



## The acanthocephalan fauna of Iran, a check list

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### Abstract

The acanthocephalan fauna of Iran is reported for the first time since the report of *Pomphorhynchus perforator* (von Linstow, 1908) Meyer, 1932 in 1964. The knowledge of the acanthocephalan biodiversity of Iran, with parasite-host and host-parasite checklists, is presented. The species of Acanthocephala are presented in alphabetical order, followed by the species of hosts, localities and references. A total of 30 known species of Acanthocephala from 21 genera, 12 families and 7 orders are reported from 80 species of different vertebrates of Iran. One species, *Moniliformis moniliformis* (Bremser, 1811) Travassos, 1915 was recorded from humans. The group of hosts with the largest number of reported species of acanthocephalan is Actinopterygii (ray-finned fishes).

**Key words:** Acanthocephala, Iran, biodiversity, parasite/host list, host/parasite list

### Introduction

It is amazing that acanthocephalan parasites of vertebrates in Iran have been known only within the last 50 years. The first reported species in Iran, *Pomphorhynchus perforator* (von Linstow, 1908) Meyer, 1932 was collected from *Silurus glanis* Linnaeus by Sefidkar-Langroudi (1964), who studied the helminth parasites of freshwater fishes in the northern part of Iran. Later, Ranjandish (1971) recorded acanthocephalans from different species of birds in Iran. Since then, other species of acanthocephalans have been reported as important helminth parasites, from several different animals. These were mainly from freshwater and marine fishes in natural water sources, mostly from the Caspian Sea and the Persian Gulf. Additional reports of acanthocephalans in fishes from the other coasts of the Persian Gulf include those of Amin *et al.* (1984), in Kuwait, and El-Naffar *et al.* (1992) and Kardousha (2005), in United Arab Emirates. A comprehensive classification system for the Acanthocephala was presented by Amin (1985; 1987), updated and augmented using available molecular taxonomic classifications (Amin 2013); this new checklist of species of acanthocephalans of Iran follows that classification. It includes parasite-host and host-parasite lists gathered from published records and unpublished reports. Acanthocephalans are linked with all vertebrate hosts, including humans.

### Material and methods

The information in this study has been collected from published and unpublished reports and papers based on original records as well as our own research. The checklist follows the classification of Amin (2013). The species of acanthocephalans are presented in alphabetical order, followed by the species of hosts, localities and references (listed in chronological order). The checklist also includes a number of taxa that could be identified only to the level of genus. The authorities for each scientific name of the helminths follow the scientific names in the parasite/host list. The list also includes information on localities and the citation of the source of each report. The map of all provinces of Iran including the localities of the acanthocephalan species mentioned in current study, is provided

(Fig. 1). The authorities for the scientific names of hosts are listed after the host's names in the second host/parasite list, using fishbase (Froese & Pauly 2014), avibase (Lepage 2012) and Wilson and Reeder (2005). Acanthocephalans that were included based on our own ongoing projects were placed in refrigerated water upon collection for 1–2 days to extend the proboscis then fixed in 70% ethanol, stained in Mayer's acid carmine, destained in HCl in 70% ethanol, run through increasing concentrations of ethanol, cleared in xylene, and mounted as whole worms in Canada balsam.



**FIGURE 1.** Map of Iran showing the provinces. \* = Localities from which acanthocephalans have been reported.

## Results

A total of 30 known species of Acanthocephala from 21 genera, 12 families and 7 orders are listed in the parasite-host and host-parasite lists. These species were recorded from 80 species of different animals (and humans) in Iran. Only one species, *Moniliformis moniliformis* (Bremser, 1811) Travassos, 1915 was recorded from humans whereas 16 species are reported from fishes, nine species from birds, and six species from mammals. The hosts with the greatest species richness are fishes and the most parasitized families of fish are the Acipenseridae and Cyprinidae. Genus names in repeated scientific names of acanthocephalans were not abbreviated in order to avoid confusion.

