Abstract: Surveying 59 references concerning the occurrence of the monogeneans of the families Ancylodiscoididae and Ancyrocephalidae parasitizing fishes of Iraq showed the occurrence of 11 taxa of the family Ancylodiscoididae (genera Ancylodiscoides, Bychowskyella, Chauhanellus, Hamatopeduncularia and Thaparocleidus) and 19 taxa of the family Ancyrocephalidae (genera Ancyrocephalus, Cichlidogyrus, Cleidodiscus, Haliotrema, Ligophorus and Mastacembelocleidus). These monogeneans were reported from 19 valid fish host species in Iraq. Apart from five parasite species which were recorded from marine habitats (Ancyrocephalus sp., Chauhanellus australis, Haliotrema mugiilis, Hamatopeduncularia sp. and Ligophorus mugilinus), the remaining parasite species were recorded from freshwater habitats. Among the infected fishes with these parasites, the Tigris catfish Silurus triostegus was infected with the highest number of parasite species (11 species), the mugilid fishes (Planiliza abu and P. subviridis) were infected with eight and seven parasite species, respectively, while 11 fish species were infected with only one parasite species each. Among the parasite species, Thaparocleidus vistulensis was reported from nine fish host species, while 22 parasite species were reported from one host species each. So far, eight synonymous names were applied for seven valid names of parasites of these two families in Iraq.

Keywords: Ancylodiscoididae, Ancyrocephalidae, Monogenea, Fishes, Iraq.

Introduction

The class Monogenea (previously used to be small worms that parasitize aquatic animals such as fishes and frogs. One of the most exciting things about this group of animals is the large number of species that exist (MonoDb, 2019). This group is also known as the Monogenoidea and the naming of the Monogenea/ Monogenoidea remains confusing, partly because there is no clear answer to the problem as indicated in the historical account given by MonoDb (2019). The class Monogenea includes 5567 species belonging to 62 families of which the family Ancylodiscoididae includes 417 species and
the family Ancyrocephalidae includes 1349 species (GBIF, 2019). According to a personal communication between the first author of the present article (FTM) and Dr. David I. Gibson of the British Museum (Natural History) on 15 September 2019, the classification of monogeneans is 'up in air', waiting on molecular biologists to sort it out.

According to their attachment organs that are found in the posterior part of their bodies (haptor), monogeneans are divided into two subclasses: Monopisthocotylea which are provided either with hooks and hooklets and Polyopisthocotylea which are provided with clamps (Gusev, 1985). These two subclasses can be thought as hookers and clampers (MonoDb, 2019).) According to Pugachev et al. (2009), who considered the name as Monogenoidea, these two subclasses are considered as Polygonchoinea and Oligonchoinea, respectively.

In Iraq, Herzog (1969) published the first article on fish parasites, but that article included no mention of any monogeneans. Fattohy (1975) described the first monogenean from fishes of Iraq which was Paradiplozoon kasimii (as Diplozoon kasimii). Later on, many researchers detected different monogeneans from fishes of Iraq which now reach a total of 239 species, constituting 28.8% of the total items of the parasitic fauna of fishes of Iraq (Mhaisen, 2019). Among the ancylodiscoidids, Abdul-Ameer (1989) was the first one to report on this group as she described Thaparocleidus vistulensis (as Ancylodiscoides vistulensis). Among the ancyrocephalids, Al-Daraji (1995) was the first one to report on this group as he recorded Ancyrocephalus sp., Haliotrema mugilis and Ligophorus mugilinus (as Haliotrema mugilinus).

The present checklist is the fourth checklist on monogeneans of fishes of Iraq, as a continuation to previous checklist concerned with Gyrodactylus species (Mhaisen & Abdul-Ameer, 2013), diplozoid species (Mhaisen & Abdul-Ameer, 2014) and Dactylogyrus species (Mhaisen & Abdul-Ameer, 2019). The aims of the present article are to revise Iraqi data on members of the families Ancylocohoidea and Ancyrocephalidae parasitizing fishes as such monogeneans and their hosts exhibited various synonyms and to provide updated parasite-host list and host-parasite list.

Materials & Methods
Fifty-nine references (29 research papers, 20 unpublished M. Sc. theses, five Ph. D. theses and five conference abstracts) dealing with these two families of monogenean parasites of fishes of Iraq were used to prepare the present article. Data from such references were gathered to provide parasite-fish list and fish-parasite list based on EOL (2019), GBIF (2019) and WoRMS (2019). For fishes, the scientific names were reported as they appeared in their original references but then they were checked with an account on freshwater fishes of Iraq (Coad, 2010). Fish valid names and their authorities were corrected according to well-known specialized electronic site (Fricke et al., 2019).

