

Checklists of Cestodes of Freshwater and Marine Fishes of Basrah Province, Iraq

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Abstract. Reviewing the literature on all the cestodes parasitizing freshwater and marine fishes of Basrah province, Iraq indicated the presence of 30 cestode taxa. Eleven species of such cestodes were recorded from freshwater localities, 18 from marine localities and one species from marine, brackish and fresh waters. All these cestodes belong to the subclass Eucestoda. The total number of cestode species recorded for each fish host species fluctuated from a minimum of one cestode species in 15 fish hosts to a maximum of five cestode species in *Silurus triostegus* only. Number of fish hosts reported for these cestodes fluctuated from one host in case of 17 species to a maximum of nine hosts in case of *Bothriocephalus acheilognathi*.

Key words: Cestoda, Eucestoda, freshwater fishes, marine fishes, Basrah province, Iraq.

Introduction

The tapeworms are flatworms which are generally characterized by segmented body (except the cestodarians and few eucestodes) with a scolex, sometimes colloquially referred to as the head, a "neck," and one or more proglottids, which are sometimes called segments. The scolex on the anterior end of the body is usually armed with various combinations of suckers, hooks, bothridia or bothria, or even tentacles, rostrum, apical cone or pad in some species, for attachment in the host intestine (75). With no exceptions, all tapeworms are hermaphroditic and characterized by the lack of an alimentary canal (33). In their connection with fishes, cestodes live as adults in the alimentary canal, while as larvae they inhabit fish body cavity, musculature and viscera. So, fishes serve as final, intermediate or paratenic hosts for cestodes (23, 68). Cestodes life cycles are indirect with developmental stages (metacestodes) between the oncosphere and the adult stages occur in intermediate or paratenic hosts (68). The ~6,000 tapeworm species comprise 18 orders that differ most conspicuously in the form of their attachment structure, the scolex (44). Due to their endoparasitic style of life, cestodes exert different injuries in the body of their hosts and may cause the death to the host as in the case of the Asian tapeworm *Bothriocephalus acheilognathi* (36). In addition, some cestodes, such as the broad fish tapeworm *Diphyllobothrium latum*, have a zoonotical importance as they are known to be transmissible to humans through the consumption of raw or inadequately cooked fishes (4).

The province of Basrah is the only province in southern 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 its estuary, Shatt Al-Basrah canal as well as the marine habitats of the northwest part of the Arab

Gulf (62). Such diversity in these environments facilitates the infection of freshwater as well as marine fishes of Basrah with various cestodes as different intermediate, paratenic and final hosts are available.

Information concerning cestodes of fishes of Basrah province are scattered in different local scientific references. Some of this information is really outdated. Some cestodes 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 cestode classification using available web sites as well as some major taxonomic accounts and revise fish names to provide a host-cestodes checklist in addition to the cestodes list. This review is a continuation of previous literature reviews done on parasites of fishes of Basrah province (65, 60, 63). Finally, it was also planned to compare the richness of infected fishes of this province with cestodes 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 (61).

Sources and Methods

A total of 28 references (research papers, M. Sc. and Ph. D. theses and one conference abstract) dealing with cestodes of fishes of Basrah province were used to prepare the present review. Data from such references was gathered to provide cestodes list and host-cestodes list. The systematic account of different orders of these cestodes is based on some textbooks and related revisions (74, 49, 30, 69, 52, 76, 53, 54, 77, 55) as well as some available web sites (34, 39, 40, 41, 42, 43, 44, 70, 79). For fishes, the scientific names were reported as they appeared in their original references and then checked with a recent account on freshwater fishes of Iraq (31). However, the valid names used here were based, with minor modifications, on a relevant electronic site (35).

The index-catalogue of parasites and disease agents of fishes of Iraq (61) was used to show number of cestodes reported for each infected fish species in Basrah in comparison with that of whole Iraq as well as the richness of fishes of Basrah with cestodes in comparison with such richness in fishes of the whole country of Iraq.

Results and Discussion

Surveys Achieved on Fish Cestodes in Basrah

The first two reports on parasites of fishes of Iraq (38, 78) which covered some inland waters of Iraq showed no any fish cestodes from Basrah province. The first checklist of parasites of fishes of Iraq (58) also included no any item of cestodes from fishes of Basrah. Digging for literature showed the presence of 28 references on cestodes 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) 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.

Reports on fish cestodes from the marshy area of Basrah province were achieved in Al-Hammar marsh, north of Basrah (8, 32, 9, 27, 46, 1). In addition to these, fishes collected from Basrah fish market (59) were from Basrah marshy area.