## Parasite-Host list

**Class Archiacanthocephala Meyer, 1931**

**Order Gigantorhynchida Southwell and Macfie, 1925**

**Family Gigantorhynchidae Hamann, 1892**

**Genus *Mediorhynchus* Van Cleave, 1916**

*Mediorhynchus micracanthus* (Rudolphi, 1819) Meyer, 1932

**Host:** *Alauda arvensis*

**Locality:** Golestan Province (Eslami *et al.* 2010)

**Host:** *Galerida cristata*

**Locality:** Golestan Province (Eslami *et al.* 2010)

**Order Moniliformida Schmidt, 1972**

**Family Moniliformidae Van Cleave, 1924**

**Genus *Moniliformis* Travassos, 1915**

*Moniliformis moniliformis* (Bremser, 1811) Travassos, 1915

**Host:** *Cricetulus migratorius*

**Locality:** Meshkinshahr, Ardebil Province (Mohebbali *et al.* 1997)

**Host:** *Homo sapiens*

**Locality:** Zabol, Sistan and Baluchestan Province (Sahba *et al.* 1970), Esfahan, Esfahan Province (Moayedi *et al.* 1971), Taybad, Razavi Khorasan Province (Berenji *et al.* 2007), Birjand, South Khorasan Province (Salehabadi *et al.* 2008), Ahvaz, Khuzestan Province (Maraghi *et al.* 2014)

**Host:** *Meriones persicus*

**Locality:** Meshkinshahr, Ardebil Province (Mohebbali *et al.* 1997), Germe, Moghan Plain, Ardebil Province (Kia *et al.* 2010)

**Host:** Rodent (the species of the rodents was not mentioned)

**Locality:** Khuzestan Province (Sadjjadi & Massoud, 1999), Tabriz, East Azerbaijan Province (Nematollahi *et al.* 2006)

**Order Oligacanthorhynchida Petrochenko, 1956**

**Family Oligacanthorhynchidae Southwell and Macfie, 1925**

**Genus *Macracanthorhynchus* Travassos, 1917**

*Macracanthorhynchus hirudinaceus* (Pallas, 1781) Travassos, 1917

**Host:** Canine coprolite

**Locality:** Chehrabad salt mine, Zanjan Province (Mowlavi *et al.* 2015)

**Remarks:** Eggs of this acanthocephalan were found in a coprolite that was estimated to be about 1500 years old.

**Host:** *Canis aureus*

**Locality:** Ardebil Province and Arasbaran region (Zarif-fard 1994), Kashan, Esfahan Province (Arbabi *et al.* 2002), West Azerbaijan, Kermanshah and Kordestan provinces (Dalimi *et al.* 2006), Zone 3 (Khuzestan Province, Hormozgan Province, southern parts of Sistan and Baluchestan Province) (Meshgi *et al.* 2009), Ilam Province (Razmjoo *et al.* 2014)

**Host:** *Ca. lupus*

**Locality:** Ardebil Province and Arasbaran region (Zarif-fard 1994), Kashan, Esfahan Province (Arbabi *et al.* 2002)

**Host:** *Ca. lupus familiaris*

**Locality:** Ardebil Province and Arasbaran region (Zarif-fard 1994), Kashan, Esfahan Province (Arbabi *et al.* 2002), West Azerbaijan, Kermanshah and Kordestan provinces (Dalimi *et al.* 2006), Moghan Plain, Ardebil Province (Zare-Bidaki *et al.* 2010), Tabriz, East Azerbaijan Province (Garedaghi *et al.* 2014)

**Host:** *Sus scrofa*

**Locality:** Protected areas in north, northeast and southwest of Iran (Eslami & Farsad-Hamdi 1992), Shooshtar, Khuzestan Province (Mowlavi *et al.* 2006)

**Host:** *Vulpes vulpes*

**Locality:** Ardebil Province and Arasbaran region (Zarif-fard 1994), Kashan, Esfahan Province (Arbabi *et al.* 2002), West Azerbaijan, Kermanshah and Kordestan provinces (Dalimi *et al.* 2006), Moghan Plain, northwestern Iran (Zare-Bidaki *et al.* 2010), Sarab region, East Azerbaijan Province (Khanmohammadi *et al.* 2011), Ilam Province (Razmjoo *et al.* 2014)

