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

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Abstract- Reviewing the literature on all the nematodes parasitizing 45 species of freshwater and marine fishes of Basrah province (eight elasmobranchs and 37 teleosts) indicated the presence of 48 nematode taxa. Thirty-five of such nematodes were recorded from marine localities against eight taxa from freshwater localities and two taxa from both marine and freshwater localities. These nematodes belong to two classes, three orders and eight families. All such nematodes belong to the class Secernentea except two taxa which belong to the class Adenophorea. Orders Ascaridida and Spirurida are represented with 22 and 24 taxa, respectively, while order Enoplida has only two taxa. The total number of nematode species recorded for each fish host species fluctuated from a minimum of one nematode species in 17 fish hosts to a maximum of eight nematode taxa in *Cynoglossus arel* only. Number of fish hosts reported for these nematodes fluctuated from one host in case of 31 taxa to a maximum of 20 hosts in case of *Contracaecum* sp. 1 larva.

Keywords: Nematoda, freshwater fishes, marine fishes, Basrah province, Iraq.

Introduction

The nematodes show a very wide range of ecological adaptations. Most of them live in waters (fresh, brackish and sea waters) and in the soil, while others are semiparasitic or parasitic species attacking both animals and plants. Out of about 16,000 described species of nematodes, nearly 40% are animal parasites and some 8% of the known parasitic nematodes occur in invertebrates (Anderson, 1988).

Nematodes (Nematoda) represent the most frequent and the most important parasites of fishes in freshwater, brackishwater or marine environments throughout the world. They attack most body organs, parasitizing them as adults and/or as larvae. Some nematode species are known as the agents of serious fish diseases causing considerable losses in fish cultures and in some regions and some of them cause important public health problems such as anisakiosis, gnathostomosis or paracapillariosis (Moravec, 2007a). The significance of recognizing these parasites increases with development of aquaculture in many countries and with transcontinental transfers of fishes. A prerequisite for developing effective control measures in fish culture is the exact identification of these parasites as well as the knowledge of their frequently complicated host-parasite-environment relationships (Moravec, 1994).

The province of Basrah is the only province in Iraq which has an overlooking on the Arab Gulf. In this province, different varieties of aquatic environments are met. These included the shallow marshy area in the north, Shatt Al-Arab River, its tributaries and estuary, Shatt Al-Basrah canal as well as the marine habitats of the northwest part of the Arab Gulf (Mhaisen *et al*., 2013a). Information concerning nematodes of fishes of Basrah province are scattered in different local scientific references. Some of them are really out dated. Some nematodes 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 up-to-date nematode classification using major taxonomic accounts and also to revise fish names and provide an updated host-nematodes checklist in addition to the nematodes list. This review is a continuation of series of literature reviews on major groups of parasites of fishes of Basrah province (Mhaisen *et al*., 1993; 2013 a, b, c; 2014). Finally, it was also planned to compare the richness of infected fishes of this province with nematodes 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 42 references (research papers, M. Sc. and Ph. D. theses and one conference abstract) dealing with nematodes of fishes of Basrah province were used to prepare the present review. Data from such references were gathered to provide nematodes list and host-nematodes list. The systematic account of different classes and orders of these nematodes is based on some textbooks and related revisions (Moravec, 2006; Anderson *et al*., 2009; Gibbons, 2010). 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, the valid names used here were based on Iwatsuki (2013) and with minor modifications, on relevant electronic sites (Eschmeyer, 2014; Froese and Pauly, 2014).

The index-catalogue of parasites and disease agents of fishes of Iraq (Mhaisen, 2014) was used to show number of nematodes 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 nematodes in comparison with such richness in fishes of the whole Iraq.

Results and Discussion

Surveys Achieved on Fish Nematodes in Basrah:

Digging for literature showed the presence of 42 references on nematodes of fishes of Basrah. From these references, five major categories of fish habitats can be grouped. These are:

1- The marshy area (Al-Hammar marsh and Al-Mdaina marshes) north of Basrah.
2- Shatt Al-Arab River and its creeks and canals.
3- Brackish waters of Shatt Al-Arab estuary near Al-Fao town, south of Basrah.
4- Fish farms in Basrah province.
5- Marine waters of the northwest of the Arab Gulf.

Report on fish nematodes from the marshy area of Basrah province were achieved in Al-Hammar marsh, north of Basrah (Al-Daraji, 1986; Dawood, 1986; Mohamad, 1989; Al-Salim and Mohamad, 1995; Jori, 2006; Abbas, 2007) as well as from Al-Mdaina (reported as Al-Mdina) marshes (Jori, 2005).

Some reports on fish nematodes were done on Shatt Al-Arab River (Al-Hadithi and Jawad, 1975; Al-Hadithi and Habish, 1977; Habish, 1977; Al-Hadithi and Habash, 1979; Anwar and Ismail, 1979; Al-Hadithi *et al*., 1980; Mhaisen, 1986; Ali, 2001) and its creeks and canals which included those from Mehaijeran Creek, south of Basrah city (Khamees, 1983; Mhaisen *et al*., 1986; Khamees and Mhaisen, 1988; Mhaisen *et al*., 1988), Al-Majidiah River (Mehdi, 1989), Garmat Ali River, north of Basrah city (Jori, 1998; Abdul-Rahman, 1999; Al-Niaeem, 1999; Al-Niaeem and Al-Azizz, 2002; Kadhim, 2009; Al-Janae'e, 2010), Al-Salihiya canal (Al-Janae'e, 2010) and Al-Tannuma canal (Al-Janae'e, 2010). In addition to these, some fishes were collected from Ashar fish market (Mhaisen, 1986). It is appropriate to mention here that the reference Anwar and Ismail (1979) was erroneously published as Ismail is the first name and hence the reference should be Anwar and Al-Hadithi (1979).

Only one report is known on fish nematodes from the brackish waters of Shatt Al-Arab estuary near Al-Fao town (Ali, 2001).

Only one report on nematodes from fish farms of Basrah province (Jassim, 2007) was done on fishes of Basrah University Experimental Fish Culture Station.

Reports on nematodes of marine fishes of Iraq included those from Khor Al-Zubair estuary (Al-Daraji, 1995), Khor Abdullah (Bannai, 2002; Awad *et al*., 2003), Khor Al-Ummaia (Moravec and Ali, 2005; Ali, 2008; Al-Salim and Ali, 2010; 2011; Ali and Al-Salim, 2012; Ali *et al*., 2012; Ali and Al-Salim, 2013; Moravec and Ali, 2013; 2014) and the coastal marine waters (Al-Ataby, 2012; Moravec *et al*., 2012; Jassim, 2013).

Nematodes Recorded from Fishes of Basrah:

The literature review indicated the existing of 48 nematode taxa belonging to two classes, three orders, eight superfamilies and eight families as indicated in Table (1). These nematodes are alphabetically presented under their orders, families and genera. Notes on misspelling in names of some nematodes and their hosts, authorities and synonyms are corrected in accordance with information from some systematic books (Moravec, 2006; Anderson *et al*., 2009; Gibbons, 2010) as well as some 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).

Class Adenophorea:

This class is represented in fishes of Basrah with one order, the Enoplida.

Order Enoplida:

This order is represented in fishes of Basrah with one superfamily, the Trichinelloidea.

Superfamily Trichinelloidea:

This superfamily is represented in fishes of Basrah with the family Capillaridae only.

Family Capillaridae:

This family is represented in fishes of Basrah with two species belonging to the genera *Capillaria* and *Pseudocapillaria*.