Some reports on fish cestodes were on Shatt Al-Arab River (11, 12) and its creeks and canals which included those from Mehajeran Creek, south of Basrah city (50, 64), Garmat Ali River, north of Basrah city (3, 17, 19, 20, 22, 18, 47), Al-Salihiya canal (7, 15), Al-Tannuma canal (7) in addition to few samples taken from the mouth of Shatt Al-Basrah canal, Hartha and Junaineh (7).

Only two reports are known on fish cestodes from the brackish waters of Shatt Al-Arab estuary near Al-Fao town (12, 21). Al-Salim & Ali (21) erroneously stated Khor Al-Ummaia instead of Shatt Al-Arab estuary near Al-Fao town.

Only one report on cestodes from fish farms of Basrah province (45) was done on Basrah University Experimental Culture Station and Faddak Company for Animal and Agricultural Production in Shatt Al-Arab shire.

Reports on cestodes of marine fishes of Iraq included those from Khor Al-Zubair lagoon (10), Khor Abdullah (25, 26), Khor Al-Ummaia (13) as well as other sampling area in the northwest of the Arab Gulf (5, 6). As indicated above, Al-Salim & Ali (21) erroneously stated Khor Al-Ummaia instead of Shatt Al-Arab estuary near Al-Fao town.

Cestodes Recorded from Fishes of Basrah

The literature review indicated the existing of 30 cestode taxa belonging to the subclass Eucestoda with seven orders and 13 families as indicated in Table (1). The classification of these cestodes is based on different revisions (74, 49, 30, 69, 52, 76, 53, 54, 77, 55). These cestodes are alphabetically presented under their orders, families and genera. Notes on misspelling in names of some cestodes and their hosts, authorities and synonyms are corrected in accordance with information from some electronic sites (34, 39, 40, 41, 42, 43, 44, 70, 79) 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 Froese & Pauly (35). The full authority of each valid fish host is shown in Table (2).

Order Caryophyllidea

This order is represented in fishes of Basrah with the family Lytocestidae.

Family Lytocestidae

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

Khawia armeniaca (Cholodkovsky, 1915) Shulman, 1958 was reported from the intestine of three fish species from Al-Hammar marsh. These fishes are: *Barbus xanthopterus*, which is a synonym of *Luciobarbus xanthopterus* (35), by Al-Daraji, (9), *Mesopotamichthys sharpeyi* (8) and *Silurus triostegus* and its synonym *Parasilurus triostegus*

(35), by Al-Daraji, (8, 9). On the basis of morphological similarity in all characteristics considered to be of diagnostic value, *Khawia barbi* Rahemo & Mohammad, 2002 and *Khawia lutei* Al-Kalak & Rahemo, 2003, both reported as new species from *Barbus luteus*, which is a synonym of *Carasobarbus luteus* (35), from Tigris River at Mosul, Iraq (73, 16) are considered as new synonyms with *K. armeniaca* (77).

Khawia sinensis Hsü 1935 was reported from the intestine of *Cyprinus carpio* from Al-Hammar marsh (27). The first record of this worm from Iraq was from *Barbus grypus* from Darbandikhan Lake (2). *K. sinensis* together with other six species of this genus were considered as valid species out of the 17 nominal species of this genus (77).

Order Bothriocephalidea

This order is represented in fishes of Basrah with the family Bothriocephalidae.

Family Bothriocephalidae

This family is represented in Basrah fishes with five taxa belonging to genera *Bothriocephalus*, *Oncodiscus* and *Polyonchobothrium*.

Bothriocephalus acheilognathi Yamaguti, 1934 has nine fish hosts in Basrah. These fishes included *B. luteus* (= *C. luteus*) from Garmat Ali River (3), *Chalcalburnus sellal*, which is synonym of *Alburnus sellal* (35), from Garmat Ali River (3), *Ctenopharyngodon idella* from Garmat Ali River (3) and from Basrah University Experimental Culture Station and Faddak Company for Animal and Agricultural Production in Shatt Al-Arab shire (45), *C. carpio* from Al-Hammar marsh (32), from Garmat Ali River (3, 18) and from Basrah University Experimental Culture Station (45), *Gambusia holbrooki* from Garmat Ali River (47), *Liza abu* from Al-Salihiya canal (15), *M. sharpeyi* (reported as *B. sharpeyi*) from Garmat Ali River (3, 19, 20), *Mystus pelusius* from Garmat Ali River (3) and *S. triostegus* from Garmat Ali River (3) and from Al-Hammar marsh (1). *B. acheilognathi* was reported for the first time in Iraq from *C. carpio* from unspecified fish farms (48). *B. acheilognathi* caused mortality of up to 25% at a commercial *C. carpio* fishery in South Korea (36).