Results & Discussion
Surveys achieved on ancylodiscoidids and ancyrocephalids from fishes of Iraq
The present article of available literature concerning the occurrence of ancylodiscoidid and ancyrocephalid monogeneans of fishes of Iraq indicated that the first record of such families was that of Thaparocleidus vistulensis (as Ancylodiscoides vistulensis) by
Abdul-Ameer (1989). After that, some surveys were achieved in different waters in Iraq which contributed in recording more species of these two families. The records of these parasites from fishes of Iraq can be grouped into seven major categories according to localities of collection of the infected fishes. For each category, references are chronologically listed. These categories are:

1- Tigris river at Nineveh province (Al-Niaeemi, 1997; Rahemo & Al-Neemi, 1999; Rahemo & Al-Niaeemi, 2001), Salah Al-Din province (Abdul-Ameer, 1989; Esmaeel, 2018; Owaied et al., 2018) and Baghdad province (Mhaisen et al., 1997; Adday et al., 1999; Mhaisen et al., 2003; Mansor et al., 2012; Al-Saadi, 2013a; Al-Jawda & Asmar, 2014, 2015; Abdul-Ameer & Atwan, 2016; Atwan, 2016; Rasheed, 2016; Abdul-Ameer, 2017; Hammood, 2017; Abbas, 2019) as well as some tributaries of Tigris river which included Greater Zab river (Abdullah, 2002; Abdullah & Mhaisen, 2004; Kritsky et al., 2004; Bashê, 2008; Shwani, 2009; Abdullah & Shwani, 2010; Bashê & Abdullah, 2010a, b; Bilal, 2016), Lesser Zab river (Abdullah, 2002; Abdullah & Mhaisen, 2004) and Diyala river (Abdul-Ameer & Obaid, 2011; Mohammed, 2017).

2- Euphrates river and its branches at Babylon province (Al-Sa’adi, 2007; Mhaisen et al., 2015) and Al-Muthanna province (Al-Helli, 2019).

3- Shatt Al-Arab river (Kritsky et al., 2013) and its branches at Basrah province which included Garmat Ali river (Jori, 1998; Abdul-Rahman, 1999; Al-Salim & Jori, 2000; Adday, 2001; Kadhim, 2009; Khamees et al., 2012) and Al-Salihia river (Al-Janae’e, 2010).

4- Some lakes and marshes: These included Darbandikhan lake at Sulaymaniyah province (Abdullah, 2013; Abdullah & Abdullah, 2015a, b), Hamrin dam lake at Diyala province (Balasem et al., 2000) and Al-Hammar marsh at Basrah province (Jori, 2006; Abbas, 2007; Awad et al. (2007a, b, c).

5- Man-made lake at Baghdad province (Al-Nasiri, 2000; Al-Nasiri et al., 2003).

6- Fish markets at Baghdad province (Abdul-Ameer, 2012; Al-Saadi, 2013b).

7- Marine waters of Khor Al-Zubair lagoon and Khor Abdullah, northwest of the Arab Gulf (Al-Daraji, 1995; Bannai, 2002; Bannai et al., 2005; Jori & Mohamad, 2008).

Surveying literature concerning the ancyldiscoidid and ancyrocephalid monogeneans of fishes of Iraq showed the infection of 19 valid fish species with 30 parasite taxa. The full authority of each valid fish host species is shown in table (1).

**Parasite-host list**

Species of the ancyldiscoidid and ancyrocephalid monogeneans so far parasitic on fishes of Iraq are listed in table (2).

The following is a brief account on the occurrence of these parasites in fishes of Iraq. They are alphabetically listed within their two families (Ancyldiscoididae and Ancyrocephalidae). Names of valid fish host species for each monogenean species are also alphabetically arranged.

**Family Ancyldiscoididae**

The family Ancyldiscoididae is represented in fishes of Iraq with 11 species. These are: one species each of the genera *Ancyldiscoides, Bychowskyella, Chauhanellus* and *Hamatopeduncularia*, six species of *Thaparocleidus* as well as one unidentified species of *Hamatopeduncularia*. 

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Ancylodiscoides parasiluri Yamaguti, 1937 was recorded only from gills of Silurus triostegus by Jori (2006), who considered it as a member of the subfamily Ancyrocephalinae of the family Dactylogyridae and by Abbas (2007), who also considered it as a member of the same subfamily and family. Awad et al. (2007b, c) also reported this parasite from the same fish and locality. GBIF (2019) listed two valid species of the genus Ancylodiscoides Yamaguti, 1937, inclusive of A. parasiluri. However, both EOL (2019) and WoRMS (2019) listed three valid species of this genus, inclusive of A. parasiluri.

Table (1): Valid fish species of Iraq with ancylodiscoidid and ancyrocephalid infections.

| Class Actinopterygii | Order Cypriniformes | Family Cypriniidae |
|---------------------|---------------------|--------------------|
|                     | Carasobarbus luteus (Heckel, 1843) |
|                     | Carassius auratus (Linnaeus, 1758) |
|                     | Cyprinus carpio Linnaeus, 1758 |
|                     | Mesopotamichthys sharpeyi ( Günther, 1874) |
| Family Leuciscidae  | Alburnus sellal Heckel, 1843 |
|                     | Leuciscus vorax (Heckel, 1843) |
| Order Siluriformes  | Family Ariidae |
|                     | Netuma bilineata (Valenciennes, 1840) |
| Family Bagridae     | Mystus pelusius (Solander, 1794) |
| Family Heteropneustidae | Heteropneustes fossilis (Bloch 1794) |
| Family Siluridae    | Silurus glanis Linnaeus, 1758 |
|                     | Silurus triostegus Heckel, 1843 |
| Order Synbranchiformes | Family Mastacembelidae |
|                     | Mastacembelus mastacembelus (Banks & Solander, 1794) |
| Order Cichliformes  | Family Cichlidae |
|                     | Coptodon zillii (Gervais, 1848) |
|                     | Oreochromis aureus (Steindachner, 1864) |
| Order Cyprinodontiformes | Family Aphanidae |
|                     | Aphanius stoliczkanus (Day 1872) |
| Order Mugiliformes  | Family Mugilidae |
|                     | Liza klunzingeri (Day, 1888) |
|                     | Planiliza abu (Heckel, 1843) |
|                     | Planiliza macrolepis (Smith, 1846) |
|                     | Planiliza subviridis (Valenciennes, 1836) |
Table (2): Valid species of Ancylodiscoididae and Ancyrocephalidae from fishes of Iraq.