#### ***Macracanthorhynchus* sp.**

**Host:** *Ca. aureus*

**Locality:** West Azerbaijan Province, Kermanshah and Kordestan provinces (Dalimi *et al.* 2006)

**Host:** *Ca. lupus familiaris*

**Locality:** Kerman, Kerman Province (Radfar *et al.* 2011)

**Host:** *V. vulpes*

**Locality:** West Azerbaijan, Kermanshah and Kordestan provinces (Dalimi *et al.* 2006)

#### **Genus *Nephridiicanthus* Meyer, 1931**

***Nephridiicanthus major*** (Bremser, 1811) Golvan, 1962

**Host:** *Erinaceus concolor*

**Locality:** Tonekabon (Heckmann *et al.* 2013)

**Host:** *Hemiechinus auritus*

**Locality:** Shahrood (Heckmann *et al.* 2013)

#### **Genus *Oncicola* Travassos, 1916**

***Oncicola canis*** (Kaupp, 1909) Hall and Wigdor, 1918

**Host:** *V. vulpes*

**Locality:** Iran (locality was not mentioned) (Eslami 2002)

#### ***Oncicola* sp.**

**Host:** *Ca. aureus*

**Locality:** Ardebil Province and Arasbaran region (Zarif-fard 1994)

**Host:** *Felis catus* (Stray cat)

**Locality:** Zanjan, Zanjan Province (Esmaeilzadeh *et al.* 2009)

**Host:** *F. silvestris*

**Locality:** Ardebil Province and Arasbaran region (Zarif-fard 1994)

**Host:** *V. vulpes*

**Locality:** Ardebil Province and Arasbaran region (Zarif-fard 1994)

#### **Genus *Pachysentis* Meyer, 1931**

***Pachysentis canicola*** Meyer, 1931

**Host:** *V. vulpes*

**Locality:** Bushehr, Bushehr Province (Mobedi *et al.* 2007)

**Class Eoacanthocephala Van Cleave, 1936**

**Order Gyraacanthocephala Van Cleave, 1936**

**Family Quadrigyridae Van Cleave, 1920**

**Genus *Acanthogyrus* Thapar, 1927**

**Subgenus *Acanthogyrus (Acanthosentis)* Verma & Datta, 1929**

*Acanthogyrus (Acanthosentis) barmeshoori* Amin, Gholami, Akhlaghi & Heckman, 2013

**Host:** *Aphanius farsicus*

**Locality:** Maharlou Lake, Fars Province (Amin *et al.* 2013a)

**Genus *Pallisentis* Van Cleave, 1928**

**Subgenus *Pallisentis (Pallisentis)* Van Cleave, 1928**

*Pallisentis (Pallisentis) cholodkowskyi* (Kostylew, 1928) Amin, 1985

**Host:** *Ap. vladykovi*

**Locality:** Gandoman Lagoon, Chaharmahal and Bakhtiari Province (Raissy *et al.* 2011)

**Host:** *Capoeta aculeata*

**Locality:** Choghakhor Lagoon, Chaharmahal and Bakhtiari Province (Fadaei-fard *et al.* 2001), 15 Khordad Lake, Delijan, Esfahan Province (Shafei 2002), Zayandehrud River, Esfahan Province (Mehdipour 2006)

**Host:** *Cap. bushei*

**Locality:** Zayandehrud River, Esfahan Province (Williams *et al.* 1980)

**Host:** *Cap. capoeta*

**Locality:** Zayandehrud River, Esfahan Province (Williams *et al.* 1980), Mahabad Dam Lake (Mohamadi 1997), Golestan Park River, Golestan Province (Mokhayer *et al.* 2000)

**Host:** *Cap. damascina*

**Locality:** Zayandehrud Dam, Esfahan Province (Kasraei 2001), Zayandehrud River, Esfahan Province (Mehdipour 2006)

**Host:** *Cap. trutta*

**Locality:** Vahdat Dam Lake, Kordestan Province (Barzegar & Jalali 2006)

**Host:** *Carassius carassius*

**Locality:** Zayandehrud Dam, Esfahan Province (Kasraei 2001)

**Host:** *Cyprinus carpio*

**Locality:** Mahabad Dam Lake, West Azerbaijan Province (Mohamadi 1997), Choghakhor Lagoon, Chaharmahal and Bakhtiari Province (Fadaei-fard *et al.* 2001), Zayandehrud Dam, Esfahan Province (Kasraei 2001), 15 Khordad Lake, Delijan, Esfahan Province (Shafei 2002)

**Host:** *Rutilus rutilus*

**Locality:** Mahabad Dam Lake, West Azerbaijan Province (Mohamadi 1997)

*Pallisentis (Pallisentis) sp.* (= *Acanthocephalorhynchoides* sp.)