In addition to the above records of *B. acheilognathi*, another species, *B. gowkongensis* Yeh, 1955 was reported from *C. luteus* from Mehajern Creek (50, 64) and from Basrah Fish market (55). The first record of *B. gowkongensis* from Iraq was from *C. carpio* from unspecified fish farms (48). The third species, *B. opsariichthydis* Yamaguti, 1934, was recorded for the first time in Iraq from *Barbus grypus* from Diyala River (14). Both *B. gowkongensis* and *B. opsariichthydis* are considered as synonyms of *B. acheilognathi* (51, 67). Now, *B. acheilognathi* and its above-named synonyms have 20 hosts in Iraq (61).

Unidentified species of *Bothriocephalus* were reported from four fish hosts from Basrah. These are *Aspius vorax* from Garmat Ali River (3), *C. luteus* from Al-Hammar marsh (8), *C. carpio* from Garmat Ali River (17, 22) and *Parasilurus triostegus* (= *S. triostegus*) from Al-Hammar marsh (8). Out of 106 nominal taxa of this genus, only 33 species are considered to be valid (52). Sixty-one accepted species of *Bothriocephalus*, mostly marines, are documented in WoRMS (79). The genus *Bothriocephalus* includes 87 valid species (39).

Oncodiscus sauridae Yamaguti, 1934 was recorded as larva only from the intestine of *Saurida undosquamis* from Khor Al-Zubair (10) and as an adult from the same fish from Khor Abdullah (25). Out of four nominal taxa of this genus, only *O. sauridae* is considered to be valid (52, 56, 79). The genus *Oncodiscus* includes four accepted species (39).

Polyonchobothrium (misspelled as *Polyoncobothrium*) *clarias* (Woodland, 1925) Meggitt, 1930 was reported only from the intestine of *S. triostegus* from Al-Hammar marsh (46). According to Kuchta & Scholz (52), Kuchta *et al.* (53) and Kuchta *et al.* (55), this species is considered as a new synonym of *Tetracampos ciliotheca* Wedl, 1861. However, Dr. R. Kuchta (personal communication with AHA) believes that the drawings and description of this specimen, forwarded to him, might represent *Tetracampos* sp. As no voucher specimen was deposited by Jori (46), we reexamined the drawings and the description of Jori's specimen and believe that her specimen belongs to *Tetracampos* sp. New material should be collected from the same host of the same locality in order to determine the status. This can be a task for future research. The genus *Tetracampos*, which is endemic to Africa and introduced to Asia, includes two valid species (55). However, this genus is considered as a synonym of *Polyonchobothrium* (39).

Unidentified single immature specimen of *Polyonchobothrium* sp. was reported from the intestine of *A. vorax* from Al-Hammar marsh (9). However, Dr. R. Kuchta (personal communication) believes that this immature specimen belongs to *Senga* sp. As no voucher specimen was deposited by Al-Daraji (9), we reexamined Al-Daraji's drawings and description and according to the key for recognizing the genera of Bothriocephalidae (53), we believe that Al-Daraji's specimen belongs to *Senga* sp. The genus *Senga* includes 37 accepted species (39). According to Dr. R. Kuchta (personal communication), *Senga* includes only four valid species.

Order Diphyllbothriidea

This order is represented in fishes of Basrah with the family Diphyllbothriidae.

Family: Diphyllbothriidae

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

Ligula intestinalis (L., 1758) Bloch, 1782 was reported as plerocercoid from the body cavity of *A. vorax* from Shatt Al-Arab River (11) and then from the same fish from Garmat Ali River (3). So far, this species has 13 fish hosts in Iraq (61). The genus *Ligula* is represented with five accepted species (70). The presence of *L. intestinalis* larvae in the body cavity of their hosts is associated with a suppression of the gonads of the host so it is often difficult to distinguish the gonadal tissue from surrounding mesenteries (24). Larvae of *L. intestinalis* induce behavioural changes on the roach *Rutilus rutilus* which may increase piscivorous bird encounter rate and predation efficiency on parasitized fishes and therefore facilitate completion of the parasite's life cycle (57). The adult stage of *L. intestinalis* was reported from the intestine of the moorhen *Gallinula chloropus chloropus* from around Baghdad (66).

Order Nippotaeniidea

This order is represented in Basrah fish with the family Nippotaeniidae.

Family Nippotaeniidae

This family is represented in Basrah fishes with two taxa belonging to the genus *Nippotaenia*.

Nippotaenia sp. 1 and 2 were reported from the intestine of *C. carpio* from Basrah University Experimental Culture Station (45). According to a personal communication with Dr. Rodney A. Bray, two of unspecified cestode species of the same genus from the same host and the same locality may be considered as one. Internationally, *Nippotaenia* includes three accepted species (41).