Capillaria sp. was firstly reported from the intestine of *Mesopotamichthys sharpeyi* from Al-Hammar marsh (Al-Daraji, 1986) and then from the intestine of eight fish species from Garmat Ali River (Abdul-Rahman, 1999). These were: *Barbus luteus* (= *Carasobarbus luteus*), *Chalcalburnus sellal* (= *Alburnus sellal*), *Ctenopharyngodon idella*, *Cyprinus carpio*, *Heteropneustes fossilis*, *Leuciscus vorax* which was reported as *Aspius vorax, Liza abu* and *Mastacembelus mastacembelus*. 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). So far, ten hosts are known for *Capillaria* sp. in Iraq (Mhaisen, 2014).

Pseudocapillaria tomentosa (Dujardin, 1843) was recorded from the intestine of *C. idella* from Basrah University fish farm (Jassim, 2007). This is the only report of *P. tomentosa* from fishes of Iraq.

Class Secernentea:

This class is represented in fishes of Basrah with two orders, Ascaridida and Spirurida.

Order Ascaridida:

This order is represented in fishes of Basrah with two superfamilies, the Ascaridoidea and Seuratoidea.

Superfamily Ascaridoidea:

This superfamily is represented in fishes of Basrah with one family, the Anisakidae.

Family Anisakidae:

This family includes taxa belonging to genera *Acanthocheilus*, *Anisakis*, *Contracaecum*, *Hysterothylacium*, *Mawsonascaris* and *Terranova* in addition to unidentified anisakid specimen.

Adults and fourth larval stage of *Acanthocheilus rotundatus* (Rudolphi, 1819) were recorded from the stomach and fore intestine of *Mustelus mosis*, while the third larval stage was isolated from the intestine of *Lethrinus nebulosus* from Khor Al-Ummaia (Ali, 2008). No more records are available in Iraq (Mhaisen, 2014). *Acanthocheilus* parasites infect elasmobranchs, mainly sharks (Anderson *et al*., 2009). The occurrence of the third larval stage of *A. rotundatus* from *L. nebulosus* is considered as accidental due to the fact that the bony fishes have no rule in the life cycle of this parasite as this larva normally occurs in invertebrates and elasmobranchs (Ali, 2008). *A. rotundatus* belongs to a monotypic genus in the monogenic subfamily Acanthocheilinae (Moravec and Nagasawa, 2000).

Anisakis sp. larva was reported from the body cavity of *Ablennes hians* from Shatt Al-Arab estuary near Al-Fao town (Ali, 2001). The first *Anisakis* sp. larva was reported from the freshwater fish *Cyprinion macrostomum* from Dokan Lake (Abdullah, 1990). So far, five hosts are reported for *Anisakis* sp. in Iraq (Mhaisen, 2014). The final hosts of the members of *Anisakis* are marine mammals except sirenians (Anderson *et al*., 2009). Larvae of this parasite have serious economical and medical importance as raw fishes infected with *Anisakis* or *Pseudoterranova* are rejected through the industrial processing of the products. *Anisakis* larvae in human cause intestinal inflammation "anisakiasis" which shows something like the intestine cancer symptoms (Möller, 1989; Berland, 1996).

Unidentified larval specimen of the family Anisakidae was reported from the intestine of *Carangoides malabricus* from Iraqi marine waters (Al-Ataby, 2012), erroneously as *Skrjabillanus* sp. of the family Skrjabinallidae, order Dracunculoidea. One of us (A.H.A.) examined the single larva of this specimen. It was possible to see a muscular esophagus, ventriculus (glandular portion), appendage and a conical tail with sharp tip. No buccal capsule is present and hence it was erroneously identified as *Skrjabillanus*. *Skrjabillanus* species have a simple esophagus and a long esophagus gland (Anderson *et al*., 2009). They infect the gas bladder, urinary bladder, kidneys, subsquamal part of scales and humour of eyes of freshwater fishes in Palearectic region (Moravec, 2006; Anderson *et al*., 2009; Gibbons, 2010). *Skrjabillanus* has four nominal species infecting tissues of freshwater fishes mainly cyprinids (Moravec, 2006).

Third larval stages of *Contracaecum* spp. were recorded from body cavity, internal organs and mesenteries of 20 fish species in Basrah. In Iraq, such larvae were recorded for the first time in Iraq from ten fish species from different inland waters of Iraq, excluding Basrah (Herzog, 1969). So far a total of 40 fish hosts are known for *Contracaecum* spp. larvae in Iraq (Mhaisen, 2014). Based on the differences in lengths of caecum to appendage, caecum to esophagus and appendage to esophagus (Moravec, 1994), two types of *Contracaecum* species are found in fishes of Basrah. These are *Contracaecum* sp. 1 which is found in all fishes of Basrah infected with *Contracaecum* sp. larvae, except *Heteropneustes fossilis* by Ali (2001) and *Contracaecum* sp. 2 in *H. fossilis* only (Ali, 2001). *Contracaecum* sp. 1, which is conspecific with that of Shamsuddin *et al.* (1971), has a long caecum while *Contracaecum* sp. 2 has very small caecum.

Contracaecum sp. 1 larvae were recorded from the body cavity, mesentries, liver, heart, gonads and kidneys of the following fishes of Basrah, which included the valid as well as the synonymised names. The references which refered to the fishes with synonymised name are marked here with an asterisk. The infected fishes included *Aphanius dispar* (Kadhim, 2009), *Arabibarbus grypus* which was reported as *Barbus grypus* (Al-Hadithi and Habish, 1977; Habish, 1977), *B. luteus*, which is a synonym of *C. luteus* (Al-Hadithi and Habish, 1977*; Habish, 1977*; Khamees, 1983; Al-Daraji, 1986; Mhaisen, 1986; Mhaisen *et al.*, 1986; Khamees and Mhaisen, 1988; Abdul-Rahman, 1999*; Al-Niaeem, 1999*), *Barbus sharpeyi*, which is a synonym of *M. sharpeyi* (Al-Hadithi and Habish, 1977*; Habish, 1977*; Al-Daraji, 1986; Mhaisen, 1986; Abdul - Rahman, 1999*; Al-Niaeem and Al-Azizz, 2002*),

Barbus xanthopterus, which is a synonym of *Luciobarbus xanthopterus* (Al-Hadithi and Habish, 1977*; Habish, 1977*), *C. sellal*, which is a synonym of *A. sellal* (Abdul-Rahman, 1999*), *Carassius auratus* (Al-Janae'e, 2010), *C. idella* (Abdul-Rahman, 1999), *C. carpio* (Dawood, 1986; Abdul-Rahman, 1999), *H. fossilis* and its synonym *Saccobranchus fossilis* (Al-Hadithi and Habish, 1977*; Habish, 1977*; Mhaisen, 1986; Mohamad, 1989; Al-Salim and Mohamad, 1995; Abdul-Rahman, 1999), *Johnius* (*Johnius*) *belangerii* (Bannai, 2002), *L. vorax* which was reported as *A. vorax* (Al-Hadithi and Jawad, 1975; Al-Hadithi and Habish, 1977; Habish, 1977; Khamees, 1983; Al-Daraji, 1986; Mhaisen, 1986; Mhaisen *et al.*, 1986; Abdul-Rahman, 1999), *L. abu* and its synonyms *Mugil abu* and *M. hishni* (Al-Hadithi and Jawad, 1975*; Al-Hadithi and Habish, 1977*; Habish, 1977*; Al-Hadithi and Habash, 1979; Anwar and Ismail, 1979*; Al-Hadithi *et al.*, 1980*; Khamees, 1983; Mhaisen, 1986; Mhaisen *et al.*, 1986; 1988; Mehdi, 1989; Jori, 1998; Abdul-Rahman, 1999; Al-Janae'e, 2010), *L. subviridis*, *Mugil dussumieri* and *M. subviridis* which are all synonyms of *Chelon subviridis* (Al-Hadithi and Habish, 1977*; Habish, 1977*; Abdul-Rahman, 1999*), *M. mastacembelus* (Abdul-Rahman, 1999), *Mystus pelusius* (Al-Hadithi and Habish, 1977; Habish, 1977; Abdul-Rahman, 1999), *Otolithes ruber*, erroneously spelled as *Otolithus ruber* (Bannai, 2002), *Silurus triostegus* and its synonym *Parasilurus triostegus* (Al-Hadithi and Habish, 1977; Habish, 1977; Al-Daraji, 1986*; Abdul-Rahman, 1999; Jori, 2006; Abbas, 2007; Al-Janae'e, 2010), *Synaptura orientalis*, which is a synonym of *Brachirus orientalis* (Bannai, 2002) and *Tenualosa ilisha* (Al-Janae'e, 2010). It is appropriate to mention here that *B. grypus* is considered as a synonym of *A. grypus* according to Borkenhagen (2014). This was ascertained by Eschmeyer (2014) but not by Froese and Pauly (2014) yet. The sampling site of the infected fishes with *Contracaecum* sp. 1 larvae are not given here in order to economise space. However, such sites can be detected from the preceding subheading "surveys achieved on fish nematodes in Basrah" within the part of results and discussion.

