and gills (Basson and Van As, 2006; Dickerson, 2006) while myxozoans infect fins, skin, operculum, buccal cavity, nasal chamber, eye ball, gall

bladder and wall of the alimentary canal (Kaur, 2014). The pathological effects exerted by these parasites depend on factors related to parasite species, factors related to host species as well as the environmental factors (Dogiel, 1961). Occurrence of spots, bumps or boils on different infected organs (Amlacher, 1970), epithelial erosion and ulceration that result from the parasite's entrance into and exit from the host and lesions produced by the parasites which may also lead to secondary microbial infections (Noga, 2010) are among such effects (Rogers and Gaines, 1975; Hoffman, 1998). Most Protozoan ectoparasites feed only on the epithelium's surface, but a few (e.g. *Ichthyophthirius*) penetrate into the epithelium (Noga, 2010).

Among notable parasitological investigations achieved on fishes from Euphrates River within the Iraqi territory are those of Mhaisen *et al.* (1997), Al-Alusi (1998), Asmar *et al.*

(1999), Al-Jadoaa (2002), Al-Awadi (2003), Balasem *et al.* (2003), Al-Sa'adi (2007), Al-Zubaidy (2007), Hussain (2007, 2008) and Al-Salmany (2015). Such literature neither includes the tributaries, canals and drainages associated with Euphrates River nor the fish farms which receive their water supply from this river as no space is available to accommodate all such literature. The present article was aimed to demonstrate the ciliophoran and myxozoan parasites of fishes from the Euphrates River at Al-Musaib city as no previous study was done on fishes of this area and as this area provides the water supply for many fish farms which are distributed in this area.

2. Materials and Methods

Fish specimens were collected from the Euphrates River at Al-Musaib city (32°47'N, 44°17'E), mid Iraq during the period from July 2006 till the end of June 2007. A detailed description of the sampling area was given by Al-Sa'adi (2007). Fishes were caught with the aid of a cast net and were directly transported to the laboratory where they were measured, weighed and sexed. Fishes were freshly examined by making smears from skin, fins and buccal cavity. Gills were removed and placed in Petri dishes with water and microscopically inspected. Upon fish dissection, muscles and all internal organs were examined according to Amlacher (1970). Prevalence of infection was calculated according to Margolis *et al.* (1982). Parasite identification was done according to some major taxonomical references (Bykhovskaya-Pavlovskaya *et al.*, 1962; Shul'man, 1984; Hoffman, 1998). The valid scientific names of the studied fishes were based on Froese and Pauly (2015). The index-catalogue of parasites and disease agents of fishes of Iraq (Mhaisen, 2015) was followed to indicate number of previous host records for each parasite species in order to minimize the list of references of each parasite.

3. Results and Discussion

During the period of this study, 472 fish specimens belonging to eight families and 24 species were inspected for parasites. These fishes are demonstrated below with their families and numbers:-

Family Cyprinidae

- 16 *Alburnus caeruleus* Heckel, 1843
- 10 *Alburnus orontis* Sauvage, 1882
- 24 *Alburnus sellal* Heckel, 1843
- 12 *Barbus barbulus* Heckel, 1847
- 9 *Barbus grypus* Heckel, 1843
- 2 *Capoeta damascina* (Vaenciennes, 1842)
- 77 *Carasobarbus luteus* (Heckel, 1843)
- 4 *Carassius carassius* (Linnaeus, 1758)
- 3 *Chondrostoma regium* (Heckel, 1843)
- 2 *Ctenopharyngodon idella* (Vaenciennes, 1844)
- 60 *Cyprinion kais* Heckel, 1843
- 15 *Cyprinion macrostomum* Heckel, 1843
- 7 *Cyprinus carpio* L., 1758

