

Checklists of crustaceans of freshwater and marine fishes of Basrah Province, Iraq

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Abstract- Reviewing the literature on all the crustaceans parasitizing freshwater and marine fishes of Basrah province, Iraq indicated the presence of 74 crustacean taxa. Sixty-five taxa belonged to the class Maxillopoda while nine taxa belonged to the class Malacostraca. All these crustaceans were adults living on the external surface of their fish hosts while three taxa were reported as larvae. Fifty-five species of such crustaceans were recorded from marine localities, 11 from freshwater localities and the remaining were from both freshwater and marine localities. The total number of crustacean species recorded for each fish host species fluctuated from a minimum of one crustacean species in 31 fish hosts to a maximum of 15 crustacean species in *Chelon subviridis* only. Number of fish hosts reported for these crustaceans fluctuated from one host in case of 45 crustacean species to a maximum of 18 hosts in case of pranzia larvae of *Gnathia* sp.

Keywords: Crustacea, Copepoda, Isopoda, freshwater fishes, marine fishes, Basrah province, Iraq.

Introduction

Crustaceans establish one of the four recent subphyla of the phylum Arthropoda which is as specious as it includes 1,242,040 species, of which 27,745 species are extinct (Zhang, 2011). No group of plants or animals on the planet exhibits the range of morphological diversity seen among the extant Crustacea (Martin and Davis, 2001). Of all the metazoan groups, the crustaceans are the most diverse and ubiquitous (Rohde, 2005). Ahyong *et al.* (2011) provided a classification list for all the crustacean families and gave an estimate of 1,003 families, 9,522 genera and 66,914 species for recent Crustacea. However, WoRMS (2014) reported a total of 51,758 species.

Generally, crustaceans have segmented, chitin-encased bodies, articulated appendages which included cephalic appendages in form of two pairs of antennae, mouth parts (one pair each of mandibles, maxillae and maxillules and two pairs of maxillipeds), thoracic and abdominal appendages. The paired appendages are typically biramous and consist of two branches: the endopod and exopod (McGraw-Hill Staff, 2003). Due to their relatively large size, some crustaceans such as the isopods are easily found on the outer part of fish bodies (Thatcher, 2000).

There are three main groups of parasitic crustaceans affecting commercially important fish species: Branchiura, Copepoda and Isopoda (Jithendran *et al.*, 2008). Accounts on morphology, life cycles and effects on hosts of these main

groups were given by Boxshall (2005a, b), Lester (2005) and Lester and Hayward (2006) while their managements was demonstrated by Jithendran *et al.* (2008).

The crustaceans occur on fish host on the outer body or fins, in the mouth, gill chambers, or nostrils, or occasionally in self-made pockets in the flesh of their hosts (Hoffman, 1999). Some crustaceans are parasitic as both juveniles and adults, although some are only parasitic as juveniles (Noga, 2010). Some crustaceans cause significant economic losses to fisheries by killing, stunting, or damaging these fishes. They can also kill or impair immature fishes so that they do not survive (Bunkley-Williams *et al.*, 2006). While sea lice demonstrate a problem in cultured salmonids, they are becoming problems in other fishes that are now being cage-cultured at sea (Noga, 2010). Gnathiid isopods have been reported to cause mortality in some sea-caged fishes (Lester and Hayward, 2006). It is interesting to state here that the fish louse *Argulus* has been found in the human eye but this must be highly unusual (Hoffman, 1999).

Some crustaceans play significant role in fish secondary infections. Fish lice have been shown to be mechanical vectors for fish viruses (Ahne, 1985; Overstreet *et al.*, 2009) as well as the haemoprotozoans of the family Haemogregarinidae (McKiernan *et al.*, 2005). They also can be intermediate hosts for several fish-parasitic helminths (Zander *et al.*, 1994) or even some human helminths (Roberts and Janovy, 1996). *Argulus* species are believed to carry and spread *Aeromonas* (Aquarium Connection, 2010). Wounds in pond-cultured *Tinca tinca* caused by some copepods became secondarily infected with *Saprolegnia* sp. (Lester and Hayward, 2006). According to Brusca (1981), bacterial or fungal infections are often observed around feeding wounds caused by the isopod *Nerocila*.

Information concerning crustaceans parasitic on fishes of Basrah province are scattered in different local scientific references. Some crustaceans as well as some fishes have been misidentified, misspelled or quoted with wrong authorities. For these reasons, it was decided to review these data in accordance with Ah Yong *et al.* (2011) and WoRMS (2014) and also to revise fish names and provide an updated host-crustacean checklist in addition to the crustacean list. This review is a continuation of previous literature reviews on major groups of parasites of fishes of Basrah province (Mhaisen *et al.*, 1993; 2013a, b, c; Ali *et al.*, 2014; Mhaisen *et al.*, 2014). Finally, it was also planned to compare the richness of infected fishes of this province with crustaceans with those of the whole country of Iraq based on data extracted from the index-catalogue of parasites and disease agents of fishes of Iraq (Mhaisen, 2014).

Sources and Methods

A total of 63 references (research papers, M. Sc. and Ph. D. theses and conference abstracts) dealing with crustacean parasites of fishes of Basrah province were used to prepare the present review. Data from such references were gathered to provide crustaceans list and fish-crustaceans list. The layout of classes, orders and families of these crustaceans followed Ah Yong *et al.* (2011), while the scientific names and authorities of such crustaceans is based mainly on WoRMS (2014). For fishes, the scientific names were reported as they appeared in their original references but they were then checked with a recent account on freshwater fishes of Iraq (Coad, 2010). However, fish valid names used here were based on the widely used electronic site, the Catalog of Fishes (Eschmeyer, 2014) as well as the FishBase (Froese and Pauly, 2014).

The index-catalogue of parasites and disease agents of fishes of Iraq (Mhaisen, 2014) was used to show number of crustaceans reported for each infected fish species in Basrah in comparison with that of the whole country of Iraq as well as the richness of fishes of Basrah with crustaceans in comparison with such richness in fishes of the whole Iraq.

Results and Discussion

Surveys Achieved on Fish Crustaceans in Basrah:

Surveying available literature showed the presence of 63 references on crustaceans of fishes of Basrah. From these references, seven major categories of fish habitats can be grouped. These are:

- 1- The marshy area (Al-Hammar marsh) north of Basrah.
- 2- Shatt Al-Arab River and its creeks and canals.
- 3- Shatt Al-Basrah canal.
- 4- Brackish waters of Shatt Al-Arab estuary at Al-Fao area, south east of Basrah.
- 5- Fish farms and aquaria in Basrah province.
- 6- Fish markets at Basrah province.
- 7- Marine waters of the northwest of the Arab Gulf.

Reports on fish crustaceans from the marshy area of Basrah province were achieved in Al-Hammar marsh, north of Basrah (Al-Daraji, 1986; Mohamad, 1989; Jarallah *et al.*, 2005; Jori, 2006; Abbas, 2007).

Some reports on fish crustaceans were done on Shatt Al-Arab River (Mhaisen, 1986; Khamees and Mhaisen, 1995; Ho *et al.*, 1996; Khamees, 1996; Khamees and Mhaisen, 1998, 2001; Mhaisen and Khamees, 2001; Khamees and Mhaisen, 2002) and its creeks and canals which included those from Abu Al-Khaseeb Creek, south of Basrah city (Piasecki *et al.*, 1991), Mehajjeran Creek, south of Basrah city (Khamees, 1983; Mhaisen *et al.*, 1986; Khamees and Mhaisen, 1988; Mhaisen *et al.*, 1988), Al-Majidiah River, north of Basrah city (Mehdi, 1989; Al-Hadithi *et al.*, 1989; Khudhair *et al.*, 1992; Mehdi *et al.*, 2009), Garmat Ali River, north of Basrah city (Khamees, 1997; Jori, 1998; Abdul-Rahman, 1999; Adday, 2001; Al-Salim and Jori, 2002a; Adday *et al.*, 2006a, b; Al-Niaeem, 2006; Kadhim, 2009; Al-Janae'e, 2010; Adday, 2013) and Al-Salihiya canal, east of Basrah city (Al-Janae'e, 2010).

Only three reports are known on crustacean parasites of fishes from Shatt Al-Basrah canal (Khamees, 1996; Khamees and Mhaisen, 1998; Adday and Ali, 2011).

One report is known on fish crustaceans from the brackish waters of Shatt Al-Arab estuary at Al-Fao area (Al-Janabi, 2010).

Seven reports on crustaceans from some farm and aquarium fishes of Basrah province (Mhaisen, 1982, 1986; Abed, 2005; Al-Niaeem, 2006; Jassim, 2007; Hussein *et al.*, 2011; Ahmed and Ali, 2013).

Some fish samples were collected from different fish markets at Basrah province (Mhaisen, 1986; Khamees, 1997).

Reports on crustaceans of marine fishes of Iraq included those from Khor Al-Zubair estuary (Al-Daraji, 1995; Al-Daraji and Naama, 1989; Piasecki *et al.*, 1993; Amado *et al.*, 2001; Al-Daraji, 2002a, b, c), Khor Abdullah (Ahmed, 1970a, b; Al-Daraji, 2002c; Bannai, 2002; Bannai *et al.*, 2008; Jori and Mohamad, 2010), Khor Al-Ummaia (Uyeno and Ali, 2013) and the coastal marine waters of the Arab Gulf (Mhaisen, 1996; Al-Ataby, 2012; Al-Ataby *et al.*, 2012; Adday, 2013; Al-Niaeem *et al.*, 2013; Jassim, 2013; Khamees and Adday, 2013; Al-Azizz *et al.*, 2014; Al-Hasson *et al.*, 2014; Venmathi Maran *et al.*, 2014a, b, c).

Crustaceans Recorded from Fishes of Basrah:

Reviewing existing literature on crustacean parasites of fishes of Basrah indicated the existing of 74 taxa belonging to two classes, four orders and 13 families as indicated in Table (1). Ah Yong *et al.* (2011) was followed to arrange the major taxonomic groups down to the scientific names of such crustaceans. These crustaceans are alphabetically presented under their orders, families and genera. Notes on misspelling in names of such crustaceans, their authorities and synonyms are corrected in accordance with information from WoRMS (2014) as well as some relevant literature and correspondence with some experts. Names of fish hosts are quoted as they appeared in the reviewed literature but the valid names have been updated according to Eschmeyer (2014) and Froese and Pauly (2014). The full authority of each valid fish host is shown in Table (2).

The crustaceans of fishes of Basrah province belong to two main classes: Maxillopoda and Malacostraca.

Class Maxillopoda:

This class is represented in fishes of Basrah with two subclasses: Branchiura which includes one order (Arguloida) and Copepoda which includes two orders (Cyclopoida and Siphonostomatoida).

Order Arguloida:

This order is represented in fishes of Basrah with only the family Argulidae. The name Arguloida was appeared as Arguloidea in Yamaguti (1963) and Martin and Davis (2001).

Family Argulidae:

This family is represented in fishes of Basrah with one species of the genus *Argulus* as well as one unidentified species of this genus.