| Phylum Platyhelminthes                      |                                                                 |
|---------------------------------------------|-----------------------------------------------------------------|
| Class Monogenea                             |                                                                 |
| Subclass Monopisthocotylea                  |                                                                 |
| Order Dactylogyridea                        |                                                                 |
| Family Ancylodiscoididae                    |                                                                 |
| Ancylodiscoides parasiluri Yamaguti, 1937   | {1}*                                                            |
| Bychowskyella gharui (Tripathi, 1959) Gusev, 1961 | {3}                                                            |
| Chauhanellus australis (Young, 1967) Bychowsky & Nagibina, 1969 | {1}                                                            |
| Hamatopeduncularia arii Yamaguti, 1953      | {1}                                                            |
| Hamatopeduncularia sp.                      | {1}                                                            |
| Thaparocleidus gomtius Jain, 1952 Lim, 1996 | {1}                                                            |
| Thaparocleidus macracanthus (Akhmerow, 1952) Lim, 1996 | {1}                                                            |
| Thaparocleidus magnicirrus (Gusev & Strelkov, 1960) Lim, 1996 | {1}                                                            |
| Thaparocleidus mediancathus (Akhmerow, 1952) Lim, 1996 | {2}                                                            |
| Thaparocleidus siluri (Zandt, 1924) Lim, 1996 | {1}                                                            |
| Thaparocleidus vistulensis (Sivak, 1932) Lim, 1996 | {9}                                                            |
| Family Ancyrocephalidae                     |                                                                 |
| Ancyrocephalus polymorphus Gusev, 1955      | {2}                                                            |
| Ancyrocephalus sp.                          | {1}                                                            |
| Cichlidogyrus sclerosus Paperma & Thurston, 1969 | {2}                                                            |
| Cichlidogyrus tiberianus Paperma, 1960      | {1}                                                            |
| Cichlidogyrus tilapiae Paperma, 1960        | {1}                                                            |
| Cleidodiscus sp.                            | {1}                                                            |
| Haliotrema mugilis (Tripathi, 1959) Yamaguti, 1963 | {1}                                                            |
| Haliotrema sp.                              | {1}                                                            |
| Ligophorus acuminatus Euzet & Suriano, 1977 | {1}                                                            |
| Ligophorus bantingensis Soo & Lim, 2012     | {3}                                                            |
| Ligophorus fluviatilis (Bychowsky, 1949) Dmitrieva, Gerasev, Gibson, Pronkina & Galli, 2012 | {3}                                                            |
| Ligophorus heteronchus Euzet & Suriano, 1977 | {1}                                                            |
| Ligophorus imitans Euzet & Suriano, 1977    | {1}                                                            |
| Ligophorus lebedevi Dmitrieva, Gerasev, Gibson, Pronkina & Galli, 2012 | {1}                                                            |
| Ligophorus mugilinus (Hargis, 1955) Euzet & Suriano, 1977 | {3}                                                            |
| Ligophorus sagarius Kritsky, Khamées & Ali, 2013 | {1}                                                            |
| Ligophorus vanbenedenii (Parona & Perugia, 1890) Euzet & Suriano, 1977 | {1}                                                            |
| Ligophorus sp.                              | {1}                                                            |
| Mastacembelocleidus heteranchorus (Kulkarni, 1969) Kritsky, Pandey, Agrawal & Abdullah, 2004 | {1}                                                            |

* Numbers in curly brackets occurring after the authority of each parasite species refer to number of host species recorded for that parasite from the whole waters of Iraq based on Mhaisen (2019).

Bychowskyella gharui (Tripathi, 1959) Gusev, 1961 was recorded from gills of three fish species: Carasobarbus luteus (as Barbus luteus) by Esmaeel (2018), Cyprinus carpio by Esmaeel (2018) and Owaied et al. (2018) as well as S. triostegus by Jori (2006). It is reliable to state here that both Esmaeel (2018) and Owaied et al. (2018) had misspelled the generic name of this parasite as Bychowskylla instead of Bychowskyella, its specific name as qhauri instead of gharui, its authority as Tripathi, 1959 instead of the
above corrected authority and its family as Gyrodactylidae instead of Ancylodiscoididae. On the other hand, Jori (2006) considered this parasite as a member of the subfamily Ancyrocephalinae of the family Dactylogyridae. WoRMS (2019) listed five synonyms of *B. gharui*: *Bychowskyella gussevi* Agrawal & Sharma, 1990 nec Majumdar & Agarwal, 1989; *Silonditrema chauhani* Agrawal & Singh, 1981; *Silonditrema gharui* Tripathi, 1959; *Silonditrema lucknowensis* Agrawal & Singh, 1981 and *Silonditrema yogendrai* Agrawal & Singh, 1981. GBIF (2019) also considered these as synonyms, except *B. gussevi* which was considered as a valid species. According to GBIF (2019), the genus *Bychowskyella* Akhmerov, 1952 includes 29 species. EOL (2019) listed seven valid species of this genus, inclusive of *B. gharui*, while WoRMS (2019) listed 25 valid species of this genus, inclusive of *B. gharui*. As species of *Bychowskyella* are parasites of silurid fishes (Lim et al., 2001), so their records from non silurid fishes might be as a result of misidentification.