Order Diphyllidea

This order is represented in Basrah fish with the family Echinobothriidae only.

Family Echinobothriidae

This family is represented in Basrah fishes with one species belonging to the genus *Echinobothrium*.

Echinobothrium rhynchobati (Khalil & Abdul-Salam, 1989) Tyler, 2006 was reported as *Macrobothrium rhynchobati* from the intestine of the granulated guitarfish *Rhynchobatus granulatus*, which is a synonym of *Glaucostegus granulatus* (35), from Khor Al-Ummaia, northwest of the Arab Gulf (13). *M. rhynchobati* is a synonym of *E. rhynchobati* (34, 79). In the world records, *E. rhynchobati* has so far only two hosts (71). The genus *Echinobothrium* includes 45 valid species (37).

Order Trypanorhyncha

In the sense of number of taxa recorded in fishes of Basrah, this order includes more than half of the cestode taxa so far reported from such fishes. It includes seven families.

Family Eutetrarhynchidae

This family is represented in Basrah fishes with one species belonging to the genus *Trigonolobium*.

Trigonolobium spinuliferum (Southwell, 1911) Dollfus, 1929 was reported from the spiral intestine of the hooktooth shark *Chaenogaleus macrostoma* from Khor Al-Ummaia, northwest of the Arab Gulf (13). The genus *Trigonolobium* includes only two accepted marine species (69, 34, 79).

Family Lacistorhynchidae

This family is represented in Basrah fishes with five taxa belonging to genera *Callitetrarhynchus*, *Dasyrhynchus*, *Floriceps* and *Pseudogrillotia*.

Callitetrarhynchus gracilis (Rudolphi, 1819) Pintner, 1931 was reported from seven fish species from Basrah. These are: *Ablennes hians*, *Netuma bilineata*, *Tylosurus crocodilus* and *Mustelus mosis* from Khor Al-Ummaia (13), *S. commersonianus* (erroneously reported as *S. commersonia*) from Khor Abdullah (26) and both *Carangoides malabaricus* and

Megalaspis cordyla from the northwest of the Arab Gulf (5). According to Dr. H. W. Palm (Personal communication with AHA on 5 Feb. 2007 and 31 Jan. 2008), *C. gracilis* reported from the four above- named fish species by Ali (13) as well as the larval specimens of *Mixodigma* sp. from *T. crocodilus* from Shatt Al-Arab estuary near Al-Fao town (12) belong to *Callitetrarhynchus cf. gracilis*. All the specimens of *C. gracilis* reported in this paragraph were larvae except those from *M. mosis* which were adults.

Unidentified larvae of *Callitetrarhynchus* sp. were reported from the body cavity of both *C. malabaricus* and *M. cordyla* from the northwest of the Arab Gulf (5). The genus *Callitetrarhynchus* has two accepted species inclusive of *C. gracilis* which has four synonyms (69, 79).

Dasyrhynchus pacificus Robinson, 1959 was reported, as plerocercoid, from the intestine and musculature of only *Scomberoides commersonianus* from Khor Abdullah (26). The year of authority was erroneously reported as 1965 and the specific name of the fish was misspelled as *commersoniaius* by the same researcher (26). The genus *Dasyrhynchus*, which according to WoRMS (79) belongs to the family Lacistorhynchidae, includes eight accepted and one unaccepted marine species.

Floriceps minacanthus Campbell & Beveridge, 1987 was reported from the body cavity and viscera (intestine, stomach wall, liver and gonad tissue) of both *Carangoides armatus* and *C. malabaricus* from the northwest of the Arab Gulf (5, 6). The year of authority was erroneously reported as 2006 by Al-Ataby (5). The genus *Floriceps* includes two accepted species and one *species inquirenda* (79).

Pseudogrillotia spratti Campbell & Beveridge, 1993 was found encapsulated in the body cavity of *C. armatus*, *C. malabaricus* and *M. cordyla* from the northwest of the Arab Gulf (5). The genus *Pseudogrillotia* includes eight accepted and one unaccepted species (79).

Family Otophthiriidae

This family is represented in Basrah fishes with three taxa belonging to the genus *Otophthirium*.

Otophthirium alexanderi Palm, 2004 was reported from the muscles of only *T. crocodilus* from Khor Al-Ummaia (13).