Argulus foliaceus (L., 1758) was reported from skin and gills of four fish species in Basrah. These included *Boleophthalmus dussumieri* (misidentified as *Pseudopocrypte dentatus*) from Shatt Al-Arab estuary at Al-Fao area (Al-Janabi, 2010), *Carassius auratus* from the aquaria of College of Agriculture (Al-Niaem, 2006), *Chelon subviridis* (reported as *Liza dussumieri*) from Shatt Al-Arab River (Mhaisen, 1986) and *Liza abu* from Mehajeran Creek (Khamees, 1983; Mhaisen *et al.*, 1986) and from Al-Ashar fish market (Mhaisen, 1986). *A. foliaceus* is common in some fish farms as well as some inland waters in Iraq and it has so far 16 fish hosts in Iraq (Mhaisen, 2014).

Unidentified *Argulus* sp. was reported from the skin of *Carasobarbus luteus* from Al-Hammar marsh (Al-Daraji, 1986). The genus *Argulus* includes 128 valid species (WoRMS, 2014).

Order Cyclopoida:

This order is represented in fishes of Basrah with five families: Bomolochidae, Chondracanthidae, Ergasilidae, Lernaeidae and Taeniacanthidae.

Family Bomolochidae:

This family is represented in fishes of Basrah with seven species of the genera *Bomolochus*, *Nothobomolochus* and *Orbitacolax* in addition to one unidentified species of the genus *Acanthocolax* as well as Bomolochidae gen. sp.

Unidentified *Bomolochus* species were reported from the gills of three fish species: *C. subviridis* (reported as *L. subviridis*) from Khor Al-Zubair estuary (Piasecki *et al.*, 1993), *Sardinella albella* (reported as *S. perforata*) from Khor Al-Zubair estuary (Al-Daraji, 1995) and *Tenualosa ilisha* (reported as *Hilsa ilisha*) from Khor Al-Zubair estuary (Piasecki *et al.*, 1993). Adday (2013) showed that description and illustration of *Bomolochus* sp. of Al-Daraji's (1995) and hence of Piasecki *et al.* (1993) are identical with members of the genus *Acanthocolax* Vervoort, 1969 since the fourth seta of the basal segment of the antennule isn't being modified as a hook and the second segment of the endopod of the third leg bears one seta. This statement was ascertained by Prof. Dr. G. Boxshall. The genus *Acanthocolax* includes four valid species (WoRMS, 2014). Unidentified *Bomolochus* sp. was also reported from *Silurus triostegus* from Al-Hammar marsh by Jori (2006). Two of us (NRK and AHA) reexamined the description and illustrations of *Bomolochus* sp. of Jori (2006) and in accordance with Prof. Dr. G. Boxshall (personal communication on 22nd August 2014), such specimens do not belong to *Bomolochus* and hence we refer to them as Bomolochidae gen. sp.

Bomolochus megaceros Heller, 1865 was reported only from the gill filaments of *Ephippus orbis* from the coastal marine waters of the Arab Gulf (Adday, 2013). The genus *Bomolochus* includes 20 valid marine species (WoRMS, 2014).

Nothobomolochus denticulatus (Bassett-Smith, 1898) was reported from gills of *Sphyraena obtusata* from the coastal marine waters of the Arab Gulf (Adday, 2013).

Nothobomolochus gazzae (Shen, 1957) was reported from the gills of *Siganus canaliculatus* from the coastal marine waters of the Arab Gulf (Adday, 2013).

Nothobomolochus ilhoikimi Venmathi Maran, Moon, Adday, Khamees & Myoung, 2014 was reported only from gills of *T. ilisha* from coastal marine waters of the Arab Gulf (Venmathi Maran *et al.*, 2014c). It is appropriate to mention here that *Nothobomolochus* sp., reported from the same fish and locality by Adday (2013), in fact represents *N. ilhoikimi*.

Nothobomolochus lizae Ho & Lin, 2005 was reported from gills of *C. subviridis* and *Liza klunzingeri* from the coastal marine waters of the Arab Gulf (Adday, 2013).

Nothobomolochus quadriceros Pillai, 1973 was reported from gills of *Photopectoralis bindus* from the coastal marine waters of the Arab Gulf (Adday, 2013). The genus *Nothobomolochus* includes 37 marine species (WoRMS, 2014).

Orbitacolax haplogenyos (Yamaguti & Yamasu, 1959) was reported only from gills of *Nemipterus japonicus* from coastal marine waters of the Arab Gulf (Venmathi Maran *et al.*, 2014c). The genus *Orbitacolax* includes 10 valid marine species (WoRMS, 2014).

Family Chondracanthidae:

This family is represented in fishes of Basrah with one species of the genus *Bactrochondria* which is *B. formosana*.

Bactrochondria formosana Ho, Lin & Liu, 2011 was reported only from gills of *Cynoglossus arel* from Khor Al-Ummaia by Uyeno and Ali (2013). The genus *Bactrochondria* includes only five valid marine species (WoRMS, 2014).

Family Ergasilidae:

This family is represented in fishes of Basrah with 12 species belonging to genera *Dermoergasilus*, *Ergasilus*, *Mugilicola* and *Paraergasilus* in addition to some unidentified species of genera *Dermoergasilus*, *Ergasilus* and *Mugilicola*.

Dermoergasilus varicoleus Ho, Jayarajan & Radhakrishnan, 1992 was reported from seven fish species in Basrah: *Alburnus sellal* (reported as *Chalcalburnus sellal*) from Garmat Ali River (Abdul-Rahman, 1999), *C. subviridis* (reported as *L. subviridis*) from Garmat Ali River by (Jori, 1998; Abdul-Rahman, 1999), *Cyprinus carpio* from Garmat Ali River (Abdul-Rahman, 1999), *Leuciscus vorax* which was reported as *Aspius vorax* from Garmat Ali River (Abdul-Rahman, 1999), *L. abu* from Khor Al-Zubair estuary (Al-Daraji, 1995; Amado *et al.*, 2001), from Shatt Al-Arab River (Khamees and Mhaisen, 1995; Ho *et al.*, 1996; Khamees, 1996; Khamees and Mhaisen, 1998; Mhaisen and Khamees, 2001; Khamees and Mhaisen, 2002) and from Garmat Ali River (Jori, 1998; Abdul-Rahman, 1999), *Mesopotamichthys sharpeyi* (reported as *Barbus sharpeyi*) from Garmat Ali River (Abdul-Rahman, 1999) and *S. triostegus* from Al-Hammar marsh (Jori, 2006). It is appropriate to mention here that *A. vorax* is considered as a synonym of *L. vorax* according to Perea *et al.* (2010). This was ascertained by Eschmeyer (2014) and Froese and Pauly (2014). *D. varicoleus* has so far nine fish hosts in Iraq (Mhaisen, 2014).

Unidentified *Dermoergasilus* sp. was reported from the gills of *C. carpio* of University of Basrah fish farm (Ahmed and Ali, 2013). The genus *Dermoergasilus* includes 10 valid marine and brackish water species (WoRMS, 2014).

Ergasilus boleophthalmi Adday & Ali, 2011 was reported from gills of *Bathygobius fuscus* and *B. dussumieri* from Shatt Al-Basrah canal by Adday and Ali (2011).

Ergasilus iraquensis Amado, in Amado, da Rocha, Piasecki, Al-Daraji & Mhaisen, 2001 was reported in Basrah only from gills of *C. subviridis* (reported as *L. subviridis*) from Khor Al-Zubair estuary (Amado *et al.*, 2001). According to personal communications between one of us (FTM) and Dr. Ju-shey Ho on 27 July 2014 and with Prof. Dr. G. Boxshall on 30 July 2014, *E. irakiensis* reported by both Al-Daraji (2002c) and Bannai (2002) from the same fish from Khor Al-Zubair estuary and Khor Abdullah, respectively is considered as a synonym with *E. iraquensis* of Amado *et al.* (2001).

Ergasilus lizae Krøyer, 1863 was reported in Basrah only from gill filaments of *C. subviridis* from Garmat Ali River by Adday (2013).

Ergasilus mosulensis Rahemo, 1982 was reported from 13 fish hosts in Basrah: *A. sellal* (reported as *C. sellal*) from Garmat Ali River (Abdul-Rahman, 1999), *C. luteus* (which was also reported as *B. luteus*) from Mehajieran Creek (Khamees, 1983; Mhaisen *et al.*, 1986; Khamees and Mhaisen, 1988), from Al-Hammar marsh (Al-Daraji, 1986), from Basrah fish market (Mhaisen, 1986) and from Garmat Ali River (Abdul-Rahman, 1999), *Carassius carassius* from Garmat Ali River by Abdul-Rahman (1999), *C. subviridis* (reported as *L. subviridis*) from Garmat Ali River (Abdul-Rahman, 1999), *Ctenopharyngodon idella* from Garmat Ali River (Abdul-Rahman, 1999), *C. carpio* from Garmat Ali River (Abdul-Rahman, 1999) and from Basrah University fish farm (Abed, 2005; Hussein *et al.*, 2011), *Heteropneustes fossilis* from Garmat Ali River (Abdul-Rahman, 1999), *L. vorax* (reported as *A. vorax*) from Al-Hammar marsh (Al-Daraji, 1986) and from Garmat Ali River (Abdul-Rahman, 1999), *L. abu* from Mehajieran Creek (Khamees, 1983; Mhaisen *et al.*, 1986, 1988), from Al-Hammar marsh by Al-Daraji (1986), from Al-Ashar fish market by Mhaisen (1986), from Shatt Al-Arab River (Ho *et al.*, 1996; Khamees, 1996; Khamees and Mhaisen, 1998; Mhaisen and Khamees, 2001), from Garmat Ali River (Jori, 1998; Abdul-Rahman, 1999) and from fish farms in Basrah (Abed, 2005; Al-Niaem, 2006; Hussein *et al.*, 2011), *Mastacembelus mastacembelus* from

Garmat Ali River (Abdul-Rahman, 1999), *M. sharpeyi* from Al-Hammar marsh (Al-Daraji, 1986) and from Garmat Ali River by Abdul-Rahman (1999) who reported the fish as *B. sharpeyi*, *Mystus pelusius* from Garmat Ali River by Abdul-Rahman (1999) and from *S. triostegus* from Garmat Ali River by Abdul-Rahman (1999) and from Al-Hammar marsh by Al-Daraji (1986) who reported this fish as *Parasilurus triostegus*, Jori (2006) and Abbas (2007). *E. mosulensis* has so far 20 fish hosts in Iraq (Mhaisen, 2014).