**Host:** *Schizothorax pelzami*

**Locality:** Hamoon Lagoon, Sistan and Baluchestan Province (Sharif-Rohani 1995)

**Order Neoechinorhynchida Southwell and Macfie, 1925**

**Family Dendronucleatidae Sokolovskaya, 1962**

**Genus *Dendronucleata* Sokolovskaya, 1962**

*Dendronucleata dogieli* Sokolovskaya, 1962

**Host:** *Cap. capoeta*

**Locality:** Zarrinehrud River, West Azerbaijan Province (Jafari *et al.* 2001)

**Host:** *Leuciscus leuciscus*

**Locality:** Zarrinehrud River, West Azerbaijan Province (Jafari *et al.* 2001)

**Family Neoechinorhynchidae (Ward, 1917) Van Cleave, 1928**

**Genus *Neoechinorhynchus* Stiles and Hassall, 1905**

**Subgenus *Neoechinorhynchus* (*Neoechinorhynchus*) Hamann, 1892**

*Neoechinorhynchus* (*Neoechinorhynchus*) *rutili* (Müller, 1780)

**Host:** *Barbus lacerta cyri*

**Locality:** Sarisou River, West Azerbaijan Province (Abbasi 2002)

**Host:** *Cap. capoeta*

**Locality:** Mahabad Dam Lake, West Azerbaijan Province (Mohamadi 1997), Golestan Park River, Golestan Province (Kouhestan-Eskandari 1998), Zanjan Province (Pazouki *et al.* 2005)

**Host:** *Cy. carpio*

**Locality:** Mahabad Dam Lake, West Azerbaijan Province (Mohamadi 1997)

**Host:** *Ba. capito*

**Locality:** Zangbar River, East Azerbaijan Province (Pazouki *et al.* 2007)

**Host:** *Silurus glanis*

**Locality:** Mahabad Dam Lake, West Azerbaijan Province (Mohamadi 1997)

*Neoechinorhynchus* (*Neoechinorhynchus*) *tylosuri* Yamaguti, 1939

**Host:** *Aspius vorax*

**Locality:** Khuzestan Province (Seyed Mortazaei *et al.* 2000)

**Host:** *Ba. sharpeyi*

**Locality:** Khuzestan Province (Moghinami 1995)

**Host:** *Liza abu*

**Locality:** Khuzestan Province (Moghinami 1995; Seyed-Mortazaei *et al.* 2000)

*Neoechinorhynchus* (*Neoechinorhynchus*) *zabensis* Amin, Abdullah and Mhaisen, 2003

**Host:** *Cap. rutta*

**Locality:** Dez River, Khuzestan Province (Oguz *et al.* 2012)

*Neoechinorhynchus* sp.

**Host:** *Asp. vorax*

**Locality:** Khuzestan Province (Hajesmaeil 1998; Tabibi 2001)

**Host:** *Ba. grypus*

**Locality:** Khoramabad River, Lorestan Province (Peyghan *et al.* 2001), Khuzestan Province (Tabibi 2001)

**Host:** *Ba. luteus*

**Locality:** Khuzestan Province (Tabibi 2001)

**Host:** *Barbus* sp.

**Locality:** Zarrinehrud River, West Azerbaijan Province (Yakhchali *et al.* 2012)

**Host:** *Cap. capoeta*

**Locality:** Sefidrud River, Gilan Province (Mokhayer 1980)

**Host:** *Cap. trutta*

**Locality:** Khoramabad River, Lorestan Province (Peyghan *et al.* 2001)

**Host:** *Capoeta* sp.

**Locality:** Mahabad Dam Lake, West Azerbaijan Province (Akhavan-Roufigar 1991), Zarrinehrud River, West Azerbaijan Province (Pourzargham 1994), Tajan River, Mazandaran Province (Shamsi 1997)