Otophthirium penetrans Linton, 1907 was reported from *A. hians*, *Strongylura leiura*, *S. strongylura* and *T. crocodilus* from Shatt Al-Arab estuary near Al-Fao town (12, 21) as well as from *S. strongylura* from Shatt Al-Arab river near Nahr Khooz village (12, 21). Al-Salim and Ali (21) erroneously stated Khor Al-Ummaia instead of Shatt Al-Arab estuary near Al-Fao town. Later on, it was reported from both *S. leiura* and *T. crocodilus* from Khor Al-Ummaia (13) and from *Synaptura orientalis*, which is a synonym of *Brachirus orientalis* (34), from Khor Abdullah (26). The latter researcher (26) erroneously reported the specific name of this parasite as *penetratus* and the authority as Linton, 1905. The genus *Otophthirium* includes 14 accepted and seven unaccepted species in addition to two *species inquirendae* (78).

Paramecistobothrium sp. was reported as larvae from the alimentary canal of *S. orientalis* (= *B. orientalis*) from Khor Abdullah (26). The genus *Paramecistobothrium* is considered as a synonym of *Otobothrium* (49, 69, 42) but according to WoRMS (79), *Paramecistobothrium* is unaccepted genus and *Poecilancistrum* is the accepted one.

Family Progrillotiidae

This family is represented in Basrah fishes with one taxon belonging to the genus *Progrillotia*.

Progrillotia sp. was reported as free plerocerci in the body cavity of both *Alepes djedaba* and *M. cordyla* from the northwest of the Arab Gulf (5). The genus *Progrillotia* includes 35 taxa (40). Three accepted and one unaccepted marine species are included in this genus (79).

Family Pterobothriidae

This family is represented in Basrah fishes with two taxa belonging to the genus *Pterobothrium*.

Pterobothrium hira Yamaguti, 1952 was recorded as cysts from the wall of intestine and stomach of only *Ilisha elongata*? from Khor Abdullah (26). *I. elongata* is not found in the Arab Gulf and it is probably misidentified with *Ilisha compressa* (28).

Unidentified larva of *Pterobothrium* sp. was found encysted on the gut wall of *I. elongata*? (= *I. compressa*) from Khor Abdullah (26). The generic name was erroneously spelled as *Petrobothrium* by the above researcher. The genus *Pterobothrium* includes 27 taxa (43). According to WoRMS (79), this genus includes 14 accepted and two unaccepted species in addition to six *species inquirendae*.

Family Pseudotobothriidae

This family is represented in Basrah fishes with one taxon belonging to the genus *Parotobothrium*.

Parotobothrium balli (Southwell, 1929) Palm, 2004 was reported as *Nybelinia karachii* Khurshid & Bilqeas, 1988 as plerocercoid on stomach surface of *Johnius (Johnieops) sina*, which is a synonym of *Johnius dussumieri* (34), from Khor Al-Zubair (10). *N. karachii* is considered as a synonym of *P. balli* (34, 79). In addition to *P. balli*, the genus *Parotobothrium* includes one accepted species (34, 79).

Family Tentaculariidae

This family is represented in Basrah fishes with two taxa belonging to the genera *Nybelinia* and *Tentacularia*.

Unidentified *Nybelinia* sp. 1 was reported as post larva (plerocercus without blastocyst) from the anterior part of the pharynx and on the gill arch of *I. elongata*? (= *I. compressa*) from Khor Al-Zubair (10). *Nybelinia* sp. 2 and 3 were reported as adults from the stomach and the spiral intestine of the hooktooth shark *C. macrostoma* from Khor Al-Ummaia (12). As indicated above in the family Pseudotobothriidae, *Nybelinia karachii* reported by Al-

Daraji (10) is considered as a synonym of *P. balli*. *Nybelinia lemontae* reported by Bannai (26) is discussed in the next paragraph within the genus *Tentacularia*.

Tentacularia coryphaenae Bosc, 1797 was reported as *Nybelinia lemontae* Williams & Williams, 1996 from the wall of stomach and intestine of *S. undsquamis* from Khor Abdullah (26). In addition to the mistake in spelling the specific name *lamontae* as *lemontae* by the researcher (26), the authority Williams & Williams, 1996 is incorrect and it should be Nigrelli, 1938 according to WoRMS (79). *N. lamontae* is a synonym of *T. coryphaenae* (69, 79). The genus *Tentacularia* has one accepted species (*T. coryphaenae*) and seven unaccepted species (79).

Order Proteocephalidea

This order is represented in Basrah fishes with the family Proteocephalidae only.

Family Proteocephalidae

This family is represented in Basrah fishes with two species belonging to the genera *Gangesia* and *Proteocephalus*.