Ergasilus ogawai Kabata, 1992 was reported from 17 fish hosts in Basrah: *Acanthobrama marmid* from Garmat Ali River and Al-Salihiya canal by Al-Janae'e (2010), *Acanthopagrus arabicus* (reported as *A. latus*) from Garmat Ali River (Adday, 2001; Adday *et al.*, 2006a) and from Garmat Ali River and Al-Salihiya canal (Al-Janae'e, 2010), *Alburnus mossulensis* from Garmat Ali River and Al-Salihiya canal (Al-Janae'e, 2010), *C. luteus* (reported as *B. luteus*) from Garmat Ali River and Al-Salihiya canal (Al-Janae'e, 2010), *C. auratus* from Garmat Ali River and Al-Salihiya canal (Al-Janae'e, 2010), *C. subviridis* (reported as *L. subviridis*) from Garmat Ali River and Al-Salihiya canal (Al-Janae'e, 2010), *Coptodon zillii* (reported as *Tilapia zillii*) from Garmat Ali River by Al-Janae'e (2010), *C. carpio* from Garmat Ali River (Al-Janae'e, 2010), *Hemiculter leucisculus* from Garmat Ali River and Al-Salihiya canal (Al-Janae'e, 2010), *H. fossilis* from Garmat Ali River (Abdul-Rahman, 1999), *L. vorax* (reported as *A. vorax*) from Garmat Ali River (Al-Janae'e, 2010), *L. abu* from Garmat Ali River and Al-Salihiya canal (Al-Janae'e, 2010), *Luciobarbus xanthopterus* (reported as *B. xanthopterus*) from Garmat Ali River (Al-Janae'e, 2010), *M. mastacembelus* from Garmat Ali River (Abdul-Rahman, 1999; Adday (2001; Adday *et al.*, 2006a), *M. pelusius* from Garmat Ali River (Adday, 2001; Adday *et al.*, 2006a), *S. triostegus* from Garmat Ali River (Abdul-Rahman, 1999; Adday, 2001; Adday *et al.*, 2006a, b) and from Al-Salihiya canal (Al-Janae'e, 2010) and *T. ilisha* from Garmat Ali River (Al-Janae'e, 2010). According to Dunz and Schliewen (2013), *T. zillii* is considered as a synonym of *C. zillii*. This was ascertained by Eschmeyer (2014) but not by Froese and Pauly (2014) yet. It is appropriate to mention here that specimens of *Ergasilus ovatus* Shen, 1957 reported by Abdul-Rahman (1999) from *H. fossilis*, *M. mastacembelus* and *S. triostegus* from Garmat Ali River were re-examined by Adday (2001) and sent to Dr. Ju-shy Ho who confirmed that such specimens were erroneously identified as *Ergasilus ovatus* Shen, 1957 and they belong to *E. ogawai*. Therefore, records on *E. ovatus* in Iraq are placed here within this paragraph of *E. ogawai*. According to Adday and Khamees (2010), *Ergasilus* sp. 2, reported from *H. fossilis* by Mohamad (1989) is considered as *E. ogawai*.

Ergasilus pararostralis Amado, in Amado, da Rocha, Piasecki, Al-Daraji & Mhaisen, 2001 was reported in Basrah from gills of both *C. subviridis* (reported as *L. subviridis*) from Khor Al-Zubair estuary (Amado *et al.*, 2001) and *S. triostegus* from Al-Hammar marsh (Jori, 2006). According to the personal communication between one of us (FTM) and Dr. Ju-shy Ho on 27 July 2014 and with Prof. Dr. G. Boxshall on 30 July 2014, *E. pararostralis* reported by Al-Daraji (2002b) and Bannai (2002) from *C. subviridis* (reported as *L. subviridis*) from Khor Al-Zubair estuary and Khor Abdullah, respectively is considered as a synonym and homonym with *E. pararostralis* of Amado *et al.* (2001).

Ergasilus rostralis Ho, Jayarajan & Radhakrishnan, 1992 was reported from 17 fish hosts in Basrah: *A. marmid* from Garmat Ali River and Al-Salihiya canal (Al-Janae'e, 2010), *A. arabicus* (reported as *A. latus*) from Garmat Ali River and Al-

Salihya canal (Al-Janae'e, 2010), *A. mossulensis* from Garmat Ali River and Al-Salihya canal (Al-Janae'e, 2010), *C. luteus* (reported as *B. luteus*) from Garmat Ali River (Abdul-Rahman, 1999; Al-Janae'e, 2010) and from Al-Salihya canal (Al-Janae'e, 2010), *C. auratus* from Garmat Ali River and Al-Salihya canal (Al-Janae'e, 2010), *C. subviridis* (reported as *L. subviridis*) from Khor Al-Zubair estuary (Al-Daraji, 1995), from Garmat Ali River (Jori, 1998; Al-Salim and Jori, 2002a; Al-Janae'e, 2010) and from Al-Salihya canal (Al-Janae'e, 2010), *C. zillii* (reported as *T. zillii*) from Garmat Ali River (Al-Janae'e, 2010), *C. idella* from Garmat Ali River (Abdul-Rahman, 1999), *C. carpio* from Garmat Ali River (Abdul-Rahman, 1999; Al-Niaeem, 2006; Al-Janae'e, 2010), *H. leucisculus* from Garmat Ali River and Al-Salihya canal (Al-Janae'e, 2010), *H. fossilis* from Garmat Ali River (Abdul-Rahman, 1999), *L. vorax* (reported as *A. vorax*) from Garmat Ali River (Abdul-Rahman, 1999; Al-Janae'e, 2010), *L. abu* from Shatt Al-Arab River (Khamees and Mhaisen, 1995; Ho *et al.*, 1996; Khamees, 1996; Khamees and Mhaisen, 1998, 2001; Mhaisen and Khamees, 2001), from Garmat Ali River (Jori, 1998; Abdul-Rahman, 1999; Al-Salim and Jori, 2002a; Al-Niaeem, 2006; Al-Janae'e, 2010), from Al-Salihya canal (Al-Janae'e, 2010) and from Marine Science Center fish farm (Abed, 2005, Hussein *et al.*, 2011), *L. xanthopterus* (reported as *B. xanthopterus*) from Garmat Ali River (Al-Janae'e, 2010), *M. pelusius* from Garmat Ali River (Abdul-Rahman, 1999), *S. triostegus* from Garmat Ali River (Abdul-Rahman, 1999; Al-Janae'e, 2010), from Al-Hammar marsh (Jori, 2006) and from Al-Salihya canal (Al-Janae'e, 2010) and *T. ilisha* from Garmat Ali River (Al-Janae'e, 2010).

Ergasilus sieboldi von Nordmann, 1832 was reported from 15 fish hosts in Basrah: *A. marmid* from Garmat Ali River and Al-Salihya canal (Al-Janae'e, 2010), *A. arabicus* (reported as *A. latus*) from Garmat Ali River and Al-Salihya canal (Al-Janae'e, 2010), *A. mossulensis* from Garmat Ali River and Al-Salihya canal (Al-Janae'e, 2010), *B. dussumieri* (reported as *P. dentatus*) from Shatt Al-Arab estuary at Al-Fao area (Al-Janabi, 2010), *C. luteus* (reported as *B. luteus*) from Garmat Ali River and Al-Salihya canal (Al-Janae'e, 2010), *C. auratus* from Garmat Ali River and Al-Salihya canal (Al-Janae'e, 2010), *C. subviridis* (reported as *L. subviridis*) from Garmat Ali River and Al-Salihya canal (Al-Janae'e, 2010), *C. zillii* (reported as *T. zillii*) from Garmat Ali River (Al-Janae'e, 2010), *C. carpio* from Garmat Ali River (Al-Janae'e, 2010), *H. leucisculus* from Garmat Ali River and Al-Salihya canal (Al-Janae'e, 2010), *L. vorax* (reported as *A. vorax*) from Garmat Ali River by Al-Janae'e (2010), *L. abu* from Garmat Ali River and Al-Salihya canal (Al-Janae'e, 2010), *L. xanthopterus* (reported as *B. xanthopterus*) from Garmat Ali River (Al-Janae'e, 2010), *S. triostegus* from Garmat Ali River and Al-Salihya canal (Al-Janae'e, 2010) and *T. ilisha* from Garmat Ali River (Al-Janae'e, 2010). *E. sieboldi* has so far 26 fish hosts in Iraq (Mhaisen, 2014).

Ergasilus synanceiensis Amado, in Amado, da Rocha, Piasecki, Al-Daraji & Mhaisen, 2001 was reported only from gills of *Pseudosynanceia melanostigma* from Khor Al-Zubair estuary (Amado *et al.*, 2001). According to the personal communication between one of us (FTM) and Dr. Ju-shey Ho on 27 July 2014 and with Prof. Dr. G. Boxshall on 30 July 2014, *E. synanceiensis* reported by Al-Daraji (2002a) from the same fish and locality is considered as a synonym and homonym with *E. synanceiensis* of Amado *et al.* (2001).

Unidentified specimens of *Ergasilus* spp. were reported from seven fish hosts in Basrah: *C. luteus* from Al-Hammar marsh (Al-Daraji, 1986), *C. subviridis* (reported as *L. subviridis*) from Khor Al-Zubair estuary (Piasecki *et al.*, 1993), *H. fossilis* from

Al-Hammar marsh (Mohamad, 1989), *L. vorax* (reported as *A. vorax*) from Al-Hammar marsh (Al-Daraji, 1986), *L. abu* from Al-Hammar marsh (Al-Daraji, 1986) and from Al-Majidiyah River (Mehdi, 1989; Al-Hadithi *et al.*, 1989; Khudhair *et al.*, 1992; Mehdi *et al.*, 2009), *S. triostegus* (reported as *P. triostegus*) from Al-Hammar marsh (Al-Daraji, 1986) and *T. ilisha* from Garmat Ali River (Adday, 2013). As demonstrated by Adday and Khamees (2010), *Ergasilus* sp. 2 reported by Mohamad (1989) from *H. fossilis* actually represents *E. ogawai*. The genus *Ergasilus* is represented in fishes of Iraq with 11 valid species in addition to some unidentified species from 11 hosts (Mhaisen, 2014). The genus *Ergasilus* includes 153 valid marine, brackish and freshwater species (WoRMS, 2014).

Mugilicola kabatai Piasecki, Khamees & Mhaisen, 1991 was reported in Basrah for the first time from gill arches and the upper roof of the buccal and pharyngeal cavities of *L. abu* from Abu Al-Khaseeb Creek, south of Basrah city (Piasecki *et al.*, 1991). Later on, it was reported from the same fish from other localities: Khor Al-Zubair estuary (Al-Daraji, 1995), Shatt Al-Arab River (Ho *et al.*, 1996; Khamees, 1996; Khamees and Mhaisen, 1998), Garmat Ali River (Jori, 1998; Al-Niaeem, 2006; Al-Janae'e, 2010) and Al-Salihiya canal (Al-Janae'e, 2010).

Unidentified specimen of *Mugilicola* was reported only from gills of *C. subviridis* (reported as *L. subviridis*) from Khor Al-Zubair estuary (Piasecki *et al.*, 1993). The genus *Mugilicola* includes only four valid species (WoRMS, 2014).

Paraergasilus inflatus Ho, Khamees & Mhaisen, 1996 was reported from six fish hosts in Basrah: *C. luteus* (reported as *B. luteus*) from Garmat Ali River (Abdul-Rahman, 1999), *C. subviridis* (reported as *L. subviridis*) from Garmat Ali River (Jori, 1998; Abdul-Rahman, 1999), *C. carpio* from Garmat Ali River (Abdul-Rahman, 1999), *L. vorax* (reported as *A. vorax*) from Garmat Ali River (Abdul-Rahman, 1999), *L. abu* from Shatt Al-Arab River (Ho *et al.*, 1996; Khamees, 1996; Khamees and Mhaisen, 1998; Mhaisen and Khamees, 2001) and from Garmat Ali River (Jori, 1998; Abdul-Rahman, 1999) and *S. triostegus* from Garmat Ali River (Abdul-Rahman, 1999) and from Al-Hammar marsh (Jori, 2006). *P. inflatus* has so far seven fish host in Iraq (Mhaisen, 2014). The genus *Paraergasilus* includes 16 valid species (WoRMS, 2014).