- 22 *Garra rufa* (Heckel, 1843)
- 33 *Leuciscus vorax* (Heckel, 1843)
- 11 *Luciobarbus xanthopterus* Heckel, 1843
- 2 *Mesopotamichthys sharpeyi* (Günther, 1874)
- Family Bagridae
- 18 *Mystus pelusius* (Solander, 1794)
- Family Siluridae
- 5 *Silurus triostegus* Heckel, 1843
- Family Sisoridae
- 13 *Glyptothorax steindachneri* (Pietschmann, 1913)
- Family Heteropneustidae
- 12 *Heteropneustes fossilis* (Bloch, 1794)
- Family Cichlidae
- 29 *Coptodon zillii* (Gervais, 1848)
- Family Mugilidae
- 48 *Liza abu* (Heckel, 1843)
- Family Mastacembelidae
- 38 *Mastacembelus mastacembelus* (Banks & Solander, 1794)

Fish inspection revealed the occurrence of three ciliates and two myxosporeans as indicated in Table (1) which also shows their hosts and the percentage incidence of infection. All these parasite species were detected from the gills only. These parasites are arranged here in the following systematic list:

Phylum Ciliophora

Class Ciliata

Order Holotricha

Family Ophryoglenidae

Ichthyophthirius multifiliis Fouquet, 1876

Order Peritricha

Family Trichodinidae

Trichodina cottidarum Dogiel, 1948

Trichodina domerguei (Wallengren, 1897)

Phylum Myxozoa

Class Myxosporea

Order Bivalvulida

Family Myxobolidae

Myxobolus oviformis Thélohan, 1882

Myxobolus pfeifferi Thélohan, 1895

The following is a brief account on the occurrence of these parasites.

3.1. *Ichthyophthirius multifiliis* Fouquet, 1876

This parasite was recorded from gills of 14 fish species (Table 1). The first record of this parasite in Iraq was from the skin and gills of *Chelon subviridis* (reported as *Mugil dussumieri*) from Tigris River near Baghdad (Herzog, 1969). Later on, it was recorded from 29 other hosts from different habitats in north, mid and south Iraq (Mhaisen, 2015) which didn't included *A. orontis*, *A. sellal*, *C. zillii*, *C. kais* and *G. steindachneri*. So, these five fish species are considered now as new host records for *I. multifiliis* in Iraq which bring the total number of its hosts to 35 species. Previous host records of *I. multifiliis* from Euphrates River included *C. luteus*, *C. carpio*, *Gambusia holbrooki*, *G. rufa*, *L. vorax*, *L. abu* and *M.*

sharppei (Al-Jadoaa, 2002; Al-Awadi, 2003; Balasem *et al.*, 2003; Hussain, 2008; Al-Salmany, 2015).

3.2. *Trichodina cottidarum* Dogiel, 1948

This parasite was recorded from gills of four fish species (Table 1). The first record of this parasite in Iraq was from gills of *C. carpio* from a manmade fish lake in Al-Zawraa Park, Baghdad city (Abdul-Ameer, 2004). Later on, it was recorded from eight fish hosts from different water bodies and fish farms in mid Iraq (Mhaisen, 2015) which didn't included *A. sellal*, *C. zillii*, *C. kais* and *L. abu*. So, these four fish species are considered as new host records for *T. cottidarum* in Iraq which bring the total number of its hosts to 13 species in Iraq. Previous host records of *T. cottidarum* from Euphrates River included *Capoeta aculeata*, *C. luteus*, *C. regium*, *C. kais*, *C. macrostomum*, *L. vorax*, *L. abu* and *L. xanthopterus* (Hussain, 2007; Al-Salmany, 2015).