Gangesia parasiluri Yamaguti, 1934 was reported from the intestine of *S. triostegus* from Al-Hammar marsh (9). The specimens are probably misidentified and they belong to *Postgangesia inarmata* de Chambrier, Al-Kallak & Mariaux, 2003 (Personal communication between Dr. T. Scholz and Dr. A. H. Ali on 18 Sept. 2013). *P. inarmata* was described as a new species from *Silurus glanis* from Tigris River at Mosul city (29). It is appropriate to mention here that Scholz *et al.* (76) had transferred *Proteocephalus hemispherous* which was proposed as a new species by Rahemo & Al-Niaeemi (72) from *S. glanis* from Tigris River at Mosul to *Postgangesia* as *Postgangesia hemispherous* (Rahemo & Al-Niaeemi, 2001) Scholz, Hanzelová, Škeříková, Shimazu & Rolbiecki, 2007.

Glanitaenia osculata (Goeza, 1872) was reported as *Proteocephalus osculatus* (Goeze, 1782) Nybelin, 1924, as plerocercoids, from the intestine of *B. luteus* (= *C. luteus*) from Garmat Ali River (3). *P. osculatus* was reported for the first time in Iraq from *M. pelusius* from Diyala River (14). Based on molecular data, de Chambrier *et al.* (30) proposed a new genus, *Glanitaenia*, to accommodate *Proteocephalus osculatus*. *G. osculata* is also markedly distinct from *Proteocephalus* species in possessing a well-developed, functional apical sucker and a greater number of testes (76).

In addition to the all taxa of cestodes reported from fishes of Basrah, Al-Daham *et al.* (7) indicated the presence of unidentified immature cestodes near the anal opening, ovary region or in the body cavity of three *Aphanius* species (*A. dispar*, *A. mento* and *A. sophiae*) from five stations at Basrah province which included the mouth of Shatt Al-Basrah canal, Hartha, Junaineh and date plantation at both Al-Tannuma and Al-Salihia. The above report demonstrated that these cestodes prevented the development of gonads of infected female fishes. All the above researchers in that report (7) are not familiar with fish parasites. Above all, the report of *A. sophiae* from Iraq is erroneous as this species is restricted to Kor River basin in Fars province, Iran (31).

Host-Cestodes List

Names of all fish hosts infected with cestodes in Basrah province are alphabetically arranged. For each host, the cestode 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: *Callitetrarhynchus cf. gracilis* (Ali, 2008) and *Otobothrium penetrans* (12, 21).

Alburnus sellal, reported as *Chalcalburnus sellal*: *Bothriocephalus acheilognathi* (3).

Alepes djedaba: *Progrillotia* sp. (5).

Aphanius dispar: Unidentified immature cestodes (7).

A. mento: Unidentified immature cestodes (7).

Aspius vorax: *Bothriocephalus* sp. (3), *Ligula intestinalis* (11, 3) and *Senga* sp., reported as *Polyonchobothrium* sp. (9).

B. luteus: See *Carasobarbus luteus*.

B. sharpeyi: See *Mesopotamichthys sharpeyi*.

B. xanthopterus: See *Luciobarbus xanthopterus*.

Brachirus orientalis, reported as *Synaptura orientalis*: *Otobothrium penetrans* (26) and *Otobothrium* sp., reported as *Paramecistobothrium* sp. (25).

Carangoides armatus: *Floriceps minacanthus* (5, 6) and *Pseudogrillotia spratti* (5).

Carangoides malabaricus: *Callitetrarhynchus gracilis* (5), *Callitetrarhynchus* sp. (5), *Floriceps minacanthus* (5, 6) and *Pseudogrillotia spratti* (5).

Carasobarbus luteus, reported also as *Barbus luteus*: *Bothriocephalus acheilognathi* (3) and as *B. gowkongensis* (50, 59, 64), *Bothriocephalus* sp. (8) and *Glanitaenia osculata*, reported as *Proteocephalus osculatus* (3).

Chaenogaleus macrostoma: *Nybelinia* spp. (13), *Trigonolobium spinuliferum* (13).

Chalcalburnus sellal: See *Alburnus sellal*.

Ctenopharyngodon idella: *Bothriocephalus acheilognathi* (3).

Cyprinus carpio: *Bothriocephalus acheilognathi* (32, 3, 18, 45), *Bothriocephalus* sp. (17, 21), *Khawia sinensis* (27) and *Nippotaenia* spp. (45).

Glaucostegus granulatus, reported as *Rhynchobatus granulatus*: *Echinobothrium rhynchobati*, reported as *Macrobothrium rhynchobati* (13).

Gambusia holbrooki: *Bothriocephalus acheilognathi* (47),

Ilisha compressa, reported as *Ilisha elongata?*: *Nybelinia* spp. (10), *Pterobothrium hira* (26) and *Pterobothrium* sp. (25).

Ilisha elongata?: See *Ilisha compressa*.

Johnius dussumieri, reported as *Johnius (Johnieops) sina*: *Parotobothrium balli*, reported as *Nybelinia karachii* (10).