Family Lernaeidae:

This family is represented in fishes of Basrah with two species belonging to genera *Lamproglana* and *Lernaea* in addition to unidentified species of *Lernaea*.

Lamproglana pulchella von Nordmann, 1832 was reported in Basrah from gills of *L. vorax* (as *A. vorax*) from Mehajjeran creek (Khamees, 1983; Mhaisen *et al.*, 1986), from Al-Hammar marsh (Al-Daraji, 1986) and from *M. sharpeyi* from Al-Hammar marsh (Al-Daraji, 1986). This species has so far 19 fish hosts in Iraq (Mhaisen, 2014). *Lamproglana* includes 43 valid species (WoRMS, 2014).

Lernaea cyprinacea L., 1758 was reported in Basrah from skin, fins and gills of nine fish species which included *Aphanius dispar* from Basrah University fish farm at Al-Tannuma (Mhaisen, 1986), *B. dussumieri* from Garmat Ali River (Khamees, 1997) and from Shatt Al-Arab estuary at Al-Fao area by Al-Janabi (2010) who misidentified this fish as *Pseudopocrypte dentatus*, *C. luteus* (reported as *B. luteus*) from Mehajjeran creek (Khamees, 1983), *C. auratus* from Basrah University fish farm at Al-Tannuma (Mhaisen, 1986), from aquaria of College of Agriculture and Al-Amwaj private sector aquaria (Al-Niaeem, 2006) as well as from Al-Salihiya canal (Al-Janae'e, 2010), *C. idella* from three fish farms at Basrah (Jassim, 2007), *C.*

carpio from different fish farms at Basrah (Mhaisen, 1982, 1986; Abed, 2005; Al-Niaeem, 2006; Jassim, 2007; Hussein *et al.*, 2011) and from Garmat Ali fish market (Khamees, 1997), *Gambusia holbrooki* from Garmat Ali River (Kadhim, 2009) as well as from *G. holbrooki* (which was reported as *G. affinis*) from fish farms in Basrah (Al-Niaeem, 2006), *M. sharpeyi* (reported as *B. sharpeyi*) from Garmat Ali fish market (Khamees, 1997) and from *Poecilia latipinna* from Garmat Ali River (Kadhim, 2009). *L. cyprinacea* is the commonest crustacean among fishes of Iraq as it has so far 28 hosts in fish farms and hatcheries and in various inland waters of Iraq (Mhaisen, 2014). The genus *Lernaea* includes 56 valid freshwater species (WoRMS, 2014).

Unidentified copepodal stage larva of *Lernaea* sp. was reported from gills of *C. carpio* of University of Basrah fish farm (Ahmed and Ali, 2013). Unidentified *Lernaea* sp. was so far recorded from three fish hosts in Iraq (Mhaisen, 2014).

Family Taeniacanthidae:

This family is represented in fishes of Basrah with one species of the genus *Anchistrotos* which is *A. tangi*.

Anchistrotos tangi Venmathi Maran, Moon & Adday, 2014a was reported in Basrah only from gills of *T. ilisha* from the coastal marine waters of the Arab Gulf by Venmathi Maran *et al.* (2014a). The genus *Anchistrotos* includes only four valid marine species (WoRMS, 2014).

Order Siphonostomatoidea:

This order is represented in fishes of Basrah with five families: Caligidae, Eudactylinidae, Hatschekiidae, Lernaeopodidae and Lernanthropidae.

Family Caligidae:

This family is represented in fishes of Basrah with 10 species of the genera *Anuretes*, *Caligus* and *Hermilius* as well as two unidentified species of the genera *Abasia* and *Caligus*.

Abasia sp. was erroneously reported as *Alicalgus* sp. from gills of *S. triostegus* from Al-Hammar marsh (Jori, 2006). *Alicalgus* Shiino, 1955 is accepted as *Abasia* Wilson C.B., 1908 which includes six valid marine species (WoRMS, 2014). Personal communication between one of us (A.H.A.) and Prof. Dr. Geoff Boxshall showed that Jori's specimens (as indicated by her description and drawings) have slight similarity with *A. tripartita* and hence we consider them as *Abasia* sp. Dr. Boxshall believes that Jori's (2006) record of a marine *Abasia* sp. in Al-Hammar marsh could be resulted from the contact between some marine fishes migrating from the Arab Gulf to rivers and marshes of Iraq with freshwater fishes in the marshes.

Anuretes anomalus Pillai, 1967 was reported only from gills of *Diagramma pictum* from the coastal marine waters of the Arab Gulf (Adday, 2013).

Anuretes branchialis Rangnekar, 1953 was reported only from gills of *Platax teira* from the coastal marine waters of the Arab Gulf (Adday, 2013).

Anuretes similis Ho & Lin, 2000 was reported from gills of *Plectorhinchus sordidus* from the northwest of the Arab Gulf (Al-Hasson *et al.*, 2014). The genus *Anuretes* includes 20 valid marine species (WoRMS, 2014).

Caligus cordyla Pillai, 1963 was reported only from gills of *Megalaspis cordyla* from the coastal marine waters of the Arab Gulf (Al-Ataby, 2012; Al-Azizz *et al.*, 2014).

Caligus epinepheli Yamaguti, 1936 adults and larvae were reported only from gills of *N. japonicus* from the coastal marine waters of the Arab Gulf (Khamees and Adday, 2012; Adday, 2013; Venmathi Maran *et al.*, 2014b).

Caligus longicaudus Bassett-Smith, 1898 was reported only from gills of *Chirocentrus nudus* from the coastal marine waters of the Arab Gulf (Adday, 2013).

Caligus orientalis Gusev, 1951 was reported only from gills of *Chelone macrolepis* (reported as *Liza macrolepis*) from Khor Al-Zubair estuary (Al-Daraji, 1995). According to Carpenter *et al.* (1997) and Froese and Pauly (2014), *C. macrolepis* is not found in the Arab Gulf. However, Hussain *et al.* (1988) reported *L. macrolepis* from Khor Al-Zubair.

Unidentified *Caligus* sp. was reported only from gills of *Netuma bilineata* (reported as *Arius bilineatus*) from Khor Abdullah (Jori and Mohamad, 2008). The genus *Caligus* includes 252 valid marine, brackish and freshwater species (WoRMS, 2014).

Hermilius ariodi Prabha & Pillai, 1986 was reported only from gills of *N. bilineata* from the coastal marine waters of the Arab Gulf (Adday, 2013).

Hermilius longicaudus Ho & Kim I.H., 2000 was reported only from gills of *Netuma thalassina* from the coastal marine waters of the Arab Gulf (Adday, 2013).

Hermilius longicornis Bassett-Smith, 1898 was reported only from gills of *N. thalassina* from the coastal marine waters of the Arab Gulf (Adday, 2013; Venmathi Maran *et al.*, 2014b). The genus *Hermilius* includes eight species (WoRMS, 2014).

Family Eudactylinidae:

This family is represented in fishes of Basrah with only two species of the genus *Eudactylina* which are *E. rhinobati* and *E. turgipes*.

Eudactylina rhinobati Raibaut & Essafi, 1979 was reported only from gills of *Glaucostegus granulatus* from the coastal marine waters of the Arab Gulf (Adday, 2013).

Eudactylina turgipes Bere, 1936 was reported only from gills of *Gymnura poecilura* from the coastal marine waters of the Arab Gulf (Adday, 2013). The genus *Eudactylina* includes 39 valid marine species (WoRMS, 2014).

Family Hatschekiidae:

This family is represented in fishes of Basrah with three species belonging to the genus *Hatschekia*.

Hatschekia conifera Yamaguti, 1939 was reported only from gills of *Pampus argenteus* from Khor Al-Zubair estuary (Al-Daraji, 1995) and from the same fish from Khor Abdullah (Bannai *et al.*, 2008).

Hatschekia insolita Wilson C.B., 1913 was reported from gills of both *Lutjanus johnii* and *P. argenteus* from Khor Abdullah (Bannai *et al.*, 2008).

Hatschekia shari Uyeno & Ali, 2013 was reported only from gill filaments of *Lethrinus nebulosus* from Khor Al-Ummaia (Uyeno and Ali, 2013). The genus *Hatschekia* includes 135 valid marine species (WoRMS, 2014).

Family Lernaepodidae:

This family is represented in fishes of Basrah with three species of the genera *Clavella*, *Clavellopsis* and *Clavellotis* as well as four unidentified species of the genera *Alella*, *Clavella*, *Clavellotis* and *Pseudocharopinus*.

Alella sp. was reported only from gills of *A. arabicus* from the coastal marine

waters of the Arab Gulf (Adday, 2013). The genus *Alella* includes seven valid marine species (WoRMS, 2014).

Clavella adunca (Strøm, 1762) was reported only from gill filaments of *T. ilisha* (reported as *H. ilisha*) from Khor Al-Zubair estuary (Al-Daraji, 1995).

Unidentified *Clavella* sp. was reported only from gill filaments of *Ilisha compressa* (misidentified as *I. elongata*) from Khor Al-Zubair estuary (Piasecki *et al.*, 1993). The genus *Clavella* includes 48 valid marine species (WoRMS, 2014).

Clavellopsis appendiculata Kirtisinghe, 1950 was reported as *Isobranchia appendiculata* Heegaard, 1947 from gill rakers of *C. nudus* from the coastal marine waters of the Arab Gulf (Adday, 2013). According to WoRMS (2014), *I. appendiculata* is accepted as *C. appendiculata*. The genus *Clavellopsis* includes 11 valid marine species (WoRMS, 2014).

Clavellotis bilobata (Pillai, 1962) was reported only from gills of *N. japonicus* from the coastal marine waters of the Arab Gulf (Adday, 2013).

Clavellotis sp. was reported only from gills of *A. arabicus* from the coastal marine waters of the Arab Gulf (Adday, 2013). The genus *Clavellotis* includes nine valid marine species (WoRMS, 2014).

Pseudocharopinus sp. was reported only from gills of *Chiloscyllium arabicum* from the coastal marine waters of the Arab Gulf (Adday, 2013). The genus *Pseudocharopinus* includes 10 valid marine species (WoRMS, 2014).

Family Lernanthropidae:

This family is represented in fishes of Basrah with one species of the genus *Lernanthropinus* and eight species of the genus *Lernanthropus* as well as one unidentified species of the genus *Lernanthropus*.

Lernanthropinus temminckii (von Nordmann, 1864) was reported only from gills of *Saurida tumbil* from the coastal marine waters of the Arab Gulf (Adday, 2013; Venmathi Maran *et al.*, 2014b). It is appropriate to mention here that Venmathi Maran *et al.* (2014b) formally relegated *L. gibbosus* and *L. sauridae* as junior synonyms of *L. temminckii*. The genus *Lernanthropinus* includes six valid marine species (WoRMS, 2014).

Lernanthropus corniger Yamaguti, 1954 was reported from gills of both *Carangoides malabricus* and *M. cordyla* from the coastal marine waters of the Arab Gulf (Al-Ataby, 2012; Al-Niaeem *et al.*, 2013).

Lernanthropus cornutus Kirtisinghe, 1937 was reported from gills of *Tylosurus crocodilus* from the coastal marine waters of the Arab Gulf (Adday, 2013).

Lernanthropus ilishae Chin, 1948 was reported only from gills of *I. compressa* from the coastal marine waters of the Arab Gulf (Adday, 2013).