*Chauhanellus australis* (Young, 1967) Bychowsky & Nagibina, 1969 was reported as *Hamatopeduncularia australis* Young, 1967 from gills of *Netuma bilineata* (as *Arius bilineatus*) by Al-Daraji (1995). GBIF (2019) and WoRMS (2019) recognized *H. australis* as a synonym of *C. australis*. The genus *Chauhanellus* Bychowsky & Nagibina, 1969 includes 30 accepted species (GBIF, 2019; WoRMS, 2019) while EOL (2019) listed only seven accepted species. According to a personal communication of the senior author on 15 September 2019 with Dr. David I. Gibson, the classification of Ancylodiscoididae in WoRMS (2019) is following Lim et al. (2001).

*Hamatopeduncularia arii* Yamaguti, 1953 was recorded only from gills of *S. triostegus* by Jori (2006) and Awad et al. (2007a). Jori (2006) considered this parasite as a member of the subfamily Ancyrocephalinae of the family Dactylogyridae. EOL (2019), GBIF (2019) and WoRMS (2019) listed *H. arii* among the valid species of the genus *Hamatopeduncularia* of the family Ancylodiscoididae.

*Hamatopeduncularia* sp. was recorded from gills of the marine fish *Netuma bilineata* (as *Arius bilineatus*) by Al-Daraji (1995). According to GBIF (2019), the genus *Hamatopeduncularia* Yamaguti, 1953 includes 34 valid species, while WoRMS (2019) listed 26 valid species and EOL (2019) listed 24 species.

*Thaparocleidus gomtius* (Jain, 1952) Lim, 1996 was recorded as *Ancyloleidocoides gomtius* from gills of *S. triostegus* by Mhaisen et al. (1997, 2003) and Al-Sa’adi (2007), as *Haplocleides gomtius* by Adday et al. (1999) and as *Thaparocleidus gomtius* by Mhaisen et al. (2015). It is reliable to state here that all these five above-named references had erroneously misspelled the specific name of this parasite as *gomtius* instead of *gomtius*. According to GBIF (2019) and WoRMS (2019), *Haplocleides gomtius* Jain, 1952; *Paradiscocoides gomtius* (Jain, 1952) Dubey, Gupta & Agarwal, 1992 and *Silurodiscoides gomtius* (Jain, 1952) Gusev, 1976 are all synonyms of *T. gomtius*. EOL (2019), GBIF (2019) and WoRMS (2019) listed 128, 121 and seven species, respectively of *Thaparocleidus* Jain, 1952 inclusive of *T. gomtius*.

*Thaparocleidus macracanthus* (Akhmerow, 1952) Lim, 1996 was recorded from gills of *S. triostegus* by Mohamed (2017). This is, so far, the only record of this
parasite from fishes of Iraq. *T. macracanthus* is considered as a valid species within the genus *Thaparocleidus* Jain, 1952 according to EOL (2019), GBIF (2019) and WoRMS (2019).

*Thaparocleidus magnicirrus* (Gusev & Strelkow, 1960) Lim, 1996 was recorded from gills of *S. triostegus* by Mohammed (2017). This is so far, the only record of this parasite from fishes of Iraq. *T. magnicirrus* is considered as a valid species within the genus *Thaparocleidus* according to EOL (2019), GBIF (2019) and WoRMS (2019).

*Thaparocleidus mediacanthus* (Achmerow, 1952) Lim, 1996 was reported from gills of *Carasobarbus luteus* (as *Barbus luteus*) by Abdul-Ameer & Obaid (2011) as *Silurodiscoides mediacanthus* and from gills of *S. triostegus* by Abdul-Rahman (1999) as *Silurodiscoides mediacanthus*. GBIF (2019) and WoRMS (2019) recognized *Ancylodiscoides mediacanthus* Achmerow, 1952; *Parancylodiscoides mediacanthus* (Achmerow, 1964) and *Silurodiscoides mediacanthus* (Achmerow, 1952) as synonyms of *T. mediacanthus*. EOL (2019) also listed *T. mediacanthus* as a valid species.