**Host:** *Ctenopharyngodon idella*

**Locality:** Zarrinehrud River, West Azerbaijan Province (Pourzargham 1994)

**Host:** *Cy. carpio*

**Locality:** Khouzestan Province (Tabibi 2001)

**Host:** *Li. abu*

**Locality:** Khouzestan Province (Moghinami 1995; Hajesmaeil 1998; Tabibi 2001)

**Host:** *Li. macrolepis*

**Locality:** Persian Gulf (Amin *et al.* 1984)

**Host:** *Pseudorhombus arsius*

**Locality:** Persian Gulf (Amin *et al.* 1984)

**Host:** *Silurus glanis*

**Locality:** Aras Dam Lake, West Azerbaijan Province (Azadikhah 2001)

**Host:** *Sil. triostegus*

**Locality:** Khouzestan Province (Tabibi 2001)

## **Class Palaeacanthocephala Meyer, 1931**

### **Order Echinorhynchida Southwell and Macfie, 1925**

#### **Family Echinorhynchidae Cobbold, 1876**

##### **Genus *Acanthocephalus* Koelreuther, 1771**

*Acanthocephalus lucii* (Müller, 1776) Lühe, 1911

**Host:** *Esox lucius*

**Locality:** Caspian Sea (Younesi 1973)

#### **Family Pomphorhynchidae Yamaguti, 1939**

##### **Genus *Pomphorhynchus* Monticelli, 1905**

*Pomphorhynchus laevis* (Zoega in Muller, 1776) Van Cleave, 1924

**Host:** *Acipenser stellatus*

**Locality:** Caspian Sea (Mokhayer 1973)

**Host:** *Oncorhynchus mykiss*

**Locality:** Maku, West Azerbaijan Province (Abdi *et al.* 2006)

**Host:** fishes (not identified)

**Locality:** Sefidrud River, Gilan Province (Mokhayer 1980)

*Pomphorhynchus perforator* (von Linstow, 1908) Meyer, 1932

**Host:** *Cy. carpio*

**Locality:** Caspian Sea (Seighali 1973)

**Host:** *Sil. glanis*

**Locality:** Anzali Lagoon, Gilan Province (Sefidkar-Langroudi 1964)

**Host:** fishes (not identified)

**Locality:** Sefidrud River, Gilan Province (Mokhayer 1980)

**Family Rhadinorhynchidae Lühe, 1912**

**Genus *Leptorhynchoides* Kostylew, 1924**

*Leptorhynchoides plagicephalus* (Westrumb, 1821) Kostylew, 1924

**Host:** *Aci. gueldenstaedtii*

**Locality (reference):** Caspian Sea (Hajimoradlou & Ghorbani 2003; Sattari & Mokhayer 2005a)

**Host:** *Aci. nudiventris*

**Locality (reference):** Caspian Sea (Sattari & Mokhayer 2005a)

**Host:** *Aci. persicus*

**Locality:** Caspian Sea (Ghoroughi 1994; Sattari *et al.* 2000a; Hajimoradlou & Ghorbani 2003; Sattari & Mokhayer 2005b; Ebrahimi & Malek 2007; Masoumzadeh *et al.* 2007; Haghparast *et al.* 2007; Rajabpour *et al.* 2008)

**Host:** *Aci. stellatus*

**Locality:** Caspian Sea (Asgharzadeh & Hajimoradlou 2002; Sattari *et al.* 2000b; Sattari & Mokhayer 2005b; Ebrahimi & Malek 2007; Rajabpour *et al.* 2008)