Johnius (Johnieops) sina: See *Johnius dussumieri*.

Liza abu: *Bothriocephalus acheilognathi* (15).

Luciobarbus xanthopterus, reported as *Barbus xanthopterus*: *Khawia armeniaca* (9).

Megalaspis cordyla: *Callitetrarhynchus gracilis* (5), *Callitetrarhynchus* sp. (5), *Progrillotia* sp. (5) and *Pseudogrillotia spratti* (5).

Mesopotamichthys sharpeyi, reported also as *Barbus sharpeyi*: *Bothriocephalus acheilognathi* (3, 19, 20) and *Khawia armeniaca* (8).

Mustelus mosis: *Callitetrarhynchus cf. gracilis* (13).

Mystus pelusius: *Bothriocephalus acheilognathi* (3).

Netuma bilineata: *Callitetrarhynchus cf. gracilis* (13).

Parasilurus triostegus: See *Silurus triostegus*.

Rhynchobatus granulatus: See *Glaucostegus granulatus*.

Saurida undosquamis: *Oncodiscus sauridae* (10, 25), *Tentacularia coryphaenae*, reported as *Nybelinia lemonteeae* (26).

Scomberoides commersonianus: *Callitetrarhynchus gracilis* (26) and *Dasyrhynchus pacificus* (26).

Silurus triostegus, reported also as *Paraergasilus triuostegus*: *Bothriocephalus acheilognathi* (3, 1), *Bothriocephalus* sp. (8), *Postgangesia inarmata*, reported as *Gangesia parasiluri* (9), *Khawia armeniaca* (8, 9) and *Tetracampos* sp., reported as *Polygonchobothrium clarias* (46).

Strongylura leiura: *Otobothrium penetrans* (12, 21, 13).

S. strongylura: *Otobothrium penetrans* (12, 21).

Synaptura orientalis: See *Brachirus orientalis*.

Tylosurus crocodilus: *Callitetrarhynchus cf. gracilis* (13) and as *Mixodigma* sp. (12), *Otobothrium alexanderi* (13) and *Otobothrium penetrans* (12, 21, 13).

To sum up, it is worthwhile to show here that the 30 cestode taxa so far recorded from fishes of Basrah province represent 48.4% of the total number of cestode taxa from freshwater and marine fishes of whole Iraq (61). Such high percentage is due to the presence of marine cestodes from fishes of Basrah province in addition to the freshwater cestodes.

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Table (1): List of cestodes of fishes of Basrah province*.

Class Cestoda
Subclass Eucestoda
Order Caryophyllidea
 Family Lytocestidae
 Khawia armeniaca (Cholodkovsky, 1915) Shulman, 1958 {3/5}
 Khawia sinensis Hsü, 1935 {1/3}
Order Bothriocephalidea
 Family Bothriocephalidae
 Bothriocephalus acheilognathi Yamaguti, 1934 {9/20}
 Bothriocephalus sp. {4/5}
 Oncodiscus sauridae Yamaguti, 1934 {1/1}
 Senga sp. {1/1}
 Tetracampos sp. {1/1}
Order Diphyllbothriidea
 Family Diphyllbothriidae
 Ligula intestinalis (L., 1758) Bloch, 1782 {1/13}
Order Nippotaeniidea
 Family Nippotaeniidae
 Nippotaenia spp. {1/1}
Order Diphyllidea
 Family Echinobothriidae
 Echinobothrium rhynchobati (Khalil & Abdul-Salam, 1989) Tyler, 2006 {1/1}
Order Trypanorhyncha
 Family Eutetrarhynchidae
 Trigonolobium spinuliferum (Southwell, 1911) Dollfus, 1929 {1/1}
 Family Lacistorhynchidae
 Callitetrarhynchus gracilis (Rudolphi, 1819) Pintner, 1931 {7/7}
 Callitetrarhynchus sp. {2/2}
 Dasyrhynchus pacificus Robinson, 1959 {1/1}
 Floriceps minacanthus Campbell & Beveridge, 1987 {2/2}
 Pseudogrillotia spratti Campbell & Beveridge, 1993 {3/3}
 Family Obothriidae
 Obothrium alexanderi Palm, 2004 {1/1}
 Obothrium penetrans Linton, 1907 {5/5}
 Obothrium sp. {1/1}
 Family Progrillotiidae
 Progrillotia sp. {2/2}
 Family Pterobothriidae
 Pterobothrium hira Yamaguti, 1952 {1/1}
 Pterobothrium sp. {1/1}
 Family Pseudotobothriidae
 Parotobothrium balli (Southwell, 1929) Palm, 2004 {1/1}

Family Tentaculariidae

Nybelinia spp. {2/2}

Tentacularia coryphaenae Bosc, 1797 {1/1}

Order Proteocephalidea

Family Proteocephalidae

Postgangesia inarmata de Chambrier, Al-Kallak & Mariaux, 2003 {1/1}

Glanitaenia osculata (Goeze, 1782) de Chambrier, Zehnder, Vaucher & Mariaux, 2004 {1/8}

* 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 of fishes of Iraq (61).