*Thaparocleidus siluri* (Zandt, 1924) Lim, 1996 was reported from gills of *Alburnus sellal* (as *Chalcalburnus sellal*), *Heteropneustes fossilis*, *Leuciscus vorax* (as *Aspius vorax*), *Mastacembelus mastacembelus* and *Mesopotamichthys sharpeyi* (as *Barbus sharpeyi*) by Abdul-Rahman (1999) as well as from *Mystus pelusius* by both Abdul-Rahman (1999) and Adday (2001), *Planiliza abu* (as *Liza abu*) by Abdul-Rahman (1999), *Silurus glanis* by Al-Niaeeemi (1997), Rahemo & Al-Neemi (1999), Rahemo & Al-Niaeeemi (2001), Abdullah (2002) and Abdullah & Mhaisen (2004) and *S. triostegus* by Abdul-Ameer (1989), Abdul-Rahman (1999), Adday (2001), Al-Sa’adi (2007), Shwani (2009), Abdullah & Shwani (2010), Abdullah (2013), Abdullah & Abdullah (2015a, b), Al-Jawda & Asmar (2015), Mhaisen et al. (2015), Bilal (2016) and Al-Helli (2019). It is reliable to state here that all the above named references, concerning this monogenean, referred to it with its synonymous name *Ancylodiscoides vistulensis*, except Abdullah (2013), Abdullah & Abdullah (2015a, b), Al-Jawda & Asmar (2015), Mhaisen et al. (2015), Bilal (2016) and Al-Helli (2019) who referred to it with its valid name *T. vistulensis*. GBIF (2019) and WoRMS (2019) recognized four synonyms for *T. vistulensis* which are: *Ancylodiscoides vistulensis* (Sivak, 1932) Yamaguti, 1963; *Ancyrocephalus vistulensis Sivak, 1932; Silurodiscoides vistulensis* (Sivak, 1932) Gusev, 1985 and *Urocleidus vistulensis* (Sivak, 1932) Mizelle & Hughes, 1938. EOL (2019) also listed *T. vistulensis* as a valid species.
species. In connection with the presence of this parasite on nine fish host species in Iraq, inclusive of non siluriform fishes, it is possible that misidentification might occur as this parasite is known to infect only silurid fishes (Lim et al., 2001; Pugachev et al., 2009; EOL, 2019).

**Family Ancyrocephalidae**

The family Ancyrocephalidae is represented in fishes of Iraq with 19 species. These are: one species each of the genera *Ancyrocephalus*, *Haliotrema* and *Mastacembelocleidus*, three species of *Cichlidogyrus*, nine species of *Ligophorus* as well as unidentified species of the genera *Ancyrocephalus*, *Cleidodiscus*, *Haliotrema* and *Ligophorus*.

*Ancyrocephalus polymorphus* Gusev, 1955 was reported from gills of both *Aphanius stoliczkanus* (misidentified as *Aphanius dispar*) by Kadhim (2009) and Khamees et al. (2012) and *Carassius auratus* by Al-Jana'e (2010). *A. polymorphus* is considered as a valid species by EOL (2019), GBIF (2019) and WoRMS (2019). According to WoRMS (2019), the subspecies *Ancyrocephalus polymorphus typica* Gusev, 1955 is considered as a synonym of *A. polymorphus*.

*Ancyrocephalus* species was recorded from gills of *Planiliza subviridis* (as *Liza subviridis*) by Al-Daraji (1995). WoRMS (2019) listed 39 valid species of the genus *Ancyrocephalus* Creplin, 1839, while GBIF (2019) listed 45 accepted species of this genus.

*Cichlidogyrus sclerosus* Paperna & Thurston, 1969 was reported from gills of *Coptodon zillii* by Abdul-Ameer & Atwan (2016), Atwan (2016), Rasheed (2016), Abbas (2019) and Al-Helli (2019). According to GBIF (2019) and WoRMS (2019), *C. sclerosus* has one synonym which is *Cichlidogyrus bangladeshi* Ferdousi & Chandra, 2002.

*Cichlidogyrus tibarianus* Paperna, 1960 was reported from gills of *Coptodon zillii* by Atwan (2016), Rasheed (2016), Abdul-Ameer (2017) and Mohammed (2017). *C. tibarianus* is considered as a valid species according to EOL (2019), GBIF (2019) and WoRMS (2019).

*Cichlidogyrus tilapiae* Paperna, 1960 was reported from gills of *Coptodon zillii* by Abdul-Ameer & Atwan (2016) and Atwan (2016). According to GBIF (2019) and WoRMS (2019), *C. tilapiae* has two synonyms: *Cleidodiscus tilapiae* (Paperna, 1960) Price, 1967 and *Cichlidogyrus chandrai* Ferdousi & Chandra, 2002. GBIF (2019) listed 126 species of the genus *Cichlidogyrus* Paperna, 1960, while WoRMS (2019) listed 123 species, and in both sites, *C. tilapiae* is considered as a valid species.

*Cleidodiscus* species was reported from gills of *S. triostegus* by Jori (2006) who considered this species within the subfamily Ancyrocephalinae of the family Dactylogyridae. GBIF (2019) listed 15 species of the genus *Cleidodiscus* Mueller, 1934, while EOL (2019) listed six species and WoRMS (2019) listed seven accepted species for this genus. It is appropriate to mention here that the genus *Cleidodiscus* is considered within the family Ancylodiscoididae only by MonoDb (2019). The first author of this article received no any answer from eight concerned scientists (see the acknowledgement section of this article for their names) in MonoDb (2019) about this consideration.
Haliotrema mugilis (Tripathi, 1959) Yamaguti, 1963 was reported from gills of Planiliza subviridis (as Liza subviridis) by Al-Daraji (1995) and Bannai (2002) who both considered this parasite within the subfamily Ancyrocephalinae and the family Dactylogyridae. This is a valid species according to EOL (2019), GBIF (2019) and WoRMS (2019). The two latter electronic sites recognized Ancyrocephalus fluviatilis as a synonym of L. fluviatilis.