3.3. *Trichodina domerguei* (Wallengren, 1897)

This parasite was recorded from gills of 12 fish hosts (Table 1). The first record of this parasite in Iraq was from the skin, fins and gills of eight hosts: *B. grypus*, *C. luteus* (reported as *Barbus luteus*), *C. carpio*, *L. abu*, *Luciobarbus esocinus* (reported as *Barbus esocinus*), *L. xanthopterus* (reported as *Barbus xanthopterus*), *M. sharppei* (reported as *Barbus sharppei*) and *S. triostegus* from Tigris River, Al-Tharthar Lake and fish markets in Baghdad city (Shamsuddin *et al.*, 1971). Later on, it was recorded from 28 other hosts from different habitats in north, mid and south Iraq (Mhaisen, 2015) which didn't included *A. orontis*, *C. zillii* and *G. steindachneri*. So, these three fish species are considered as new host records for *T. domerguei* in Iraq which bring the total number of its hosts to 39 species in Iraq. Previous host records of *T. domerguei* from Euphrates River included *Aphanius dispar*, *B. grypus*, *C. luteus*, *C. macrostomum*, *C. carpio*, *G. rufa*, *L. abu*, *L. xanthopterus*, *M. sharppei* and *Myxolus pelusius* (Asmar *et al.*, 1999; Al-Jadoaa, 2002; Al-Awadi, 2003; Balasem *et al.*, 2003; Al-Zubaidy, 2007; Hussain, 2007; Al-Salmany, 2015). *T. domerguei* is the most prevalent ciliate among fishes of Iraq as it has so far 39 fish host species (Mhaisen, 2015).

3.4. *Myxobolus oviformis* Thélohan, 1882

This parasite was recorded from gills of *C. luteus* only (Table 1). Its first report from Iraq was from gill arches of four fish species: *B. grypus*, *L. vorax* (reported as *Aspius vorax*), *Luciobarbus esocinus* (reported as *Barbus esocinus*) and *M. sharppei* (reported as *Barbus sharppei*) from different localities in Iraq (Herzog, 1969). Later on, it was reported from 16 other hosts (Mhaisen, 2015) from different inland waters in north, mid and south Iraq which included *C. luteus*. So, the total hosts of *M. oviformis* in Iraq are 20 species. Previous host records of *M. oviformis* from Euphrates River included *Alburnus caeruleus*, *B. grypus*, *C. luteus*, *C. regium*, *C. carpio*, *L. vorax*, *L. abu* and *L. xanthopterus* (Mhaisen *et al.*, 1997; Asmar *et al.*, 1999; Balasem *et al.*, 2003; Al-

Zubaidy, 2007). Myxozoans are parasites affecting a wide range of fish tissues (Klinger and Floyd, 1998). In Iraq, *M. oviformis* was reported from a variety of locations of the same host such as the skin, gills, gall bladder, heart, kidneys and spleen of *L. xanthopterus* (Asmar *et al.*, 1999).

Table 1. Parasite-fish host list from the Euphrates River at Al-Musaib city.

| Parasite species | Fish host species | % Incidence | |
|-------------------------------------|----------------------------|---------------------|------|
| <i>Ichthyophthirius multifiliis</i> | <i>A. caeruleus</i> | 12.5 | |
| | <i>A. orontis</i> * | 10 | |
| | <i>A. sellal</i> * | 4.3 | |
| | <i>B. grypus</i> | 22.5 | |
| | <i>C. luteus</i> | 10.4 | |
| | <i>C. regium</i> | 33.3 | |
| | <i>C. zillii</i> * | 10.3 | |
| | <i>C. kais</i> * | 6.7 | |
| | <i>C. macrostomum</i> | 6.7 | |
| | <i>G. rufa</i> | 22.7 | |
| | <i>G. steindachneri</i> * | 15.4 | |
| | <i>L. vorax</i> | 3 | |
| | <i>L. abu</i> | 12.5 | |
| <i>Trichodina cottidarum</i> | <i>M. pelusius</i> | 5.6 | |
| | <i>A. sellal</i> * | 4.3 | |
| | <i>C. zillii</i> * | 6.9 | |
| | <i>C. kais</i> * | 1.7 | |
| | <i>L. abu</i> * | 4.2 | |
| | <i>A. caeruleus</i> | 12.5 | |
| | <i>A. orontis</i> * | 10 | |
| | <i>A. sellal</i> | 4.3 | |
| | <i>C. carassius</i> | 25 | |
| | <i>C. zillii</i> * | 3.4 | |
| <i>Trichodina domerguei</i> | <i>C. kais</i> | 3.3 | |
| | <i>G. rufa</i> | 4.5 | |
| | <i>G. steindachneri</i> * | 15.4 | |
| | <i>H. fossilis</i> | 8.3 | |
| | <i>L. abu</i> | 27.1 | |
| | <i>L. xanthopterus</i> | 9.1 | |
| | <i>M. pelusius</i> | 5.6 | |
| | <i>Myxobolus oviformis</i> | <i>C. luteus</i> | 13 |
| | | <i>A. orontis</i> * | 10 |
| | | <i>B. grypus</i> | 22.2 |
| <i>C. damascina</i> | | 8.3 | |
| <i>C. luteus</i> | | 14.3 | |
| <i>Myxobolus pfeifferi</i> | <i>C. kais</i> | 5 | |
| | <i>C. macrostomum</i> | 6.7 | |
| | <i>L. abu</i> | 6.3 | |
| | <i>L. xanthopterus</i> | 9.1 | |
| | <i>M. sharppei</i> | 50 | |