Lernanthropus indicus Pillai, 1967 was reported from gills of both *C. malabricus* and *M. cordyla* from the coastal marine waters of the Arab Gulf (Al-Ataby, 2012; Al-Ataby *et al.*, 2013).

Lernanthropus nemipteri Jayasree & Pillai, 1976 was reported only from gills of *N. japonicus* from the coastal marine waters of the Arab Gulf (Adday, 2013).

Lernanthropus polynemi Richiardi, 1881 was misidentified as *Lernanthropus trifoliatus* Bassett-Smith, 1898 from gills of *Otolithes ruber* from Khor Abdullah (Bannai, 2002) and from *S. triostegus* from Al-Hammar marsh (Jori, 2006). The generic name of the fish *O. ruber* was misspelled as *Otolithus* instead of *Otolithes* by Bannai (2002).

Lernanthropus sarbae Kensley & Grindley, 1973 was reported only from gills of *A. arabicus* from the coastal marine waters of the Arab Gulf (Adday, 2013).

Lernanthropus sillaginis Pillai, 1963 was reported from gills of both *Sillago arabica* and *S. sihama* from the coastal marine waters of the Arab Gulf (Adday, 2013).

Unidentified *Lernanthropus* species were reported from gill filaments of both *C. nudus* from Khor Al-Zubair (Piasecki *et al.*, 1993) and *Scomberomorus guttatus* from the same locality (Al-Daraji, 1995) and from *A. arabicus* (deliberately misidentified as *A. latus*) from the coastal marine waters of the Arab Gulf (Jassim, 2013). The genus *Lernanthropus* includes 104 valid marine water species (WoRMS, 2014).

Class Malacostraca:

This class is represented in fishes of Basrah with the order Isopoda only.

Order Isopoda:

This order is represented in fishes of Basrah with only two families: Cymothoidae and Gnathiidae.

Family Cymothoidae:

This family is represented in fishes of Basrah with eight marine species which belong to genera *Anilocra*, *Catoessa*, *Ichthyoxenus*, *Joryma* and *Nerocila*.

Anilocra monoma Bowman & Tareen, 1983 was reported from Khor Al-Zubair estuary by Al-Daraji and Naama (1989) from under the base of the dorsal fin of *C. subviridis* (reported as *L. subviridis*), over the head of *Johnius dussumieri* (reported as *Johnieopse sina*), behind the operculum of *Johnius elongatus* (misspelled as *Johnius elongata*) and on the head and above the pectoral fin of *Nematalosa arabica*. It is appropriate to mention here that *Johnius elongatus* Lal Mohan, 1976 which was reported as *J. elongata* by Al-Daraji and Naama (1989), was reported from Khor Al-Zubair estuary (Hussain *et al.*, 1988) but according to Froese and Pauly (2014), it is distributed only in India and Sri Lanka. *N. arabica* which was reported by Al-Daraji and Naama (1989) is distributed in Khor Al-Zubair (Hussain *et al.*, 1988) but Froese and Pauly (2014) stated that its distribution in Asia is limited to Yemen, Oman and Iran. *Anilocra* includes 49 valid marine species (WoRMS, 2014).

Catoessa gruneri Bowman & Tareen, 1983 adults and manca larvae were reported for the first time in Iraq by Al-Daraji (1995) from the buccal cavity of both *I. compressa* (misidentified as *Ilisha elongata*) and *P. bindus* (reported as *Leiognathus bindus*) from Khor Al-Zubair estuary and then from the gill cavity of *P. bindus* (Adday, 2013) from the coastal marine waters. *I. elongata* is not found in the Arab Gulf and it is probably misidentified with *I. compressa* which is found in the Arab Gulf (Carpenter *et al.*, 1997; Froese and Pauly, 2014). *I. compressa* was reported in Iraq by Al-Janae'e (2010) and Adday (2013). *Catoessa* includes four valid marine species (WoRMS, 2014).

Ichthyoxenus asymmetrica Ahmed, 1970a was reported for the first time from gills of *Cynoglossus lingua* from Khor Abdullah (Ahmed, 1970a) and then from *Chirocentrus dorab* from Al-Fao town fish market (Mhaisen, 1986). According to Froese and Pauly (2014), *C. lingua* reported by Ahmed (1970a, b) is not distributed in the Arab Gulf but in Africa and some places in Asia to the east of the Arab Gulf.

Checking all the 127 *Cynoglossus* spp. in Froese and Pauly (2014) revealed that only *C. arel* is distributed in Iraq (Ali and Al-Salim, 2012; Uyeno and Ali, 2013), Kuwait (Wright, 1988; Bishop, 2003) as well as Iran and Oman. Other *Cynoglossus* spp. such as *C. bilineatus*, *C. carpenteri* and *C. kysophii* (Kuronoma and Abe, 1972; Carpenter *et al.*, 1997; Bishop, 2003; Eschemyer, 2014; Froese and Pauly, 2014) are considered native in the Arab Gulf. The genus *Ichthyoxenus* includes 23 valid species (WoRMS, 2014).

Joryma sawayah Bowman & Tareen, 1983 was reported from the buccal cavity of *C. nudus* and *I. compressa* (misidentified as *I. elongata*) from Khor Al-Zubair estuary (Al-Daraji, 1995). *Joryma* includes four valid marine species (WoRMS, 2014).

Nerocila arres Bowman & Tareen, 1983 was reported for the first time in Iraq by Al-Daraji (1995) from the lower jaw of *Thryssa whiteheadi* (misidentified as *T. mystax*) from Khor Al-Zubair estuary and then from gills of *Himantura imbricata* from the coastal marine waters (Adday, 2013). *T. mystax* was a misapplied name for *T. whiteheadi* (Carpenter *et al.*, 1997).

Nerocila heterozota Ahmed, 1970b was reported for the first time from gills of *C. lingua* from Khor Abdullah (Ahmed, 1970b) and then from gills of both *Ilisha megaloptera* and *Sphyræna jello* from Al-Fao town fish market (Mhaisen, 1986). As explained above in *I. asymmetrica*, *C. lingua* reported by Ahmed (1970b) is not distributed in the Arab Gulf (Froese and Pauly, 2014). On the other hand, *I. megaloptera* reported by Mhaisen (1986) is known from Iran as well as from some regions of south Asia (Froese and Pauly, 2014). One of us (FTM) who inspected *I. megaloptera* believes that it was a misidentification of *I. compressa* which is found in the Arab Gulf (Carpenter *et al.*, 1997; Adday, 2013; Froese and Pauly, 2014) as well as in both Garmat Ali River and Al-Salihiya canal (Al-Janae'e, 2010).

Nerocila kisra Bowman & Tareen, 1983 was reported for the first time in Iraq from the lower jaw of *Johnius dussumieri* (reported as *J. sina*) from Khor Al-Zubair estuary (Al-Daraji and Naama, 1989) and then reported from base of fins of *J. dussumieri* [reported as *Johnius (Johnieopse) sina*], *O. ruber* and *S. albella* (reported as *S. perforata*) from Khor Al-Zubair estuary (Al-Daraji, 1995).

Nerocila phaiopleura Bleeker, 1857 was reported for the first time in Iraq from above the base of pectoral fin of *C. dorab* from Khor Al-Zubair estuary (Al-Daraji and Naama, 1989) and then was reported from different fins of *C. nudus*, *I. compressa* (misidentified as *I. elongata*), *S. albella* (reported as *S. perforata*) and *T. ilisha* (reported as *Hilsa ilisha*) from Khor Al-Zubair estuary (Al-Daraji, 1995). The genus *Nerocila* includes 42 valid marine species (WoRMS, 2014).

Family Gnathiidae:

This family is represented in fishes of Basrah with only isopod larval forms (the praniza larvae) of this family.

Gnathia sp. praniza larvae were detected from gills of *A. arabicus* (deliberately misidentified as *A. latus*) from the coastal marine waters of the Arab Gulf by Jassim (2013). Later on, such larvae were also detected from gills of 18 fish species (including *A. arabicus*) from the coastal marine waters of the Arab Gulf by Adday (2013). These fishes included eight cartilaginous fishes and 10 bony fishes. The cartilaginous fishes included *Carcharhinus dussumieri*, *C. arabicum*, *G. granulatus*, *G. poecilura*, *Himantura bleekeri*, *H. imbricata*, *H. randalli* and *Pastinachus sephen*, while the bony fishes included *A. arabicus*, *D. pictum*,

Diplodus sargus, *E. orbis*, *J. dussumieri*, *Nematalosa nasus*, *N. japonicus*, *N. thalassina*, *Rhabdosargus haffara* and *T. ilisha*. The family Gnathiidae includes 12 valid genera of which the genus *Gnathia* includes 126 valid marine species (WoRMS, 2014).

Addendum:

With this article and the previous articles on helminths of fishes of Basrah province (Mhaisen *et al.*, 2013a, b, c; Ali *et al.*, 2014; Mhaisen *et al.*, 2014), checklists of all the groups of parasitic metazoans infecting fishes of Basrah province were achieved. However, only one group remains untreated. This is the group of glochidial larval forms of some adult clams (phylum Mollusca, class Bivalvia, order Unionoida, family Unionidae). Such larvae were detected from gills of four fishes of Basrah. These included both *C. subviridis* (reported as *L. subviridis*) and *L. abu* from Garmat Ali River (Jori, 1998; Al-Salim and Jori, 2002b), *M. pelusius* from Garmat Ali River (Adday, 2001) and *S. triostegus* from Garmat Ali River (Adday, 2001) and from Al-Hammar marsh (Jori, 2006; Abbas, 2007). In Iraq, glochidial larvae were so far recorded from 25 fish host species (Mhaisen, 2014).

Host-Crustaceans List:

The names of all fish hosts infected with crustaceans in Basrah province (72 valid fish names and 22 synonymous and misidentified names) are alphabetically arranged. For each host, the crustacean species are also alphabetically arranged. For each crustacean species, the references are chronologically arranged but references of the same year are alphabetically arranged. The present host list included the valid as well as the synonymous names.

Acanthobrama marmid: *Ergasilus ogawa* (Al-Janae'e, 2010), *E. rostralis* (Al-Janae'e, 2010) and *E. sieboldi* (Al-Janae'e, 2010).

Acanthopagrus latus: See *Acanthopagrus arabicus*.

Acanthopagrus arabicus, reported also as *A. latus*: *Alella* sp. (Adday, 2013), *Clavellotis* sp. (Adday, 2013), *Ergasilus ogawai* (Adday, 2001; Adday *et al.*, 2006a; Al-Janae'e, 2010), *E. rostralis* (Al-Janae'e, 2010), *E. sieboldi* (Al-Janae'e, 2010), *Gnathia* sp. (Adday, 2013; Jassim, 2013), *Lernanthropus sarbae* (Adday, 2013) and *Lernanthropus* sp. (Jassim, 2013).

Alburnus mossulensis: *Ergasilus ogawai* (Al-Janae'e, 2010), *E. rostralis* (Al-Janae'e, 2010) and *E. sieboldi* (Al-Janae'e, 2010).

Alburnus sellal, reported as *Chalcalburnus sellal*: *Dermoergasilus varicoleus* (Abdul-Rahman, 1999) and *Ergasilus mosulensis* (Abdul-Rahman, 1999).

Aphanius dispar: *Lernaea cyprinacea* (Mhaisen, 1986).