Contracaecum sp. 2 larvae recorded from Basrah included only those from the body cavity and mesentries of *H. fossilis* from Shatt Al-Arab River near Nahr Khooz village (Ali, 2001).

Al-Daraji (1995) reported females of *Contracaecum* sp. from *J.* (*J.*) *belangerii* from Khor Al-Zubair estuary and Bannai (2002) recorded such females from three species of marine fishes (*A. hians*, *Saurida undosquamis* and *Sillago sihama*) from Khor Abdullah. It is well known that adult *Contracaecum* species are parasites of birds and mammals, so they cannot mature in fishes. Therefore, Ali (2008) and Al-Salim and Ali (2010) transferred the above female *Contracaecum* records of both Al-Daraji (1995) and Bannai (2002) to the genus *Hysterothylacium* Ward *et* Magath, 1917 and as only females were available, it is impossible to identify them to the species level.

Some adult *Contracaecum* species were recorded from some piscivorous birds in Basrah. *C. microcephalum* was reported from the purple heron *Ardea purpurea* (Al-Hadithi and Habish, 1977; Habish, 1977; Awad *et al*., 1994), from the pygmy cormorant *Phalocrocorax pygmeus* and the little egret *Egretta grazetta* from Basrah marshes (Awad *et al*., 1994) and from *E. grazetta*, the bittern *Ardeola ralloides* and the little bittern *Ixobrychus*

minutus from Al-Hammar marsh (Ali, 2008). *C. micropapillatum* was reported from the grey heron *Ardea cinerea* and *A. ralloides* from Al-Hammar marsh (Ali, 2008). *C. multipapillatum* and *C. rudolphi* (reported as *C. spiculigerum*) were reported from *P. pygmeus* from Basrah marsh (Awad *et al*., 1994). *C. ovale* was recorded from *A. purpurea* from Abu Zijri marsh north of Basrah province (Abdullah, 1988; Al-Hadithi and Abdullah, 1991) and from *A. ralloides* (Ali, 2008). Unidentified adult *Contracaecum* species were also reported from *Phalocrocorax carbo* from Shatt Al-Arab River (Abed, 2005) and from ten bird species in Meshab marsh (Al-Tameemi, 2013).

Fourth larval stage of *Hysterothylacium reliquens* (Norris & Overstreet, 1975) from fishes of Basrah were described from the intestine of *Cynoglossus arel* and *L. nebulosus* while the adults were reported from *Trichiurus lepturus* from Khor Al-Ummaia (Ali, 2008; Al-Salim and Ali, 2010).

Females of *Hysterothylacium* sp. 1 (misidentified as *Contracaecum* sp.) were recorded from the intestine of *J.* (*J.*) *belangerii* from Khor Al-Zubair estuary (Al-Daraji, 1995). Bannai (2002) recorded the same females of *Hysterothylacium* sp. 1 (also misidentified as *Contracaecum* sp.) from three species of marine fishes (*A. hians*, *Saurida undosquamis* and *Sillago sihama*) from Khor Abdullah.

One juvenile male of *Hysterothylacium* sp. 2 was isolated from the intestine of *Drepane longimana* from Khor Al-Ummaia (Ali, 2008; Al-Salim and Ali, 2010). It is easy to distinguish between *Hysterothylacium* sp. 1 and *Hysterothylacium* sp. 2 as the former one has relatively equal length ratio of caecum to appendage in comparison with short caecum in the latter species (the ratio of caecum to appendage is 1:7 in *Hysterothylacum* sp. 2) in adition to differences in the ratio of caecum to esophagus and appendage to esophagus (Deardorff and Overstreet, 1981). Li *et al.* (2013) included 70 valid species of *Hysterothylacium*. *Hysterothylacium* includes parasites of marine, estuarine and freshwater fishes (Gibbons, 2010). Humans can be accidentally infected upon eating raw infected fishes (Shamsi *et al*., 2013).

Six type species of the third larval stages of *Hysterothylacium* sp. were reported from six marine fishes from Khor Al-Ummaia. These were: *Hysterothylacium* sp. type BA larva from the body cavity of two teleosts: *Acanthopagrus arabicus*, reported as *A. latus* (Ali, 2008; Al-Salim and Ali, 2010) and *C. arel* (Ali, 2008; Al-Salim and Ali, 2010; Ali and Al-Salim, 2012) as well as from the intestine of two sharks: *Chiloscyllium arabicum* and *Sphyrna mokarran* (Ali, 2008; Al-Salim and Ali, 2010), *Hysterothylacium* sp. type BB larvae from the body cavity of both *C. arabicum* (Ali, 2008; Al-Salim and Ali, 2010) and *C. arel* (Ali, 2008; Al-Salim and Ali, 2010; Ali and Al-Salim, 2012), *Hysterothylacium* sp. type BC larvae from the stomach serosa of *C. arabicum* (Ali, 2008; Al-Salim and Ali, 2010) and the body cavity of *C. arel* (Ali, 2008; Al-Salim and Ali, 2010; Ali and Al-Salim, 2012), *Hysterothylacium* sp. type BD larvae from the body cavity of *C. arel* (Ali, 2008; Al-Salim and Ali, 2010), *Hysterothylacium* sp. type BE larvae from gills of *Rhizoprionodon acutus* (Ali, 2008; Al-Salim and Ali, 2010) and *Hysterothylacium* sp. type BF from the body cavity of *Tylosurus crocodilus* (Ali, 2008; Al-Salim and Ali, 2010). The generic name of the host *Rhizoprionodon* was erroneously spelled as *Rhizopriodon* by Ali (2008).

Ali (2008) described unidentified adult and fourth larval stages of species of *Mawsonascaris* from the intestine of *Himantura gerrardi* from Khor Al-Ummaia. Then, the same parasite was described as a new species which is *Mawsonascaris parva* by Ali *et al*. (2012) from the intestine of *Himantura randalli* as the type host was already described as a new species in the same year of parasite description from the Arab Gulf by Last *et al*. (2012). The genus *Mawsonascaris* includes six nominal species which infect the digestive tract of elasmobranchs (Ali *et al.*, 2012; Li *et al*., 2012).