Haliotrema species was reported from gills of S. triostegus by Jori (2006) who considered this species within the subfamily Ancyrocephalinae of the family Dactylogyridae. According to Lim et al. (2001), members of the genus Haliotrema infect non-siluriform hosts. GBIF (2019) listed 145 species of the genus Haliotrema Johnston & Tiegs, 1922, while WoRMS (2019) listed 141 valid species of this genus.

Ligophorus acuminatus Euzet & Suriano, 1977 was recorded from gills of only Planiliza abu (as Liza abu) by Al-Saadi (2012). L. acuminatus is a valid species according to EOL (2019), GBIF (2019) and WoRMS (2019).

Ligophorus bantingensis Soo & Lim, 2012 was reported by Kritsky et al. (2013) from gills of three mullet species: Liza klunzingeri, Planiliza abu (as Liza abu) and Planiliza subviridis (as Chelon subviridis). This is a valid species according to GBIF (2019) and WoRMS (2019).

Ligophorus fluviatilis (Bychowsky, 1949) Dmitrieva, Gerasev, Gibson, Pronkina & Galli, 2012 was reported from gills of three fish species: Liza klunzingeri by Kritsky et al. (2013), Planiliza abu (also as Liza abu) by Kritsky et al. (2013), Atwan (2016) and Hammood (2017) and Planiliza subviridis (as Chelon subviridis) by Kritsky et al. (2013). This is a valid species according to EOL (2019), GBIF (2019) and WoRMS (2019). The two latter electronic sites recognized Ancyrocephalus fluviatilis as a synonym of L. fluviatilis.

Ligophorus heteronchus Euzet & Suriano, 1977 was recorded from gills of only Planiliza abu (as Liza abu) by Al-Saadi (2013a). This parasite is a valid species according to EOL (2019), GBIF (2019) and WoRMS (2019).

Ligophorus lebedevi Dmitrieva, Gerasev, Gibson, Pronkina & Galli, 2012 was recorded from gills of only Planiliza abu (as Liza abu) by Al-Saadi (2013a). This parasite is a valid species according to EOL (2019), GBIF (2019) and WoRMS (2019).

Ligophorus mugilinus (Hargis, 1955) Euzet & Suriano, 1977 was reported as Haliotrema mugilinus Hargis, 1955 from gills of three mullet species: Planiliza abu (as L. abu) by Jori (1998) and Al-Salim & Jori (2000), Planiliza macrolepis (as Liza macrolepis) by Al-Daraji (1995) and Planiliza subviridis (as Liza subviridis) by Al-Daraji (1995), Jori (1998), Al-Salim & Jori (2000) and Bannai et al. (2005). According to GBIF (2019) and WoRMS (2019), both Haliotrema mugilinus (Hargis, 1955) and Pseudohaliotrema mugilinus Hargis, 1955 are considered as synonyms of L. mugilinus.

Ligophorus sagmarius Kritsky, Khamees & Ali, 2013 was reported from gills of Planiliza subviridis (as Chelon subviridis) by Kritsky et al. (2013). L. sagmarius is a valid species according to EOL (2019), GBIF (2019) and WoRMS (2019).
Ligophorus vanbenedenii (Parona & Perugia, 1890) Euzet & Soriano, 1977 was reported from gills of Planiliza abu (as Liza abu) by Mhaisen et al. (1997), Adday et al. (1999), Al-Nasiri (2000) Al-Nasiri et al. (2003), Mhaisen et al. (2003), Al-Sa’adi (2007), Al-Jawda & Asmar (2014) and Mhaisen et al. (2015). All these references, except Al-Jawda & Asmar (2014) and Mhaisen et al. (2015) had reported this parasite as Ancyrocephalus vanbenedenii. According to GBIF (2019) and WoRMS (2019), L. vanbenedenii has six synonyms: Ancyrocephalus vanbenedenii (Parona & Perugia, 1890) Johnston & Tiegs, 1922; Dactylogyrus benedenii Saint-Remy, 1898; Dactylogyrus vanbenedenii Parona & Perugia, 1895, Haliotrema vanbenedeni (Parona & Perugia, 1890) Young, 1968; Haplocleidus vanbenedenii (Parona & Perugia, 1890) Palombi, 1949 and Tetraonchus vanbenedenii Parona & Perugia, 1890. EOL (2019) also considered L. vanbenedenii as a valid species.

Ligophorus species was reported from gills of Liza klunzingeri by Kritsky et al. (2013). GBIF (2019) listed 68 accepted species within the genus Ligophorus Euzet & Soriano, 1977 while WoRMS (2019) listed 60 accepted species within this genus.