Arius bilineatus: See *Netuma bilineata*.

Aspius vorax: See *Leucescus vorax*.

Barbus luteus: See *Carasobarbus luteus*.

Barbus sharpeyi: See *Mesopotamichthys sharpeyi*.

Barbus xanthopterus: See *Luciobarbus xanthopterus*.

Bathygobius fuscus: *Ergasilus boleophthalmi* (Adday and Ali, 2011).

Boleophthalmus dussumieri, also misidentified as *Pseudopocrypte dentatus*: *Argulus foliaceus* (Al-Janabi, 2010), *Ergasilus boleophthalmi* (Adday and Ali, 2011), *E. sieboldi* (Al-Janabi, 2010) and *Lernaea cyprinacea* (Khamees, 1997; Al-Janabi, 2010).

- Carangoides malabricus*: *Lernanthropus corniger* (Al-Ataby, 2012; Al-Niaeem *et al.*, 2013) and *L. indicus* (Al-Ataby, 2012; Al-Ataby *et al.*, 2013).
- Carasobarbus luteus*, reported also as *Barbus luteus*: *Argulus* sp. (Al-Daraji, 1986), *Ergasilus mosulensis* (Khamees, 1983; Al-Daraji, 1986; Mhaisen, 1986; Mhaisen *et al.*, 1986; Khamees and Mhaisen, 1988; Abdul-Rahman, 1999), *E. ogawai* (Al-Janae'e, 2010), *E. rostralis* (Abdul-Rahman, 1999; Al-Janae'e, 2010), *E. sieboldi* (Al-Janae'e, 2010), *Ergasilus* sp. (Al-Daraji, 1986), *Lernaea cyprinacea* (Khamees, 1983) and *Paraergasilus inflatus* (Abdul-Rahman, 1999).
- Carassius auratus*: *Argulus foliaceus* (Al-Niaeem, 2006), *Ergasilus ogawai* (Al-Janae'e, 2010), *E. rostralis* (Al-Janae'e, 2010), *E. sieboldi* (Al-Janae'e, 2010) and *Lernaea cyprinacea* (Mhaisen, 1986; Al-Niaeem, 2006; Al-Janae'e, 2010).
- Carassius carassius*: *Ergasilus mosulensis* (Abdul-Rahman, 1999).
- Carcharhinus dussumieri*: *Gnathia* sp. (Adday, 2013).
- Chalcalburnus sellal*: See *Alburnus sellal*.
- Chelon macrolepis*, reported as *Liza macrolepis*: *Caligus orientalis* (Al-Daraji, 1995).
- Chelon subviridis*, reported also as *Liza dussumieri* and *L. subviridis*: *Acanthocolax* sp. which was reported as *Bomolochus* sp. (Piasecki *et al.*, 1993), *Anilocra monoma* (Al-Daraji and Naama, 1989), *Argulus foliaceus* (Mhaisen, 1986), *Dermoergasilus varicoleus* (Jori, 1998; Abdul-Rahman, 1999), *Ergasilus iraquensis* (Amado *et al.*, 2001; Al-Daraji, 2002c; Bannai, 2002), *E. lizae* (Adday, 2013), *E. mosulensis* (Abdul-Rahman, 1999), *E. ogawai* (Al-Janae'e, 2010), *E. pararostralis* (Amado *et al.*, 2001; Al-Daraji, 2002b; Bannai, 2002), *E. rostralis* (Al-Daraji, 1995; Jori, 1998; Al-Salim and Jori, 2002a; Al-Janae'e, 2010), *E. sieboldi* (Al-Janae'e, 2010), *Ergasilus* sp. (Piasecki *et al.*, 1993), *Mugilicola* sp. (Piasecki *et al.*, 1993), *Nothobomolochus lizae* (Adday, 2013) and *Paraergasilus inflatus* (Jori, 1998; Abdul-Rahman, 1999).
- Chiloscyllium arabicum*: *Gnathia* sp. (Adday, 2013) and *Pseudocharopinus* sp. (Adday, 2013).
- Chirocentrus dorab*: *Ichthyoxenus asymmetrica* (Mhaisen, 1986) and *Nerocila phaiopleura* (Al-Daraji and Naama, 1989).
- Chirocentrus nudus*: *Caligus longicaudus* (Adday, 2013), *Clavellopsis appendiculata* (Adday, 2013), *Joryma sawayah* (Al-Daraji, 1995), *Lernanthropus* sp. (Piasecki *et al.*, 1993) and *Nerocila phaiopleura* (Al-Daraji, 1995).
- Coptodon zillii*, reported as *Tilapia zillii*: *Ergasilus ogawai* (Al-Janae'e, 2010), *E. rostralis* (Al-Janae'e, 2010) and *E. sieboldi* (Al-Janae'e, 2010).
- Ctenopharyngodon idella*: *Lernaea cyprinacea* (Jassim, 2007), *Ergasilus mosulensis* (Abdul-Rahman, 1999) and *E. rostralis* (Abdul-Rahman, 1999).
- Cynoglossus arel*: *Bactrochondria formosana* (Uyeno and Ali, 2013).
- Cynoglossus lingua*: *Ichthyoxenus asymmetrica* (Ahmed, 1970a) and *Nerocila heterozota* (Ahmed, 1970b).
- Cyprinus carpio*: *Dermoergasilus varicoleus* (Abdul-Rahman, 1999), *Dermoergasilus* sp. (Ahmed and Ali, 2013), *Ergasilus mosulensis* (Abdul-Rahman, 1999; Abed, 2005; Hussein *et al.*, 2011), *E. ogawai* (Al-Janae'e, 2010), *E. rostralis* (Abdul-Rahman, 1999; Al-Niaeem, 2006; Al-Janae'e, 2010), *E. sieboldi* (Al-Janae'e, 2010), *Lernaea cyprinacea* (Mhaisen, 1982, 1986; Khamees, 1997; Abed, 2005; Al-Niaeem, 2006; Jassim, 2007; Hussein *et al.*, 2011), *Lernaea* sp. (Ahmed and Ali, 2013) and *Paraergasilus inflatus* (Abdul-

- Rahman, 1999).
- Diagramma pictum*: *Anuretes anomalus* (Adday, 2013) and *Gnathia* sp. (Adday, 2013).
- Diplodus sargus*: *Gnathia* sp. (Adday, 2013).
- Ephippus orbis*: *Bomolochus megaceros* (Adday, 2013) and *Gnathia* sp. (Adday, 2013).
- Gambusia affinis*: See *Gambusia holbrooki*.
- Gambusia holbrooki*, reported also as *G. affinis*: *Lernaea cyprinacea* (Al-Niaem, 2006; Kadhim, 2009).
- Glaucostegus granulatus*: *Eudactylina rhinobati* (Adday, 2013) and *Gnathia* sp. (Adday, 2013).
- Gymnura poecilura*: *Eudactylina turgipes* (Adday, 2013) and *Gnathia* sp. (Adday, 2013).
- Hemiculter leucisculus*: *Ergasilus ogawai* (Al-Janae'e, 2010), *E. rostralis* (Al-Janae'e, 2010) and *E. sieboldi* (Al-Janae'e, 2010).
- Heteropneustes fossilis*: *Ergasilus mosulensis* (Abdul-Rahman, 1999), *E. ogawai* (Mohamad, 1989 as *Ergasilus* sp. 2; Abdul-Rahman, 1999), *E. rostralis* (Abdul-Rahman, 1999) and *Ergasilus* sp. 1 (Mohamad, 1989).
- Hilsa ilisha*: See *Tenualosa ilisha*.
- Himantura bleekeri*: *Gnathia* sp. (Adday, 2013).
- Himantura imbricata*: *Gnathia* sp. (Adday, 2013) and *Nerocila arres* (Adday, 2013).
- Himantura randalli*: *Gnathia* sp. (Adday, 2013).
- Ilisha compressa*, also misidentified as *Ilisha elongata* and *I. megaloptera*: *Catoessa gruneri* (Al-Daraji, 1995), *Clavella* sp. (Piasecki *et al.*, 1993), *Joryma sawayah* (Al-Daraji, 1995), *Lernanthropus ilishae* (Adday, 2013), *Nerocila heterozota* (Mhaisen, 1986) and *Nerocila phaiopleura* (Al-Daraji, 1995).
- Ilisha elongata*: See *Ilisha compressa*.
- Ilisha megaloptera*: See *I. compressa*.
- Johnius dussumieri*, reported as *Johnieopse sina* and *Johnius (Johnieopse) sina*: *Anilocra monoma* (Al-Daraji and Naama, 1989), *Gnathia* sp. (Adday, 2013) and *Nerocila kisra* (Al-Daraji and Naama, 1989; Al-Daraji, 1995).
- Johnius (Johnieopse) sina*: See *Johnius dussumieri*.
- Johnius elongatus*, reported as *J. elongata*: *Anilocra monoma* (Al-Daraji and Naama 1989).
- Leioognathus bindus*: See *Photopectoralis bindus*.
- Lethrinus nebulosus*: *Hatschekia shari* (Uyeno and Ali, 2013).
- Leuciscus vorax*, reported as *Aspius vorax*: *Dermoergasilus varicoleus* (Abdul-Rahman, 1999), *Ergasilus mosulensis* (Al-Daraji, 1986; Abdul-Rahman, 1999), *E. ogawai* (Al-Janae'e, 2010), *E. rostralis* (Abdul-Rahman, 1999; Al-Janae'e, 2010), *E. sieboldi* (Al-Janae'e, 2010), *Ergasilus* sp. (Al-Daraji, 1986), *Lamproglana pulchella* (Khamees, 1983; Al-Daraji, 1986; Mhaisen *et al.*, 1986) and *Paraergasilus inflatus* (Abdul-Rahman, 1999).
- Liza abu*: *Argulus foliaceus* (Khamees, 1983; Mhaisen, 1986; Mhaisen *et al.*, 1986), *Dermoergasilus varicoleus* (Al-Daraji, 1995; Khamees and Mhaisen, 1995; Ho *et al.*, 1996; Khamees, 1996; Jori, 1998; Khamees and Mhaisen, 1998; Abdul-Rahman, 1999; Amado *et al.*, 2001; Mhaisen and Khamees, 2001; Khamees and Mhaisen, 2002), *Ergasilus mosulensis* (Khamees, 1983; Al-Daraji, 1986; Mhaisen, 1986; Mhaisen *et al.*, 1986, 1988; Ho *et al.*, 1996; Khamees, 1996; Jori,