Two unidentified larval species of *Terranova* types BA and BB were recorded from three carcharhinid sharks from Khor Al-Ummaia. *Terranova* sp. type BA larvae were reported from the stomach and intestine of *Carcharhinus dussumieri* (Ali, 2008; Ali and Al-Salim, 2013), gills, liver, stomach and intestine of *C. sorrah* (Ali, 2008; Ali and Al-Salim, 2013) and from stomach and intestine of *R. acutus* (Ali, 2008; Ali and Al-Salim, 2013). According to Ali (2013), *C. sorrah* was reported as *C. macloti* by Ali (2008). *Terranova* sp. type BB larvae were reported from the stomach of *C. dussumieri* (Ali, 2008; Ali and Al-Salim, 2013), intestine of *C. sorrah* (Ali, 2008; Ali and Al-Salim, 2013) and from stomach of *R. acutus* (Ali, 2008; Ali and Al-Salim, 2013). All specimens of *Terranova* spp. from Basrah belonging to the third larval stages and a single specimen to early fourth larval stage inside the cuticle of the previous stage (larva with lips but lacks tooth) of *Terranova* sp. type BB were reported from carcharhinid sharks due either to newly infection which might took place with these parasites or to unsuitable final hosts.

Superfamily Seuratoidea:

This superfamily is represented in fishes of Basrah with one family, the Cucullanidae.

Family Cucullanidae:

This family is represented in fishes of Basrah with three species of the genus *Cucullanus* in addition to some specimens of unidentified species of this genus.

Cucullanus armatus Yamaguti, 1954 was reported only from the intestine of *Netuma thalassina* from Khor Al-Ummaia (Ali, 2008; Al-Salim and Ali, 2011).

Cucullanus cyprini Yamaguti, 1941 was recorded from five freshwater fishes from Garmat Ali River (Abdul-Rahman, 1999). These were *B. luteus* (= *C. luteus*), *C. carpio*, *A. vorax* (=*L. vorax*), *M. pelusius* and *S. triostegus*. *C. cyprini* was reported for the first time in Iraq from both *Alburnus caeruleus* and *B. xanthopterus* which is a synonym of *L. xanthopterus* from Al-Tharthar Lake, mid Iraq (Al-Saadi, 1986). *C. cyprini* has so far 14 hosts in Iraq (Mhaisen, 2014).

Cucullanus otolithi (Ashraf, Khanum & Farooq, 1977) Al-Salim & Ali, 2011 was reported from the intestine of *O. ruber* from Khor Al-Zubair estuary (Al-Daraji, 1995) as *Indocucullanus otolithi*. The generic name *Otolithes* was misspelled as *Otolithus* by Al-Daraji (1995). According to Anderson *et al*. (2009), the genus *Indocucullanus* is considered as a synonym of *Cucullanus*.

Females of *Cucullanus* sp. were recorded only from the intestine of *L.*

nebulosus from Khor Al-Ummaia (Ali, 2008; Al-Salim and Ali, 2011). Previously, male *Cucullanus* sp. was reported from *C. macrostomum* from Tigris River at Mosul city (Fattohy, 1975).

Cucullanus sp. larvae were isolated only from the mesenteries of *B. luteus* (= *C. luteus*) from Shatt Arab River (Al-Hadithi and Habish, 1977; Habish, 1977). Larvae of *Cucullanus* sp. have so far three fish hosts in Iraq (Mhaisen, 2014).

Order Spirurida:

This order comprises approximately half number of all nematode taxa so far recorded from fishes of Basrah. It is represented in fishes of Basrah with five superfamilies: Camallanoidea, Dracunculoidea, Gnathostomatoidea, Thelazioidea and Spiruroidea.

Superfamily Camallanoidea:

This superfamily is represented in fishes of Basrah with one family, the Camallanidae.

Family Camallanidae:

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

Camallanus ancylodirus Ward & Magath, 1916 was recorded only from the intestine of *C. carpio* in Al-Mdaina marshes (Jori, 2005). Personal communication between one of us (A.H.A.) and Dr. František Moravec concerning *C. ancylodirus* reported by Jori (2005) revealed that this species is not *C. ancylodirus*. So, it is designated as *Cucullanus* sp. 1 in the present checklist.

Camallanus kirandensis Baylis, 1928 was reported only from the intestine of *S. triostegus* in Al-Hammar marsh (Jori, 2006). Again, the personal communication between with Dr. František Moravec concerning *C. kirandensis* reported by Jori (2006) revealed that it is not *C. kirandensis*. So, it is designated as *Cucullanus* sp. 2 in the present checklist.

Specimens of the fourth larval stage of *Camallanus* sp. were recorded only from the mesenteries of *C. arel* from Khor Al-Ummiah (Ali, 2008; Al-Salim and Ali, 2011).

Superfamily Dracunculoidea:

This superfamily is represented in fishes of Basrah with one family, the Philometridae.

Family Philometridae:

This family is represented in fishes of Basrah with seven species of the genus *Philometra* and two species of the genus *Philometroides* in addition to four unidentified species of the genus *Philometra*. All the 13 taxa recorded in this family, except one species (*Philometroides cyprini)*, were reported from marine waters.

Philometra brachiri Moravec & Ali, 2014 was described only from the ovaries of the oriental sole *B. orientalis* from Khor Al-Ummaia (Moravec and Ali, 2014).

Philometra johnii Moravec & Ali, 2013 was described only from the ovaries of sin croaker *Johnius dussumieri* from Khor Al-Ummaia (Moravec and Ali, 2013).

Philometra otolithi Moravec & Manoharan, 2013 was recorded only from the ovaries of the tigerteeth croaker *O. ruber* from Khor Al-Ummaia (Moravec and Ali, 2014).

Philometra piscaria Moravec & Justine, 2014 was recorded only from the ovaries of the orange-spotted grouper *Epinephelus coioides* from Khor Al-Ummaia (Moravec and Ali, 2014).

Philometra strongylurae Moravec & Ali, 2005 was described from the subcutaneous muscles of the beak and gills of both the banded needlefish *Strongylura leiura* (Moravec and Ali, 2005; Ali, 2008) and spottail needlefish *S. strongylura* from Khor Al-Ummaia (Moravec and Ali, 2005).

Philometra tricornuta Moravec & Ali, 2014 was described only from musculature of the caudal peduncle of the greater lizardfish *Saurida tumbil* from Khor Al-Ummaia (Moravec and Ali, 2014).

Philometra tylosuri Moravec & Ali, 2005 was described only from the musculature and subcutaneous tissues of the hound needlefish *T. crocodilus* from Al-Fao coast (Moravec and Ali, 2005).

Four unidentified species of *Philometra* were also reported from the ovaries of *S. leiura* and *T. crocodilus* from Shatt Al-Arab estuary at Al-Fao town (Ali, 2001) and from the body cavity of both *Sphyreana jello* and *N. thalassina* from Khor Al-Ummaia (Ali, 2008). Due to the rather high degree of host specificity in philometrids (Moravec, 2006) and their species-characteristic tissue sites (Moravec and Ali, 2005; Moravec, 2006), it can be assumed that the above-named four unidentified *Philometra* spp. belong to different species and account separately in the present study as *Philometra* spp. 1-4. The genus *Philometra* includes parasites of body cavity and tissues of marine, brackish and freshwater fishes. A total of 105 nominal species of *Philometra* are encountered up to the end of 2013 (Personal communication with Dr. F. Moravec).