Mastacembelocleidus heter anchorus (Kulkarni, 1969) Kritsky, Pandey, Agrawal & Abdullah, 2004 was reported from gills of Mastacembelus mastacembelus by Kritsky et al. (2004), Al-Sa’adi (2007), Bashê (2008), Bashê & Abdullah (2010a, b), Abdullah (2013), Abdullah & Abdullah (2015a, b), Mhaisen et al. (2015), Atwan (2016), Mohammed (2017) and Al-Helli (2019). This parasite was described as species de novo by Kritsky et al. (2004) who considered it within the family Dactylogyridae. According to GBIF (2019) and WoRMS (2019), M. heter anchorus has one synonym which is Urocleidus heter anchorus Kulkarni, 1969. The genus Mastacembelocleidus Kritsky, Pandey, Agrawal & Abdullah, 2004 has two valid species, inclusive of M. heter anchorus according to EOL (2019), GBIF (2019) and WoRMS (2019).

The previous parasite-host list of the present article identified eight synonyms for seven species of both ancyldiscoidids and ancyrocephalids infecting fishes of Iraq. These are:

1- Ancyldiscoides gomtius as a synonym of Thaparocleidus gomtius.
2- Haplocleides gomtius as a synonym of Thaparocleidus gomtius.
3- Silurodiscoides mediacanthus as a synonym of Thaparocleidus mediacanthus.
4- Ancyldiscoides siluri as a synonym of Thaparocleidus siluri.
5- Ancyldiscoides vistulensis as a synonym of Thaparocleidus vistulensis.
6- Hamatopeduncularia australis as a synonym of Chauhanellus australis.
7- Haliotrema mugilinus as a synonym of Ligophorus mugilinus.
8- Ancyrocephalus vanbenedenii as a synonym of Ligophorus vanbenedenii.

The list of valid ancyldiscoidid and ancyrocephalid monogeneans infecting valid fish species of Iraq is demonstrated in table (3). Host-parasite list

Names of all fish host species of Iraq, infected with ancyldiscoidid and ancyrocephalid monogeneans (19 valid fish names and ten synonyms) are alphabetically arranged in the following list. For each valid host species, parasite species are alphabetically arranged
according to the sequence of their families. For fishes, the scientific names were reported as they appeared in their original references but they were then checked with an account on freshwater fishes of Iraq (Coad, 2010). As indicated earlier in the section of Sources and Methods, fish valid scientific names were checked according to Fricke et al. (2019).

Table (3): Species of Ancylodiscoididae and Ancyrocephalidae with their fish host species.

| Family Ancylodiscoididae                                      | Fish Host Species                                                                 |
|---------------------------------------------------------------|----------------------------------------------------------------------------------|
| Ancylodiscoides parasiluri                                    | Silurus triostegus                                                              |
| Bychowskyella gharui                                          | Carasobarbus luteus, Cyprinus carpio, Silurus triostegus                        |
| Chauhanellus australis                                        | Netuma bilineata                                                                |
| Hamatopeduncularia arii                                       | Silurus triostegus                                                              |
| Hamatopeduncularia sp.                                        | Netuma bilineata                                                                |
| Thaparocleidus gomtius                                        | Silurus triostegus                                                              |
| Thaparocleidus macracanthus                                   | Silurus triostegus                                                              |
| Thaparocleidus magnicirrus                                    | Silurus triostegus                                                              |
| Thaparocleidus mediacanthus                                   | Carasobarbus luteus, Silurus triostegus                                        |
| Thaparocleidus siluri                                        | Silurus triostegus                                                              |
| Thaparocleidus vistulensis                                    | Albuminus sellal, Heteropeustes fossilis, Leuciscus vorax,                     |
|                                                              | Mastacembelus mastacembelus, Mesopotamichthys sharpeyi,                        |
|                                                              | Mystus pelusi, Planiliza abu, Silurus glanis, S. triostegus                     |
| Family Ancyrocephalida                                        |                                                                                  |
| Ancyrocephalus polymorphus                                    | Aphanius stolicekzanus, Carassius auratus                                      |
| Ancyrocephalus sp.                                            | Planiliza subviridis                                                            |
| Cichlidogyrus sclerosus                                       | Coptodon zillii, Oreochromis aureus                                            |
| Cichlidogyrus tiberianus                                      | Coptodon zillii                                                                 |
| Cichlidogyrus tilapiae                                        | Coptodon zillii                                                                 |
| Cleidodiscus sp.                                              | Silurus triostegus                                                              |
| Haliotrema mugilis                                            | Planiliza subviridis                                                            |
| Haliotrema sp.                                                | Silurus triostegus                                                              |
| Ligophorus acuminatus                                         | Planiliza abu                                                                   |
| Ligophorus bantingensis                                       | Liza klunzingeri, Planiliza abu, P. subviridis                                  |
| Ligophorus fluviatilis                                        | Liza klunzingeri, Planiliza abu, P. subviridis                                  |
| Ligophorus heteronchus                                        | Planiliza abu                                                                   |
| Ligophorus imitans                                            | Planiliza abu                                                                   |
| Ligophorus lebedevi                                           | Planiliza subviridis                                                            |
| Ligophorus mugilinus                                          | Planiliza abu, P. macrolepis, P. subviridis                                    |
| Ligophorus sagmarius                                          | Planiliza subviridis                                                            |
| Ligophorus vanbenedenii                                       | Planiliza abu                                                                   |
| Ligophorus sp.                                                | Liza klunzingeri                                                                |
| Mastacembelocleidus heteranchorus                             | Mastacembelus mastacembelus                                                    |

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Alburnus sellal (reported as Chalcalburnus sellal)

Family Ancylodiscoididae: Thaparocleidus vistulensis (as Ancylodiscoides vistulensis).