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

Class Elasmobranchii

Order Rajiformes

Family Rhinobatidae

* *Glaucostegus granulatus* (Cuvier, 1829) {1/1}

Order Carcharhiniformes

Family Hemigaleidae

* *Chaenogaleus macrostoma* (Bleeker, 1852) {2/2}

Family Triakidae

* *Mustelus mosis* Hemprich & Ehrenberg, 1899 {1/1}

Class Actinopterygii

Order Clupeiformes

Family Pristigasteridae

* *Ilisha compressa* Randall, 1994 {3/3}

Order Cypriniformes

Family Cyprinidae

Alburnus sellal Heckel, 1843 {1/1}

Aspius vorax Heckel, 1843 {3/7}

Carasobarbus luteus (Heckel, 1843) {3/8}

Ctenopharyngodon idella (Valenciennes, 1844) {1/3}

Cyprinus carpio Linnaeus, 1758 {4/9}

Luciobarbus xanthopterus Heckel, 1843 {1/11}

Mesopotamichthys sharpeyi (Günther, 1874) {2/5}

Order Siluriformes

Family Ariidae

* *Netuma bilineata* (Valenciennes, 1840) {1/1}

Family Bagridae

Mystus pelusius (Solander, 1794) {1/4}

Family Siluridae

Silurus triostegus Heckel, 1843 {5/11}

Order Beloniformes

Family Belonidae

* *Ablennes hians* (Valenciennes, 1846) {2/2}

* *Strongylura leiura* (Bleeker, 1850) {1/1}

** *Strongylura strongylura* (van Hasselt, 1823) {1/1}

* *Tylosurus crocodilus* (Péron & Lesueur, 1821) {3/3}

Order Aulopiformes

Family Synodontidae

* *Saurida undosquamis* (Richardson, 1848) {2/2}

Order Cyprinodontiformes

Family Cyprinodontidae

Aphanius dispar (Rüppell, 1829) {1/1}

Aphanius mento (Heckel, 1843) {1/1}

Family Poeciliidae

Gambusia holbrooki Girard, 1859 {1/1}

Order Perciformes

Family Carangidae

* *Alepes djedaba* (Forsskål, 1775) {1/1}

* *Carangoides armatus* (Rüppell, 1830) {2/2}

* *Carangoides malabaricus* (Bloch & Schneider, 1801) {4/4}

* *Megalaspis cordyla* (Linnaeus, 1758) {4/4}

* *Scomberoides commersonianus* Lacepède, 1801 {2/2}

Family Sciaenidae

* *Johnius dussumieri* (Cuvier, 1830) {1/1}

Order Mugiliformes

Family Mugilidae

Liza abu (Heckel, 1843) {1/3}

Order Pleuronectiformes

Family Soleidae

* *Brachirus orientalis* (Bloch & Schneider, 1801) {2/2}

§ Richness of fishes with cestodes: number of cestode species recorded in any particular fish in Basrah province/
number of cestode species recorded from that fish from the whole waters of Iraq, based on the index-
catalogue of parasites of fishes of Iraq (61).

* Marine fishes, ** marine fishes found in brackish waters and the remaining fishes are freshwater fishes.

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

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الخلاصة. أظهر إستعراض المراجع لكل الديدان الشريطية المتطفلة على أسماك المياه العذبة والبحرية في محافظة البصرة، العراق وجود 30 نوعا من هذه الديدان. سجل 11 نوعا من هذه الديدان الشريطية من بيئات مياه عذبة في حين سجل 18 نوعا من بيئات بحرية ونوع واحد من مياه بحرية ومياه شروب ومياه عذبة. كل هذه الديدان تعود للصنف الثانوي المسمى الديدان الشريطية الحقيقية. تذبذب عدد أنواع الديدان الشريطية المسجلة في كل نوع من أنواع الأسماك ما بين نوع واحد من الديدان في 15 مضيّفاً سمكياً إلى أعلى رقم وهو خمسة أنواع في سمكة الجري الآسيوي فقط. تذبذب عدد أنواع الأسماك المضيّفة لتلك الديدان الشريطية من مضيّف واحد في حالة الإصابة بـ 16 نوعا من هذه الديدان إلى أقصى عدد وهو تسعة مضيّفات في حالة الدودة الشريطية *Bothriocephalus acheilognathi*.