Philometroides acanthopagri Moravec, Jassim & Al-Salim, 2012 was described only from the musculature near the pectoral fin and nasal cavity of *Acanthopagrus latus* from the coastal marine waters of the Arab Gulf (Moravec *et al.*, 2012; Jassim, 2013). According to the personal communication between one of us (A.H.A.) and Prof. Dr. Y. Iwatsuki on 8th Dec. 2013, *A. latus* is not distributed in the Arab Gulf and hence *A. latus*, reported here, is actually representing *A. arabicus*. This fact comes in agreement with Iwatsuki (2013), Adday (2013), Eschmeyer (2014) and Froese and Pauly (2014).

Philometroides cyprini (Ishii, 1931) Nakajima, 1970 was misidentified as *Philometroides carasii* (Ishii, 1931) Nakajima & Egusa, 1977 from the body cavity of *C. carpio* from Al-Mdaina marshes (Jori, 2005). Personal communication between one of us (A.H.A.) and Dr. F. Moravec indicated that the description provided by Jori (2005) is apparently misidentification of the nematode with *P. cyprini*. The genus *Philometroides* includes 30 valid species which parasitise freshwater, brackish and marine fishes (Moravec and Manoharan, 2013).

Superfamily Gnathostomatoidea:

This superfamily is represented in fishes of Basrah with two families: Gnathostomidae and Physalopteridae.

Family Gnathostomatidae:

This family is represented in fishes of Basrah with adults and larval forms of unidentified *Echinocephalus*.

Adults of *Echinocephalus* sp. were recorded from the intestine of both *Himantura randalli* (reported as *H. gerrardi*) and *Pastinachus sephen* in Khor Al-Ummaia (Ali, 2008).

Echinocephalus sp. 1 larvae were reported from the intestinal wall of both *J. belangerii* and *S. sihama* from Khor Abdullah (Bannai, 2002; Awad *et al*., 2003) and from the intestine of *S. triostegus* from Al-Hammar marsh (Jori, 2006). The generic name *Sillago* was misspelled as *Silago* by Awad *et al*. (2003). Bannai (2002), Awad *et al*. (2003) and Jori (2006) stated that *Echinocephalus* sp. larvae were provided with four transverse rows of spines on the cephalic bulb. As *Echinocephalus* spp. larvae are known to have 6-8 rows of spines (Millemann, 1963; Moravec and Justine, 2006), we conclude that the report of four rows of spines as indicated by the above three references from Basrah is erroneous and it is possible to indicate that with deformed specimens or improperly preserved ones loss of spines is quite possible.

Echinocephalus sp. 2 larvae were recorded from the mesenteries of both *C. arabicum* and *C. arel* from Khor Al-Ummaia (Ali, 2008; Ali and Al-Salim, 2013). *Echinocephalus* sp. 2 larvae have six transverse rows of spines on the cephalic bulb in comparison with larvae of *Echinocephalus* sp. 1 which were claimed by Bannai (2002), Awad *et al*. (2003) and Jori (2006) to have four rows. In addition, in *Echinocephalus* sp. 2 larvae, Ali (2008) and Ali and Al-Salim (2013) showed the presence of two groups of ventro-dorsally minute spines between the pseudolips and the first row of the large spines, each group consists of three transverse rows, the first and second rows have two minute spines and the last row has three minute spines, while such minute spines were never mentioned by Bannai (2002), Awad *et al*. (2003) and Jori (2006) in *Echinocephalus* sp. 1 larvae. The genus *Echinocephalus* has ten nominal species as parasites of the alimentary canal of elasmobranchs (Moravec, 2007b). It is difficult to separate different larval stages of *Echinocephalus* by morphological criteria. Also, it is difficult to associate the morphologically dissimilar larvae with their respective adults other than by observing specimens actually undergoing the final moult (Andrews *et al*., 1988; Beveridge, 1991; Moravec and Justine, 2006). There is a concern that at least some species of *Echinocephalus* may have public health significance as potential invaders of the human digestive tract (Bower, 2006).

Family Physalopteridae:

This family is represented in fishes of Basrah with three taxa, one belongs to the genus *Paraleptus* and two taxa belong to the subfamily Proleptinae.

Unidentified species of *Paraleptus* was reported from the stomach of *C. arabicum* in Khor Al-Ummaia (Ali, 2008). This is the only report on *Paraleptus* in Iraq (Mhaisen, 2014). The genus *Paraleptus* is one of the four genera of the subfamily Proleptinae which includes parasites of elasmobranchs

(Moravec, 2007b). *Paraleptus* has eight valid species (Personal communication between A.H.A. and Dr. Liang Li on 17th Feb. 2014).

Unidentified larval species type BA of the subfamily Proleptinae was isolated from the mesenteries of *Cynoglosus arel* (Ali, 2008; Ali and Al-Salim, 2013). Another larval species type BB of this subfamily was recorded from the intestine of *C. carpio* from Univesrsity of Basrah fish farm (Jassim, 2007).

Superfamily Thelazioidea:

This superfamily is represented in fishes of Basrah with the family Rhabdochonidae.

Family Rhabdochonidae:

This family is represented in fishes of Basrah with one species of the genus *Rhabdochona*.

Rhabdochona garuai Agrawal, 1965 was recorded from the intestine of *S. triostegus* in Al-Hammar marsh (Jori, 2006). Dr. F. Moravec examined the illustration and description of *R. garuai* of Jori (2006) and believed that it was a misidentification of *R. garuai* by Jori (2006). So, we regretfully consider *R. garuai*, reported by Jori (2006) as *Rhabdochona* sp. The genus *Rhabdochona* comprises a large number of species parasitizing freshwater fishes in all the zoogeographical regions (Moravec, 2010). This genus includes four subgenera: the monotypical subgenus *Rhabdochona*, *Globochona*, *Globochonoides* and *Sinonema* which differ from each others mainly by numbers of anterior prostomal teeth, presence/ absence of lateral alae and some other features (Moravec, 2010). *R. garuai* belongs to the subgenus *Globochona*. The genus *Rhabdochona* has 97 valid species at the present (Moravec *et al.*, 2013).

Superfamily Spiruroidea:

Unidentified larval specimens belonging to this superfamily were isolated from the mesenteries of *A. grypus* (reported as *B. grypus*) and *C. luteus* (reported as *B. luteus*) from Shatt Al-Arab River (Al-Hadithi and Habish, 1977; Habish, 1977).

Addendum:

With this article, checklists of all the groups of parasitic worms infecting fishes of Basrah province were achieved. However, only one group remains untreated. This is the group of leeches (phylum Annelida, class Clitellata, subclass Hirudinea). Only one report on this group from fishes of Basrah is available. This is the record of the leech *Hemiclepsis marginata* (O. F. Müller, 1774) from gills of *L. abu* at the junction of Al-Khora canal with Shatt Al-Arab River (Mhaisen *et al.*, 1993). This leech was reported for the first time in Iraq from the skin of three fish species in fish ponds near Baghdad (Khalifa, 1985). In Iraq, six taxa of leeches are so far documented (Mhaisen, 2014).

Host-Nematodes List:

The names of all fish hosts infected with nematodes in Basrah province (45 valid fish names and 18 synonyms) are alphabetically arranged. For each host, the nematode species are also alphabetically arranged. For each parasite 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.

Ablennes hians: *Anisakis* sp. larva (Ali, 2001) and *Hysterothylacium* sp. 1, reported as *Contracaecum* sp. (Bannai, 2002).

Acanthopagrus latus: See *Acanthopagrus arabicus*.

Acanthopagrus arabicus, reported as *A. latus*: *Hysterothylacium* sp. type BA larva (Ali, 2008; Al-Salim and Ali, 2010) and *Philometroides acanthopagri* (Moravec *et al*., 2012; Jassim, 2013).