* New host record in Iraq.

3.5. *Myxobolus pfeifferi* Thélohan, 1895

This parasite was recorded from gills of nine fish hosts (Table 1). Its first report from Iraq was from *Acanthobrama marmid* from Tigris River at Mosul city (Fattohy, 1975). Later on, it was reported from 33 other hosts (Mhaisen, 2015) from different inland waters in north, mid and south Iraq which didn't included *A. orontis*. So, *A. orontis* is now considered as a new host record for *M. pfeifferi* in Iraq which brings the total number of its hosts to 35 species in Iraq. Previous host records of *M. pfeifferi* from Euphrates River included *Acanthobrama centisquama*, *A. caeruleus*, *Aphanius dispar*, *B. grypus*, *C. luteus*, *C. macrostomum*, *C. carpio*, *L.*

vorax, *L. abu* and *M. sharpeyi* (Mhaisen *et al.*, 1997; Asmar *et al.*, 1999; Al-Awadi, 2003; Balasem *et al.*, 2003; Al-Zubaidy, 2007; Al-Salmany, 2015). So far, *M. pfeifferi* is the prevalent myxozoan among fishes of Iraq as it has 35 fish host species (Mhaisen, 2015).

4. Conclusions

To conclude on the ciliophoran and myxozoan infections of fishes from the Euphrates River at Al-Musaib city, *I. multifiliis*, *T. domerguei* and *M. pfeifferi* were the prevalent parasites among these fishes as they were recorded here from 14, 12 and nine fish hosts, respectively. On the other hand, *T. cottidarum* has four hosts and *M. oviformis* has only one host species.

In connection with the hosts, both *C. kais* and *L. abu* harbored four out of the five parasite species. Each of *A. orontis*, *A. sellal*, *C. luteus* and *C. zillii* harbored three parasite species, while the remaining fish species harbored two or one parasite species and five fish species showed no any infection with any of these parasites.

Although in most infected fish species of the present investigation the percentage of infection was generally light, the infected fishes might demonstrate a high risk to cultured fishes (*C. idella*, *C. carpio* and *Hypophthalmichthys molitrix*) in Al-Musaib region where many fish farms get their supplied water from the nearby Euphrates River. Some wild fish species, such as *L. abu* (which harbored four out of the five parasite species) enter fish farms in Iraq with the supplied water and hence the cultured fishes might gain some parasitic infections from such wild fishes (Mhaisen, 1993). *L. abu* which was collected from Al-Furat fish farm (previously known as Babylon fish farm), Hilla showed different degrees of petrification and degeneration in fish ovaries due to its infection with *M. pfeifferi* (Mhaisen *et al.*, 1989).

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