- 1998; Khamees and Mhaisen, 1998; Abdul-Rahman, 1999; Mhaisen and Khamees, 2001; Abed, 2005; Al-Niaeem, 2006; Hussein *et al.*, 2011), *E. ogawai* (Al-Janae'e, 2010), *E. rostralis* (Khamees and Mhaisen, 1995; Ho *et al.*, 1996; Khamees, 1996; Jori, 1998; Khamees and Mhaisen, 1998; Abdul-Rahman, 1999; Khamees and Mhaisen, 2001; Mhaisen and Khamees, 2001; Al-Salim and Jori, 2002a; Abed, 2005; Al-Niaeem, 2006; Al-Janae'e, 2010; Hussein *et al.*, 2011), *E. sieboldi* (Al-Janae'e, 2010), *Ergasilus* sp. (Al-Daraji, 1986; Mehdi, 1989; Al-Hadithi *et al.*, 1989; Khudhair *et al.*, 1992; Mehdi *et al.*, 2009), *Mugilicola kabatai* (Piasecki *et al.*, 1991; Al-Daraji, 1995; Ho *et al.*, 1996; Khamees, 1996; Jori, 1998; Khamees and Mhaisen, 1998; Al-Niaeem, 2006; Al-Janae'e, 2010) and *Paraergasilus inflatus* (Ho *et al.*, 1996; Khamees, 1996; Jori, 1998; Khamees and Mhaisen, 1998; Abdul-Rahman, 1999; Mhaisen and Khamees, 2001).
- Liza dussumieri*: See *Chelon subviridis*.
- Liza klunzingeri*: *Nothobomolochus lizae* (Adday, 2013).
- Liza macrolepis*: See *Chelon macrolepis*.
- Liza subviridis*: See *Chelon subviridis*.
- Luciobarbus xanthopterus*, reported as *Barbus xanthopterus*: *Ergasilus ogawai* (Al-Janae'e, 2010), *E. rostralis* (Al-Janae'e, 2010) and *E. sieboldi* (Al-Janae'e, 2010).
- Lutjanus johnii*: *Hatschekia insolita* (Bannai *et al.*, 2008).
- Mastacembelus mastacembelus*: *Ergasilus mosulensis* (Abdul-Rahman, 1999) and *E. ogawai* (Abdul-Rahman, 1999; Adday, 2001; Adday *et al.*, 2006a).
- Megalaspis cordyla*: *Caligus cordyla* (Al-Ataby, 2012; Al-Azizz *et al.*, 2014), *Lernanthropus corniger* (Al-Ataby, 2012; Al-Niaeem *et al.*, 2013) and *L. indicus* (Al-Ataby, 2012; Al-Ataby *et al.*, 2013).
- Mesopotamichthys sharpeyi*, reported also as *Barbus sharpeyi*: *Dermoergasilus varicoleus* (Abdul-Rahman, 1999), *Ergasilus mosulensis* (Al-Daraji, 1986; Abdul-Rahman, 1999), *Lamproglena pulchella* (Al-Daraji, 1986) and *Lernaea cyprinacea* (Khamees, 1997).
- Mystus pelusius*: *Ergasilus mosulensis* (Abdul-Rahman, 1999), *E. ogawai* (Adday, 2001; Adday *et al.*, 2006a) and *E. rostralis* (Abdul-Rahman, 1999).
- Nematalosa arabica*: *Anilocra monoma* (Al-Daraji and Naama, 1989).
- Nematalosa nasus*: *Gnathia* sp. (Adday, 2013).
- Nemipterus japonicus*: *Caligus epinepheli* (Khamees and Adday, 2012; Adday, 2013; Venmathi Maran *et al.*, 2014b), *Clavellotis bilobata* (Adday, 2013), *Gnathia* sp. (Adday, 2013), *Lernanthropus nemipteri* (Adday, 2013) and *Orbitacolax haplogenyos* (Venmathi Maran *et al.*, 2014c).
- Netuma bilineata*, reported also as *Arius bilineatus*: *Caligus* sp. (Jori and Mohamad, 2008) and *Hermilius ariodi* (Adday, 2013).
- Netuma thalassina*: *Gnathia* sp. (Adday, 2013), *Hermilius longicaudus* (Adday, 2013) and *H. longicorni* (Adday, 2013; Venmathi Maran *et al.*, 2014b).
- Otolithes ruber*: *Lernanthropus polynemi* (Bannai, 2002) and *Nerocila kisra* (Al-Daraji, 1995).
- Pampus argenteus*: *Hatschekia conifera* (Al-Daraji, 1995; Bannai *et al.*, 2008) and *H. insolita* (Bannai *et al.*, 2008).
- Parasilurus triostegus*: See *Silurus triostegus*.
- Pastinachus sephen*: *Gnathia* sp. (Adday, 2013).

- Photopectoralis bindus*, reported also as *Leiognathus bindus*: *Catoessa gruneri* (Al-Daraji, 1995; Adday, 2013) and *Nothobomolochus quadriceros* (Adday, 2013).
- Platax teira*: *Anuretes branchialis* (Adday, 2013).
- Plectorhinchus sordidus*: *Anuretes similis* (Al-Hasson *et al.*, 2014).
- Poecilia latipinna*: *Lernaea cyprinacea* (Kadhim, 2009).
- Pseudopocrypte dentatus*: See *Boleophthalmus dussumieri*.
- Pseudosynanceia melanostigma*: *Ergasilus synanceiensis* (Amado *et al.*, 2001; Al-Daraji, 2002a).
- Rhabdosargus haffara*: *Gnathia* sp. (Adday, 2013).
- Sardinella albella*, reported also as *S. perforata*: *Acanthocolax* sp. which was reported as *Bomolochus* sp. (Al-Daraji, 1995), *Nerocila kisra* (Al-Daraji, 1995) and *N. phaiopleura* (Al-Daraji, 1995).
- Sardinella perforata*: See *Sardinella albella*.
- Saurida tumbil*: *Lernanthropinus temminckii* (Adday, 2013; Venmathi Maran *et al.*, 2014b).
- Scomberomorus guttatus*: *Lernanthropus* sp. (Al-Daraji, 1995).
- Siganus canaliculatus*: *Nothobomolochus gazzae* (Adday, 2013).
- Sillago arabica*: *Lernanthropus sillaginis* (Adday, 2013).
- Sillago sihama*: *Lernanthropus sillaginis* (Adday, 2013).
- Silurus triostegus*, reported also as *Parasilurus triostegus*: *Abasia* sp. (Jori, 2006), *Bomolochidae* gen. sp. which was reported as *Bomolochus* sp. (Jori, 2006), *Dermoergasilus varicoleus* (Jori, 2006), *Ergasilus mosulensis* (Al-Daraji, 1986; Abdul-Rahman, 1999; Jori, 2006; Abbas, 2007), *E. ogawai* (Abdul-Rahman, 1999; Adday, 2001; Adday *et al.*, 2006a, b; Al-Janae'e, 2010), *E. pararostralis* (Jori, 2006), *E. rostralis* (Abdul-Rahman, 1999; Al-Janae'e, 2010; Jori, 2006), *E. sieboldi* (Al-Janae'e, 2010), *Ergasilus* sp. (Al-Daraji, 1986), *Lernanthropus polynemi* (Jori, 2006) and *Paraergasilus inflatus* (Abdul-Rahman, 1999; Jori, 2006).
- Sphyraena jello*: *Nerocila heterozota* (Mhaisen, 1986).
- Sphyraena obtusata*: *Nothobomolochus denticulatus* (Adday, 2013).
- Tenualosa ilisha*, reported also as *Hilsa ilisha*: *Acanthocolax* sp. which was reported as *Bomolochus* sp. (Piasecki *et al.*, 1993), *Anchistrotos tangi* (Venmathi Maran *et al.*, 2014a), *Clavella adunca* (Al-Daraji, 1995), *Ergasilus ogawai* (Al-Janae'e, 2010), *E. rostralis* (Al-Janae'e, 2010), *E. sieboldi* (Al-Janae'e, 2010), *Ergasilus* sp. (Adday, 2013), *Gnathia* sp. (Adday, 2013), *Nerocila phaiopleura* (Al-Daraji, 1995) and *Nothobomolochus ilhoikimi* (Adday, 2013; Venmathi Maran *et al.*, 2014c).
- Thryssa mystax*: See *Thryssa whiteheadi*.
- Thryssa whiteheadi*, reported as *T. mystax*: *Nerocila arres* (Al-Daraji, 1995).
- Tilapia zillii*: See *Coptodon zillii*.
- Tylosurus crocodilus*: *Lernanthropus cornutus* (Adday, 2013).

To sum up, it is worthwhile to show here that the 74 crustacean taxa so far recorded from fishes of Basrah province represent 86.1% of the total number of crustacean taxa from freshwater and marine fishes of whole Iraq (Mhaisen, 2014). Such high percentage is due to the presence of many marine crustaceans from fishes of Basrah province.

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Table 1. List of crustaceans of fishes of Basrah province[§].

| |
|--|
| Kingdom Animalia |
| Phylum Arthropoda |
| Subphylum Crustacea |
| Class Maxillopoda |
| Subclass Branchiura |
| Order Arguloida |
| Family Argulidae |
| <i>Argulus foliaceus</i> (L., 1758) {4/16}* |
| <i>Argulus</i> sp. {1/3} |
| Subclass Copepoda |
| Order Cyclopoida |
| Family Bomolochidae |
| <i>Acanthocolax</i> spp. {3/3} |
| <i>Bomolochus megaceros</i> Heller, 1865 {1/1} |
| Bomolochidae gen. sp. {1/1} |
| <i>Nothobomolochus denticulatus</i> (Bassett-Smith, 1898) {1/1} |
| <i>Nothobomolochus gazzae</i> (Shen, 1957) {1/1} |
| <i>Nothobomolochus ilhoikimi</i> Venmathi Maran, Moon, Adday, Khamees & Myoung, 2014 {1/1} |
| <i>Nothobomolochus lizae</i> Ho & Lin, 2005 {2/2} |
| <i>Nothobomolochus quadriceros</i> Pillai, 1973 {1/1} |
| <i>Orbitacolax haplogenyos</i> (Yamaguti & Yamasu, 1959) {1/1} |
| Family Chondracanthidae |
| <i>Bactrochondria formosana</i> Ho, Lin & Liu, 2011 {1/1} |
| Family Ergasilidae |
| <i>Dermoergasilus varicoleus</i> Ho, Jayarajan & Radhakrishnan, 1992 {7/9} |
| <i>Dermoergasilus</i> sp. {1/1} |
| <i>Ergasilus boleophthalmi</i> Adday & Ali, 2011 {2/2} |
| <i>Ergasilus iraquensis</i> Amado, in Amado, da Rocha, Piasecki, Al-Daraji & Mhaisen, 2001 {1/1} |
| <i>Ergasilus lizae</i> Krøyer, 1863 {1/1} |
| <i>Ergasilus mosulensis</i> Rahemo, 1982 {12/20} |