Alburnus sellal, reported as *Chalcalburnus sellal*: *Capillaria* sp. (Abdul-Rahman, 1999) and *Contracaecum* sp. 1 larva (Abdul-Rahman, 1999).

Aphanius dispar: *Contracaecum* sp. 1 larva (Kadhim, 2009).

Arabibarbus grypus, reported as *Barbus grypus*: *Contracaecum* sp. 1 larva (Al-Hadithi and Habish, 1977; Habish, 1977) and Spiruroidea gen. sp. larva (Al-Hadithi and Habish, 1977; Habish, 1977).

Aspius vorax: See *Leuciscus vorax*.

Barbus grypus: See *Arabibarbus grypus*.

Barbus luteus: See *Carasobarbus luteus*.

Barbus sharpeyi: See *Mesopotamichthys sharpeyi*.

B. xanthopterus: See *Luciobarbus xanthopterus*.

Brachirus orientalis, reported also as *Synaptura orientalis*: *Contracaecum* sp. 1 larva (Bannai, 2002) and *Philometra brachiri* (Moravec and Ali, 2014).

Carangoides malabricus: Anisakidae gen. sp. larva, misidentified as *Skrjabillanus* sp. (Al-Ataby, 2012).

Carasobarbus luteus, reported also as *Barbus luteus*: *Capillaria* sp. (Abdul-Rahman, 1999), *Contracaecum* sp. 1 larva (Al-Hadithi and Habish, 1977; Habish, 1977; Khamees, 1983; Al-Daraji, 1986; Mhaisen, 1986; Mhaisen *et al*., 1986; Khamees and Mhaisen, 1988; Abdul-Rahman, 1999; Al-Niaeem, 1999), *Cucullanus cyprini* (Abdul-Rahman, 1999), *Cucullanus* sp. larva (Al-Hadithi and Habish, 1977; Habish, 1977) and Spiruroidea gen. sp. larva (Al-Hadithi and Habish, 1977; Habish, 1977).

Carassius auratus: *Contracaecum* sp. 1 larva (Al-Janae'e, 2010).

Carcharhinus dussumieri: *Terranova* sp. BA larva (Ali, 2008; Ali and Al-Salim, 2013) and *Terranova* sp. BB larva (Ali, 2008; Ali and Al-Salim, 2013).

Carcharhinus macloti: See *Carcharhinus sorrah*.

Carcharhinus sorrah, reported as *Carcharhinus macloti*: *Terranova* sp. BA larva (Ali, 2008; Ali and Al-Salim, 2013) and *Terranova* sp. BB larva (Ali, 2008; Ali and Al-Salim, 2013).

Chalcalburnus sellal: See *Alburnus sellal*.

Chelon subviridis, reported as *Liza subviridis*, *Mugil dussumieri* and *M. subviridis*: *Contracaecum* sp. 1 larva (Al-Hadithi and Habish, 1977; Habish, 1977; Abdul-Rahman, 1999).

Chiloscyllium arabicum: *Echinocephalus* sp. 2 larva (Ali, 2008; Ali and Al-Salim, 2013), *Hysterothylacium* sp. type BA larva (Ali, 2008; Al-Salim and Ali, 2010), *Hysterothylacium* sp. type BB larva (Ali, 2008; Al-Salim and Ali, 2010), *Hysterothylacium* sp. type BC larva (Ali, 2008; Al-Salim and Ali, 2010) and *Paraleptus* sp. (Ali, 2008).

Ctenopharyngodon idella: *Capillaria* sp. (Abdul-Rahman, 1999), *Contracaecum* sp. 1 larva (Abdul-Rahman, 1999) and *Pseudocapillaria tomentosa* (Jassim, 2007).

Cynoglossus arel: *Camallanus* sp. larva (Ali, 2008; Al-Salim and Ali, 2011), *Echinocephalus* sp. 2 larva (Ali, 2008; Ali and Al-Salim, 2013), *Hysterothylacium reliquens* larva (Ali, 2008; Al-Salim and Ali, 2010), *Hysterothylacium* sp. type BA larva (Ali, 2008; Al-Salim and Ali, 2010; Ali and Al-Salim, 2012), *Hysterothylacium* sp. type BB larva (Ali, 2008; Al-Salim and Ali, 2010; Ali and Al-Salim, 2012), *Hysterothylacium* sp. type BC larva (Ali, 2008; Al-Salim and Ali, 2010; Ali and Al-Salim, 2012), *Hysterothylacium* sp. type BD larva (Ali, 2008; Al-Salim and Ali, 2010) and Proleptinae gen. sp. larva type BA (Ali, 2008; Ali and Al-Salim, 2013).

Cyprinus carpio: *Camallanus* sp., reported as *C. ancylodirus* (Jori, 2005), *Capillaria* sp. (Abdul-Rahman, 1999), *Contracaecum* sp. 1 larva (Dawood, 1986; Abdul-Rahman, 1999), *Cucullanus cyprini* (Abdul-Rahman, 1999), *Philometroides cyprini*, misidentified as *P. carasii* (Jori, 2005) and Proleptinae gen. sp. type BB larva (Jassim, 2007).

Drepane longimana: *Hysterothylacium* sp. 2 (Ali, 2008; Al-Salim and Ali, 2010).

Epinephelus coioides: *Philometra piscaria* (Moravec and Ali, 2014).

Heteropneustes fossilis, reported also as *Sacchobranchus fossilis*: *Capillaria* sp. (Abdul-Rahman, 1999), *Contracaecum* sp. 1 larva (Al-Hadithi and Habish, 1977; Habish, 1977; Mhaisen, 1986; Mohamad, 1989; Al-Salim and Mohamad, 1995; Abdul-Rahman, 1999) and *Contracaecum* sp. 2 larva (Ali, 2001).

Himantura gerrardi: See *Himantura randalli*.

Himantura randalli: *Mawsonascaris parva* (adult and larva) which are the same as *Mawsonascaris* sp. (Ali, 2008; Ali *et al*., 2012) and *Echinocephalus* sp. (Ali, 2008).

Johnius belangerii: *Contracaecum* sp. 1 larva (Bannai, 2002), *Echinocephalus* sp. 1 larva (Bannai, 2002; Awad *et al*., 2003) and *Hysterothylacium* sp. 1, reported as *Contracaecum* sp. (Al-Daraji, 1995).

Johnius (*Johnius*) *belangerii*: See *J. belangerii*.

Johnius dussumieri: *Philometra johnii* (Moravec and Ali, 2013).

Lethrinus nebulosus: *Acanthocheilus rotundatus* larva (Ali, 2008), *Cucullanus* sp. (Ali, 2008; Al-Salim and Ali, 2011) and *Hysterothylacium reliquens* juvenile (Ali, 2008; Al-Salim and Ali, 2010).

Leuciscus vorax, reported as *Aspius vorax*: *Capillaria* sp. (Abdul-Rahman, 1999), *Contracaecum* sp. 1 larva (Al-Hadithi and Jawad, 1975; Al-Hadithi and Habish, 1977; Habish, 1977; Khamees, 1983; Al-Daraji, 1986; Mhaisen, 1986; Mhaisen *et al*., 1986; Abdul-Rahman, 1999) and *Cucullanus cyprini* (Abdul-Rahman, 1999).

Liza abu, reported also as *Mugil hishni* and *Mugil abu*: *Capillaria* sp. (Abdul-Rahman, 1999) and *Contracaecum* sp. 1 larva (Al-Hadithi and Jawad, 1975; Al-Hadithi and Habish, 1977; Habish, 1977; Al-Hadithi and Habash, 1979; Anwar and Ismaeel, 1979; Al-Hadithi *et al.*, 1980;

Khamees, 1983; Mhaisen, 1986; Mhaisen *et al.*, 1986; 1988; Mehdi, 1989; Jori, 1998; Abdul-Rahman, 1999; Al-Janae'e, 2010).