Aphanius dispar: See Aphanius stoliczkanus.

Aphanius stoliczkanus

Family Ancyrocephalidae: Ancyrocephalus polymorphus.

Arius bilineatus: See Netuma bilineata.

Aspius vorax: See Leuciscus vorax.

Barbus luteus: See Carasobarbus luteus.

Barbus sharpeyi: See Mesopotamichthys sharpeyi.

Carasobarbus luteus (reported as Barbus luteus)

Family Ancylodiscoididae: Bychowskyella gharui, Thaparocleidus mediacanthus (as Silurodiscoides mediacanthus).

Carassius auratus

Family Ancylodiscoididae: Ancyrocephalus polymorphus.

Chalcalburnus sellal: See Alburnus sellal.

Coptodon zillii

Family Ancyrocephalidae: Cichlidogyrus sclerosus, C. tiberianus, C. tilapiae.

Cyprinus carpio

Family Ancylodiscoididae: Bychowskyella gharui.

Chelon subviridis: See Planiliza subviridis.

Heteropneustes fossilis

Family Ancylodiscoididae: Thaparocleidus vistulensis (as Ancylodiscoides vistulensis).

Leuciscus vorax (reported as Aspius vorax)

Family Ancylodiscoididae: Thaparocleidus vistulensis (as Ancylodiscoides vistulensis).

Liza abu: See Planiliza abu.

Liza klunzingeri

Family Ancyrocephalidae: Ligophorus bantingensis, L. fluviatilis, Ligophorus sp.

Liza macrolepis: See Planiliza macrolepis.

Liza subviridis: See Planiliza subviridis.

Mastacembelus mastacembelus

Family Ancylodiscoididae: Thaparocleidus vistulensis (as Ancylodiscoides vistulensis).

Family Ancyrocephalidae: Mastacembelocleidus heteranchorus.

Mesopotamichthys sharpeyi (reported as Barbus sharpeyi)

Family Ancylodiscoididae: Thaparocleidus vistulensis (as Ancylodiscoides vistulensis).

Mystus pelius

Family Ancylodiscoididae: Thaparocleidus vistulensis (as Ancylodiscoides vistulensis).

Netuma bilineata (reported as Arius bilineatus)

Family Ancylodiscoididae: Chauhanellus australis (as Hamatopeduncularia australis), Hamatopeduncularia sp.

Oreochromis aureus

Family Ancyrocephalidae: Cichlidogyrus sclerosus.

Planiliza abu (also reported as Liza abu)

Family Ancylodiscoididae: Thaparocleidus vistulensis (as Ancylodiscoides vistulensis).

Family Ancyrocephalidae: Ligophorus acuminatus, L. bantingensis, L. fluviatilis, L. heteronchus, L. imitans, L. mugilinus (as Haliotrema mugilinus), L. vanbenedenii (also as Ancyrocephalus vanbenedenii). Planiliza macrolepis (as Liza macrolepis)

Family Ancyrocephalidae: Ligophorus mugilinus (as Haliotrema mugilinus).

Planiliza subviridis (reported also as Chelon subviridis and Liza subviridis)

Family Ancyrocephalidae: Ancyrocephalus sp., Haliotrema mugilis, Ligophorus bantingensis, L. fluviatilis, L. lebedevi, L. mugilinus (as Haliotrema mugilinus), L. sagmarius.

Silurus glanis

Family Ancylodiscoididae: Thaparocleidus vistulensis (as Ancylodiscoides vistulensis).

Silurus triostegus
Family Ancylodiscoididae: *Ancylodiscoides parasiluri*, Bychowskyella gharui, Hamatopeduncularia arii, Thaparocleidus gomtius (also as *Ancylodiscoides gomtius* and as *Haplocleides gomtius*), *T. macracanthus*, *T. magnicirrus*, *T. mediacanthus*, *T. siluri* (also as *Ancylodiscoides siluri*), *T. vistulensis* (also as *Ancylodiscoides vistulensis*).

Family Ancyrocephalidae: *Cleidodiscus* sp., *Haliotrema* sp.

**Acknowledgements**

The first author of this article expresses his sincere thanks to Dr. David I. Gibson of the British Museum (Natural History) for his comments on some monogenean species. Thanks also are due to Mr. Jawdat M. Al-Jawda of Animal and Fish Research Center, Agriculture Research Directorate, Ministry of Science and Technology, Baghdad, Iraq for his comments concerning some records appeared in a paper by Mansor et al. (2012). On the other hand, the first author condemn the negative abstention response of some of the concerned staff of the MonoDb (Prof. Tor Bakke, Dr. James Bron, Dr. Joanne Cable, Dr. Kevin Christison, Prof. Phil Harris, Dr. Andrew Shinn, Prof. Dr. Ian Whittington and Dr. Gil Ha Yoon) toward 14 e-mail letters forwarded to them about the allocation of some monogeneans in MonoDb (2019) in contrast to their allocation in EOL (2019), GBIF (2019) and WoRMS (2019).

**Conflicts of interest**

The authors declare that they have no conflict of interests.

**Ethical approval:** All applicable national and international guidelines for the care and use of animals were followed.

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