- Ergasilus ogawai* Kabata, 1992 {17/17}
Ergasilus pararostralis Amado, in Amado, da Rocha, Piasecki, Al-Daraji & Mhaisen, 2001 {2/2}
Ergasilus rostralis Ho, Jayarajan & Radhakrishnan, 1992 {17/19}
Ergasilus sieboldi von Nordmann, 1832 {15/26}
Ergasilus synanceiensis Amado, in Amado, da Rocha, Piasecki, Al-Daraji & Mhaisen, 2001 {1/1}
Ergasilus spp. {7/11}
Mugilicola kabatai Piasecki, Khamees & Mhaisen, 1991 {1/1}
Mugilicola sp. {1/1}
Paraergasilus inflatus Ho, Khamees & Mhaisen, 1996 {6/7}
- Family Lernaecidae
Lamproglena pulchella von Nordmann, 1832 {2/19}
Lernaea cyprinacea L., 1758 {9/28}
Lernaea sp. {1/3}
- Family Taeniacanthidae
Anchistrotos tangi Venmathi Maran, Moon & Adday, 2014a {1/1}
- Order Siphonostomatoida
 Family Caligidae
Abasia sp. {1/1}
Anuretes anomalus Pillai, 1967 {1/1}
Anuretes branchialis Rangnekar, 1953 {1/1}
Anuretes similis Ho & Lin, 2000 {1/1}
Caligus cordyla Pillai, 1963 {1/1}
Caligus epinepheli Yamaguti, 1936 {1/1}
Caligus longicaudus Bassett-Smith, 1898 {1/1}
Caligus orientalis Gusev, 1951 {1/1}
Caligus sp. {1/1}
Hermilius ariodi Prabha & Pillai, 1986 {1/1}
Hermilius longicaudus Ho & Kim I.H., 2000 {1/1}
Hermilius longicornis Bassett-Smith, 1898 {1/1}
- Family Eudactylinidae
Eudactylina rhinobati Raibaut & Essafi, 1979 {1/1}
Eudactylina turgipes Bere, 1936 {1/1}
- Family Hatschekiidae
Hatschekia conifera Yamaguti, 1939 {1/1}
Hatschekia insolita Wilson C.B., 1913 {2/2}
Hatschekia shari Uyeno & Ali, 2013 {1/1}
- Family Lernaepodidae
Alella sp. {1/1}
Clavella adunca (Strøm, 1762) {1/1}
Clavella sp. {1/1}
Clavellopsis appendiculata Kirtisinghe, 1950 {1/1}
Clavellotis bilobata (Pillai, 1962) {1/1}
Clavellotis sp. {1/1}
Pseudocharopinus sp. {1/1}

Family Lernanthropidae

- Lernanthropinus temminckii* (von Nordmann, 1864) {1/1}
Lernanthropus corniger Yamaguti, 1954 {2/2}
Lernanthropus cornutus Kirtisinghe, 1937 {1/1}
Lernanthropus ilishae Chin, 1948 {1/1}
Lernanthropus indicus Pillai, 1967 {2/2}
Lernanthropus nemipteri Jayasree & Pillai, 1976 {1/1}
Lernanthropus polynemi Richiardi, 1881 {2/2}
Lernanthropus sarbae Kensley & Grindley, 1973 {1/1}
Lernanthropus sillaginis Pillai, 1963 {2/2}
Lernanthropus sp. {3/3}

Class Malacostraca

Subclass Eumalacostraca

Order Isopoda

Family Cymothoidae

- Anilocra monoma* Bowman & Tareen, 1983 {4/4}
Catoessa gruneri Bowman & Tareen, 1983 {2/2}
Ichthyoxenus asymmetrica Ahmed, 1970a {2/2}
Joryma sawayah Bowman & Tareen, 1983 {2/2}
Nerocila arres Bowman & Tareen, 1983 {2/2}
Nerocila heterozota Ahmed, 1970b {3/3}
Nerocila kisra Bowman & Tareen, 1983 {3/3}
Nerocila phaiopleura Bleeker, 1857 {5/5}

Family Gnathiidae

- Gnathia* sp. larvae (Praniza) {18/18}

§ Arranged according to Ahyong *et al.* (2011) and WoRMS (2014).

* Numbers in curly brackets after the authority of each parasite refer to number of hosts recorded for that parasite in Basrah province/ number of hosts recorded for the same parasite from the whole Iraq based on Mhaisen (2014).

Table 2. List of fishes of Basrah province and their richness with the crustaceans[§].

Class Elasmobranchii

Order Orectolobiformes

Family Hemiscylliidae

- Chiloscyllium arabicum* Gubanov, 1980 {2/2}

Order: Carcharhiniformes

Family: Carcharhinidae

- Carcharhinus dussumieri* (Müller & Henle, 1839) {1/1}

Order Rajiformes

Family Rhinobatidae

- Glaucostegus granulatus* (Cuvier, 1829) {2/2}

Order Myliobatiformes

Family Dasyatidae

- Himantura bleekeri* (Blyth, 1860) {1/1}
Himantura imbricata (Bloch & Schneider, 1801) {2/2}
Himantura randalli Last, Manjaji-Matsumoto & Moore, 2012 {1/1}
Pastinachus sephen (Forsskål, 1775) {1/1}

- Family Gymnuridae
Gymnura poecilura (Shaw, 1804) {2/2}
- Class Actinopterygii
- Order Clupeiformes
- Family Clupeidae
Nematalosa arabica Regan, 1917 {1/1}
Nematalosa nasus (Bloch, 1795) {1/1}
Sardinella albella (Valenciennes, 1847) {3/3}
- ** *Tenuulosa ilisha* (Hamilton, 1822) {10/10}
- Family Engraulidae
Thryssa whiteheadi Wongratana, 1983 {1/1}
- Family Chirocentridae
Chirocentrus dorab (Forsskål, 1775) {2/2}
Chirocentrus nudus Swainson, 1839 {5/5}
- Family Pristigasteridae
Ilisha compressa Randall, 1994 {6/6}
- Order Cypriniformes
- Family Cyprinidae
* *Acanthobrama marmid* Heckel, 1843 {3/4}
* *Alburnus mossulensis* Heckel, 1843 {3/3}
* *Alburnus sellal* Heckel, 1843 {2/2}
* *Carasobarbus luteus* (Heckel, 1843) {8/13}
* *Carassius auratus* (Linnaeus, 1758) {5/5}
* *Carassius carassius* (Linnaeus, 1758) {1/3}
* *Ctenopharyngodon idella* (Valenciennes, 1844) {3/6}
* *Cyprinus carpio* Linnaeus, 1758 {9/17}
* *Hemiculter leucisculus* (Basilewsky, 1855) {3/3}
* *Leuciscus vorax* (Heckel, 1843) {8/12}
* *Luciobarbus xanthopterus* Heckel, 1843 {3/5}
* *Mesopotamichthys sharpeyi* (Günther, 1874) {4/8}
- Order Siluriformes
- Family Bagridae
* *Mystus pelusius* (Solander, 1794) {3/5}
- Family Siluridae
* *Silurus triostegus* Heckel, 1843 {11/11}
- Family Heteropneustidae
* *Heteropneustes fossilis* (Bloch, 1794) {4/6}
- Family Ariidae
Netuma bilineata (Valenciennes, 1840) {2/2}
Netuma thalassina (Rüppell, 1837) {3/3}
- Order Aulopiformes
- Family Synodontidae
Saurida tumbil (Bloch, 1795) {1/1}
- Order Cyprinodontiformes
- Family Poeciliidae
* *Gambusia holbrooki* Girard, 1859 {1/2}
* *Poecilia latipinna* (Lesueur, 1821) {1/1}

Family Cyprinodontidae

* *Aphanius dispar* (Rüppell, 1829) {1/1}

Order Beloniformes

Family Belonidae

Tylosurus crocodilus (Péron & Lesueur, 1821) {1/1}

Order Synbranchiformes

Family Mastacembelidae

* *Mastacembelus mastacembelus* (Banks & Solander, 1794) {2/4}

Order Scorpaeniformes

Family Synanceiidae

Pseudosynanceia melanostigma Day, 1875 {1/1}

Order Perciformes

Family Sillaginidae

Sillago arabica McKay & McCarthy, 1989 {1/1}

Sillago sihama (Forsskål, 1775) {1/1}

Family Carangidae

Carangoides malabricus (Bloch & Schneider, 1801) {2/2}

Megalaspis cordyla (Linnaeus, 1758) {3/3}

Family Leiognathidae

Photopectoralis bindus (Valenciennes, 1835) {2/2}

Family Lutjanidae

Lutjanus johnii (Bloch, 1792) {1/1}

Family Haemulidae

Diagramma pictum (Thunberg, 1792) {2/2}

Plectorhinchus sordidus (Klunzinger, 1870) {1/1}

Family Sparidae

** *Acanthopagrus arabicus* Iwatsuki, 2013 {8/8}

Diplodus sargus (Linnaeus, 1758) {1/1}

Rhabdosargus haffara (Forsskål, 1775) {1/1}

Family Lethrinidae

Lethrinus nebulosus (Forsskål, 1775) {1/1}

Family Nemipteridae

Nemipterus japonicus (Bloch, 1791) {5/5}

Family Sciaenidae

Johnius elongatus Lal Mohan, 1976 {1/1}

Johnius dussumieri (Cuvier, 1830) {3/3}

Otolithes ruber (Bloch & Schneider, 1801) {2/2}

Family Cichlidae

* *Coptodon zillii* (Gervais, 1848) {3/5}

Family Gobiidae

** *Bathygobius fuscus* (Rüppell, 1830) {1/1}

** *Boleophthalmus dussumieri* Valenciennes, 1837 {4/4}

Family Ephippidae

Ephippus orbis (Bloch, 1787) {2/2}

Platax teira (Forsskål, 1775) {1/1}

Family Siganidae

Siganus canaliculatus (Park, 1797) {1/1}

- Family Sphyraenidae
Sphyraena jello Cuvier, 1829 {1/1}
Sphyraena obtusata Cuvier, 1829 {1/1}
- Family Scomridae
Scomberomorus guttatus (Bloch & Schneider, 1801) {1/1}
- Family Stromateidae
Pampus argenteus (Euphrasen, 1788) {2/2}
- Order Mugiliformes
 Family Mugilidae
Chelon macrolepis (Smith, 1846) {1/1}
 ** *Chelon subviridis* (Valenciennes, 1836) {15/15}
 * *Liza abu* (Heckel, 1843) {9/13}
Liza klunzingeri (Day, 1888) {1/1}
- Order Pleuronectiformes
 Family Cynoglossidae
Cynoglossus arel (Bloch & Schneider, 1801) {1/1}
Cynoglossus lingua Hamilton, 1822 {2/2}

§ Richness of fishes with the parasitic crustaceans: number of crustacean species recorded in any particular fish in Basrah province/ number of crustacean species recorded from that fish from the whole waters of Iraq, based on Mhaisen (2014).

* Freshwater fishes, ** marine fishes entering freshwaters and the remaining fishes are marine fishes.

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قوائم مرجعية لقشريات أسماك المياه العذبة والبحرية في محافظة البصرة، العراق

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المستخلص- أظهر إستعراض المراجع عن كل القشريات المتطفلة على أسماك المياه العذبة والبحرية في محافظة البصرة، العراق وجود 74 مرتبة تصنيفية Taxon من القشريات. خمس وستون مرتبة من تلك القشريات تعود لصنف فكية الأقدام Maxillopoda في حين تعود التسعة الباقية لصنف ناعمة الدروع Malacostraca. كل تلك القشريات كانت بالغة تعيش على السطح الخارجي لمضيفاتها السمكية في حين كانت ثلاثة منها بشكل يرقات. سجل 55 من تلك القشريات من بيئات بحرية و 11 من بيئات مياه عذبة في حين سجلت البقية من بيئات بحرية وعذبة. تذبذب العدد الكلي للمراتب التصنيفية للقشريات لكل نوع من الأسماك المضييفة ما بين حد أدنى هو مرتبة واحدة من القشريات في 31 نوعا مضييفا من الأسماك إلى حد أقصى وهو 15 مرتبة تصنيفية في حالة سمكة البياح الأخضر *Chelon subviridis* فقط. وتذبذب عدد أنواع الأسماك المضييفة لهذه القشريات ما بين مضييف واحد فقط في حالة 45 مرتبة تصنيفية إلى أقصى عدد وهو 18 مضييفا في حالة الإصابة بيرقات برانيزا العائدة للجنس *Gnathia*.