L. subviridis: See *Chelon subviridis*.

Luciobarbus xanthopterus, reported as *Barbus xanthopterus*: *Contracaecum* sp. 1 larva (Al-Hadithi and Habish, 1977; Habish, 1977).

Mastacembelus mastacembelus: *Capillaria* sp. (Abdul-Rahman, 1999) and *Contracaecum* sp. 1 larva (Abdul-Rahman, 1999).

Mesopotamichthys sharpeyi, also reported as *Barbus sharpeyi*: *Capillaria* sp. (Al-Daraji, 1986) and *Contracaecum* sp. 1 larva (Al-Hadithi and Habish, 1977; Habish, 1977; Al-Daraji, 1986; Mhaisen, 1986; Abdul-Rahman, 1999; Al-Niaeem and Al-Azizz, 2002).

Mugil abu: See *Liza abu*.

Mugil dussumieri: See *Chelon subviridis*.

Mugil hishni: See *Liza abu*.

Mugil subviridis: See *Chelon subviridis*.

Mustelus mosis: *Acanthocheilus rotundatus* adult and larva (Ali, 2008).

Mystus pelusius: *Contracaecum* sp. 1 larva (Al-Hadithi and Habish, 1977; Habish, 1977; Abdul-Rahman, 1999) and *Cucullanus cyprini* (Abdul-Rahman, 1999).

Netuma thalassina: *Cucullanus armatus* (Ali, 2008; Al-Salim and Ali, 2011) and *Philometra* sp. 4 (Ali, 2008).

Otolithes ruber: *Contracaecum* sp. 1 larva (Bannai, 2002), *Cucullanus otolithi*, reported as *Indocucullanus otolithi* (Al-Daraji, 1995) and *Philometra otolithi* (Moravec and Ali, 2014).

Parasilurus triostegus: See *Silurus triostegus*.

Pastinachus sephen: *Echinocephalus* sp. (Ali, 2008).

Rhizoprionodon acutus: *Hysterothylacium* sp. type BE larva (Ali, 2008; Al-Salim and Ali, 2010), *Terranova* sp. type BA larva (Ali, 2008; Ali and Al-Salim, 2013) and *Terranova* sp. type BB larva (Ali, 2008; Ali and Al-Salim, 2013).

Saccobranchus fossilus: See *Heteropneustes fossilis*.

Saurida tumbil: *Philometra tricornuta* (Moravec and Ali, 2014).

Saurida undosquamis: *Hysterothylacium* sp. 1, reported as *Contracaecum* sp. 1 (Bannai, 2002).

Sillago sihama: *Echinocephalus* sp. 1 larva (Bannai, 2002; Awad *et al.*, 2003) and *Hysterothylacium* sp. 1, reported as *Contracaecum* sp. 1 (Bannai, 2002).

Silurus triostegus, reported also as *Parasilurus triostegus*: *Camallanus* sp., reported as *C. kirandensis* (Jori, 2006), *Contracaecum* sp. 1 larva (Al-Hadithi and Habish, 1977; Habish, 1977; Al-Daraji, 1986; Abdul-Rahman, 1999; Jori, 2006; Abbas, 2007; Al-Janae'e, 2010), *Cucullanus cyprini* (Abdul-Rahman, 1999), *Echinocephalus* sp. 1 larva (Jori, 2006) and *Rhabdochona* sp., misidentified as *R. garuai* (Jori, 2006).

Sphyraena jello: *Philometra* sp. 3 (Ali, 2008).

Sphyrna mokarran: *Hysterothylacium* sp. type BA larva (Ali, 2008; Al-Salim and Ali, 2010).

Strongylura leiura: *Philometra strongylurae* (Moravec and Ali, 2005; Ali, 2008) and *Philometra* sp. 1 (Ali, 2001).

Strongylura strongylura: *Philometra strongylurae* (Moravec and Ali, 2005).

Synaptura orientalis: See *Brachirus orientalis*.
Tenualosa ilisha: *Contracaecum* sp. 1 larva (Al-Janae'e, 2010).
Trichiurus lepturus: *Hysterothylacium reliquens* (Ali, 2008; Al-Salim and Ali, 2010).
Tylosurus crocodilus: *Hysterothylacium* sp. type BF larva (Ali, 2008; Al-Salim and Ali, 2010), *Philometra tylosuri* (Moravec and Ali, 2005) and *Philometra* sp. 2 (Ali, 2001).

To sum up, it is worthwhile to show here that the 48 nematode taxa so far recorded from fishes of Basrah province represent 60% of the total number of nematode taxa from freshwater and marine fishes of whole Iraq (Mhaisen, 2014). Such high percentage is due to the presence of marine nematodes from fishes of Basrah province in addition to the freshwater nematodes.

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

Phylum Nematoda
Class Adenophorea
Order Enoplida
Superfamily Trichinelloidea
Family Capillaridae
Capillaria sp. {9/10}[*]
Pseudocapillaria tomentosa (Dujardin, 1843) {1/1}
Class Secernentea
Order Ascaridida
Superfamily Ascaridoidea
Family Anisakidae
Acanthocheilus rotundatus (Rudolphi, 1819) adult and larva {2/2}
Anisakis sp. larva {1/5}
Anisakidae gen. sp. larva {1/1}
Contracaecum sp. 1 larva {20/40}
Contracaecum sp. 2 larva {1/1}
Hysterothylacium reliquens (Norris & Overstreet, 1975) adult and larva {3/3}
Hysterothylacium sp. 1 ♀ {4/4}
Hysterothylacium sp. 2 ♂ {1/1}
Hysterothylacium sp. Type BA larva {4/4}
Hysterothylacium sp. Type BB larva {2/2}

Hysterothylacium sp. Type BC larva {2/2}
Hysterothylacium sp. Type BD larva {1/1}
Hysterothylacium sp. Type BE larva {1/1}
Hysterothylacium sp. Type BF larva {1/1}
Mawsonascaris parva Ali, Zhang, Al-Salim & Li, 2012 adult and larva {1/1}
Terranova sp. Type BA larva {3/3}
Terranova sp. Type BB larva {3/3}
Superfamily Seuratoidea
Family Cucullanidae
Cucullanus armatus Yamaguti, 1954 {1/1}
Cucullanus cyprini Yamaguti, 1941 {5/14}
Cucullanus otolithi (Ashraf, Khanum & Farooq, 1977) Al-Salim & Ali, 2011 {1/1}
Cucullanus sp. {1/2}
Cucullanus sp. larva {1/3}
Order Spirurida
Superfamily Camallanoidea
Family Camallanidae
Camallanus sp. 1 {1/1}
Camallanus sp. 2 {1/1}
Camallanus sp. larva {1/1}
Superfamily Dracunculoidea
Family Philometridae
Philometra brachiri Moravec & Ali, 2014 {1/1}
Philometra johnii Moravec & Ali, 2013 {1/1}
Philometra otolithi Moravec & Manoharan, 2013 {1/1}
Philometra piscaria Moravec & Justine, 2014 {1/1}
Philometra strongylurae Moravec & Ali, 2005 {2/2}
Philometra tricornuta Moravec & Ali, 2014 {1/1}
Philometra tylosuri Moravec & Ali, 2005 {1/1}
Philometra spp. 1- 4 {4/7}
Philometroides acanthopagri Moravec, Jassim & Al-Salim, 2012 {1/1}
Philometroides cyprini (Ishii, 1931) Nakajima, 1970 {1/1}
Superfamily Gnathostomatoidea
Family Gnathostomatidae
Echinocephalus spp. {2/2}
Echinocephalus sp. 1 larva {3/3}
Echinocephalus sp. 2 larva {2/2}
Family Physalopteridae
Paraleptus sp. {1/1}
Proleptinae gen. sp. type BA larva {1/1}
Proleptinae gen. sp. type BB larva {1/3}
Superfamily Thelazioidea
Family Rhabdochonidae
Rhabdochona sp. {1/1}
Superfamily Spiruroidea
Spiruroidea gen. sp. larva {2/2}

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§ Arranged according to Moravec (2006), Anderson *et al*. (2009) and Gibbons (2010).