**Host:** *Huso huso*

**Locality:** Caspian Sea (Ghoroughi 1994)

*Leptorhynchoides polycristatus* Amin, Heckmann, Halajian and El-Naggar, 2013

**Host:** *Aci. nudiventris*

**Locality:** Caspian Sea (Amin *et al.* 2013b)

**Host:** *Aci. stellatus*

**Locality:** Caspian Sea (Amin *et al.* 2013b)

**Genus *Sclerocollum* Schmidt and Paperna, 1978**

*Sclerocollum rubrimaris* Schmidt and Paperna, 1978

**Host:** *Siganus oramin*

**Locality:** Persian Gulf (Amin *et al.* 1984)

**Genus *Serrasentis* Van Cleave, 1923**

*Serrasentis sagittifer* (Linton, 1889) Van Cleave, 1923

**Host:** *Bothus* sp.

**Locality:** Persian Gulf (Amin *et al.* 1984)

**Host:** *Coryphaena hippurus*

**Locality:** Oman Sea (Alinezhad & Hoseini 1998)

**Host:** *Epinephelus tavina*

**Locality:** Persian Gulf (Radfar 1998)

**Host:** *Lutjanus coccineus*

**Locality:** Persian Gulf (Amin *et al.* 1984)

**Host:** *L. fulviflammus*

**Locality:** Persian Gulf (Amin *et al.* 1984)

**Host:** *Nemipterus japonicus*

**Locality:** Persian Gulf (Amin *et al.* 1984; Ghaem-maghami *et al.* 2008)

**Host:** *Nem. tolu*

**Locality:** Persian Gulf (Amin *et al.* 1984)



**Host:** *Otolithus argenteus*  
**Locality:** Persian Gulf (Amin *et al.* 1984)

***Serrasentis* sp.**

**Host:** *Epi. coioides*  
**Locality:** Persian Gulf (Peyghan *et al.* 2004)  
**Host:** *L. malabaricus*  
**Locality:** Persian Gulf (Peyghan *et al.* 2004)  
**Host:** *Otolithus ruber*  
**Locality:** Persian Gulf (Peyghan *et al.* 2004)  
**Host:** *Parastromateus niger*  
**Locality:** Persian Gulf (Peyghan *et al.* 2004)  
**Host:** *Pomadasyys kaakan*  
**Locality:** Persian Gulf (Peyghan *et al.* 2004)  
**Host:** *Stromateus cinereus*  
**Locality:** Persian Gulf (Peyghan *et al.* 2004)

**Order Polymorphida Petrochenko, 1956**

**Family Centrorthynchidae Van Cleave, 1916 (Golvan, 1960)**

**Genus *Centrorthynchus* Lühe, 1911**

***Centrorthynchus aluconis*** (Müller, 1780) Lühe, 1911  
**Host:** *Buteo buteo*  
**Locality:** Kaleybar, East Azerbaijan Province (Shirazi *et al.* 2014)

***Centrorthynchus globocaudatus*** (Zeder, 1800) Lühe, 1911  
**Host:** *Buteo rufinus*  
**Locality:** Tehran, Tehran Province (Borhanikia *et al.* 2006)

***Centrorthynchus pinguis*** Van Cleave, 1918  
**Host:** *V. vulpes*  
**Locality:** Ardebil Province and Arasbaran region (Zarif-fard 1994)

**Genus *Sphaerirostris* Golvan, 1956**

***Sphaerirostris picae*** (Rudolphi, 1819) Golvan 1958  
**Host:** *Corvus corone*  
**Locality:** Mazandaran Province (Amin *et al.* 2010; Halajian *et al.* 2011)  
**Host:** *Co. frugilegus*  
**Locality:** Mazandaran Province (Amin *et al.* 2010; Halajian *et al.* 2011)  
**Host:** *Pica pica*  
**Locality:** Mazandaran Province (Amin *et al.* 2010; Halajian *et al.* 2011)