* Numbers in curly brackets occurring after the authority of each parasite refer to number of host species recorded for that parasite in Basrah province/ number of hosts recorded for the same parasite from the whole inland waters of Iraq based on data obtained from the index-catalogue of parasites and disease agents of fishes of Iraq (Mhaisen, 2014).

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

Class Elasmobranchii
Order Orectolobiformes
Family Hemiscylliidae
Chiloscyllium arabicum Gubanov, 1980 {5/5}
Order Carcharhiniformes
Family Carcharhinidae
Carcharhinus dussumieri (Müller & Henle, 1839) {2/2}
Carcharhinus sorrah (Müller & Henle, 1839) {2/2}
Rhizoprionodon acutus (Rüppell, 1837) {3/3}
Family Sphyrnidae
Sphyrna mokarran (Rüppell, 1837) {1/1}
Family Triakidae
Mustelus mosis Hemprich & Ehrenberg, 1899 {1/1}
Order Myliobatiformes
Family Dasyatidae
Himantura randalli Last, Manjaji-Matsumoto & Moore, 2012 {2/2}
Pastinachus sephen (Forsskål, 1775) {1/1}
Class Actinopterygii
Order Clupeiformes
Family Clupeidae
** *Tenualosa ilisha* (Hamilton, 1822) {1/1}
Order Cypriniformes
Family Cyprinidae
* *Alburnus sellal* Heckel, 1843 {2/3}
* *Arabibarbus grypus* (Heckel, 1843) {2/8}
* *Carasobarbus luteus* (Heckel, 1843) {5/12}
* *Carassius auratus* (Linnaeus, 1758) {1/1}
* *Ctenopharyngodon idella* (Valenciennes, 1844) {3/4}
* *Cyprinus carpio* Linnaeus, 1758 {6/9}
* *Leuciscus vorax* (Heckel, 1843) {3/7}
* *Luciobarbus xanthopterus* Heckel, 1843 {1/6}
* *Mesopotamichthys sharpeyi* (Günther, 1874) {2/6}
Order Siluriformes
Family Ariidae
Netuma thalassina (Rüppell, 1837) {2/2}
Family Bagridae
* *Mystus pelusius* (Solander, 1794) {2/4}
Family Heteropneustidae
* *Heteropneustes fossilis* (Bloch, 1794) {3/6}
Family Siluridae
* *Silurus triostegus* Heckel, 1843 {5/6}
Order Aulopiformes
Family Synodontidae
*Saurida tumbil (*Bloch, 1795) {1/1}
Saurida undosquamis (Richardson, 1848) {1/1}
Order Beloniformes
Family Belonidae
Ablennes hians (Valenciennes, 1846) {2/2}
Strongylura leiura (Bleeker, 1850) {2/2}
Strongylura strongylura (van Hasselt, 1823) {1/1}

Tylosurus crocodilus (Péron & Lesueur, 1821) {3/3}
Order Cyprinodontiformes
Family Cyprinodontidae
* *Aphanius dispar* (Rüppell, 1829) {1/1}
Order Perciformes
Family: Carangidae
Carangoides malabricus (Bloch & Schneider, 1801) {1/1}
Family Drepaneidae
Drepane longimana (Bloch & Schneider, 1801) {1/1}
Family Lethrinidae
Lethrinus nebulosus (Forsskål, 1775) {3/3}
Family Sciaenidae
Johnius belangerii (Cuvier, 1830) {3/3}
Johnius dussumieri (Cuvier, 1830) {1/1}
Otolithes ruber (Bloch & Schneider, 1801) {3/3}
Family: Serranidae
Epinephelus coioides (Hamilton, 1822) {1/1}
Family Sillaginidae
Sillago sihama (Forsskål, 1775) {2/2}
Family Sparidae
Acanthopagrus arabicus Iwatsuki, 2013 {2/2}
Family Sphyraenidae
Sphyraena jello Cuvier, 1829 {1/1}
Family Trichiuridae
Trichurus lepturus Linnaeus, 1758 {1/1}
Order Synbranchiformes
Family Mastacembelidae
* *Mastacembelus mastacembelus* (Banks & Solander, 1794) {2/6}
Order Mugiliformes
Family Mugilidae
** *Chelon subviridis* (Valenciennes, 1836) {1/1}
* *Liza abu* (Heckel, 1843) {2/5}
Order Pleuronectiformes
Family Cynoglossidae
Cynoglossus arel (Bloch & Schneider, 1801) {8/8}
Family Soleidae
Brachirus orientalis (Bloch & Schneider, 1801) {2/2}

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§ Richness of fishes with nematodes: number of nematode species recorded in any particular fish in Basrah province/ number of nematode species recorded from that fish from the whole waters of Iraq, based on the index-catalogue of parasites and disease agents of fishes of Iraq (Mhaisen, 2014).
* Freshwater fishes, ** marine fishes entering freshwaters and the remaining fishes are marine fishes.

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قوائم مرجعية للديدان الخيطية في أسماك المياه العذبة والبحرية في محافظة البصرة، العراق

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المستخلص- أظهر إستعراض المراجع حول كل الديدان الخيطية المتطفلة على 45 نوعا من أسماك المياه العذبة والبحرية في محافظة البصرة (ثمانية أنواع من صفائحية الغلاصم و 37 نوعا من الأسماك العظمية) وجود 48 مرتبة تصنيفية Taxon من الديدان الخيطية. من بين تلك الديدان الخيطية سجلت 35 مرتبة من مواقع مياه بحرية مقابل 11 منها سجلت من مواقع مياه عذبة وإثنتين فقط منها سجلا من مواقع مياه بحرية وعذبة بنفس الوقت. تعود هذه الديدان إلى صنفين وثلاث رتب وثمان عوائل. جميع الديدان الخيطية هذه تعود لصنف سسيرننشيا Secernentea بإستثناء مرتبتين تصنيفيتين تعودان لصنف أدينوفوريا Adenophorea. تمثلت رتبة أسكاريديدا Ascaridida بـ 22 مرتبة تصنيفية ورتبة سبايروريدا Spirurida بـ 24 مرتبة تصنيفية ورتبة إنوبليدا Enoplida بمرتبتين فقط. تذبذب العدد الكلي للمراتب التصنيفية للديدان الخيطية لكل نوع من الأسماك المضيفة مابين حد أدنى هو مرتبة واحدة من الديدان الخيطية في 17 نوعا مضيّفا من الأسماك إلى حد أقصى وهو ثمان مراتب تصنيفية في حالة سمكة لسان الثور *Cynoglossus arel* فقط. وتذبذب عدد أنواع الأسماك المضيّفة لهذه الديدان الخيطية مابين مضيف واحد فقط في حالة 31 مرتبة تصنيفية إلى أقصى عدد وهو 20 مضيّفا في حالة الإصابة بيرقات الدودة الخيطية *Contracaecum* sp. 1.