**Family Plagiorhynchidae Golvan 1960**

**Genus *Plagiorhynchus* Lühe, 1911**

**Subgenus *Plagiorhynchus* (*Prosthorhynchus*) Kostylew, 1915**

***Plagiorhynchus (Prosthorhynchus) cylindraceus*** (Goeze, 1782) Schmidt and Kuntz, 1966

**Host:** *Sturnus vulgaris*

**Locality:** Gilan Province (Ranjandish 1971)

## **Family Polymorphidae Meyer, 1931**

### **Genus *Bolbosoma* Porta, 1908**

***Bolbosoma caenoforme*** (Heitz, 1920) Meyer, 1931 (*nec* Heitz, 1917)

**Host:** *Gasterosteus aculeatus*

**Locality:** Mazandaran Province (Hosseinfard *et al.* 2010)

**Genus *Corynosoma*** Lühe, 1904 (*vide* Van Cleave 1945)

***Corynosoma capsicum*** Golvan and Mokhayer, 1973

**Host:** *Aci. gueldenstaedtii*

**Locality:** Caspian Sea (Golvan & Mokhayer 1973)

**Host:** *Aci. stellatus*

**Locality:** Caspian Sea (Golvan & Mokhayer 1973)

**Host:** *Clupeonella* sp.

**Locality:** Caspian Sea (Mokhayer 1990)

**Host:** *Hu. huso*

**Locality:** Caspian Sea (Golvan & Mokhayer 1973)

**Host:** *Lucioperca lucioperca*

**Locality:** Sefidrud River (Mokhayer 1980)

***Corynosoma strumosum*** (Rudolphi, 1802) Lühe, 1904

**Host:** *Aci. gueldenstaedtii*

**Locality:** Caspian Sea (Sattari & Mokhayer 2005a)

**Host:** *Aci. persicus*

**Locality:** Caspian Sea (Masoumzadeh *et al.* 2007)

**Host:** *Aci. stellatus*

**Locality:** Caspian Sea (Sattari *et al.* 2000b; Asgharzadeh & Hajimoradlou 2002; Sattari & Mokhayer 2005b)

**Host:** *Clu. engrauliformis*

**Locality:** Caspian Sea (Shamsi *et al.* 1998; Varshoie *et al.* 2010)

**Host:** *Clu. cultriventris*

**Locality:** Caspian Sea (Shamsi *et al.* 1998; Varshoie *et al.* 2010)

**Host:** *Clu. grimmi*

**Locality:** Caspian Sea (Shamsi *et al.* 1998; Varshoie *et al.* 2010)

**Host:** *Esox lucius*

**Locality:** Chamkhaleh River, Gilan Province (Khara *et al.* 2004)

**Host:** *F. catus*

**Locality:** Northern Iran, Gilan and Mazandaran provinces, (Dalimi & Mobedi 1992)

**Host:** *Gasterosteus aculeatus*

**Locality:** Gorganrud River, Golestan Province (Niksirat *et al.* 2006)

**Host:** *Hu. huso*

**Locality:** Caspian Sea (Sattari & Mokhayer 2005a)

**Host:** *Neogobius bathybius*

**Locality:** Caspian Sea (Daghigh Roohi & Sattari 2004; 2010; Pazouki *et al.* 2011)

**Host:** *Neo. fluviatilis*

**Locality:** Caspian Sea (Daghigh Roohi & Sattari 2004; Pazouki *et al.* 2011)

**Host:** *Neo. kessleri*  
**Locality:** Caspian Sea (Daghigh Roohi & Sattari 2004; Pazouki *et al.* 2011)  
**Host:** *Neo. melanostomus*  
**Locality:** Caspian Sea (Daghigh Roohi & Sattari 2004)  
**Host:** *Pusa caspica*  
**Locality:** Caspian Sea (Eslami & Kiai 2009; Amin *et al.* 2011)  
**Host:** *Sil. glanis*  
**Locality:** Anzali Lagoon (Sefidkar-Langroudi 1964)

***Corynosoma tunita*** Weiss, 1914  
**Host:** *Anas crecca*  
**Locality:** Gilan Province (Ranjandish 1971)

***Corynosoma sp.***  
**Host:** *Pusa caspica*  
**Locality:** Caspian Sea (Eslami & Kiai 2009)

### Genus *Polymorphus* Lühe, 1911

***Polymorphus boschadis*** (Schrank, 1788) Railliet, 1919  
**Host:** *Anas crecca*  
**Locality:** Gilan Province (Ranjandish 1971)

***Polymorphus mutabilis*** (Rudolphi, 1819) Petrochenko, 1950  
**Host:** *Anas platyrhynchos*  
**Locality:** Gilan Province (Ranjandish 1971)

***Polymorphus trochus*** Van Cleave, 1945  
**Host:** *Anas platyrhynchos*  
**Locality:** Gilan Province (Ranjandish 1971), Esfahan Province (Pestechian 1990)

### Host-Parasite List

Hosts	Parasite species
<b>Class Actinopterygii</b>	
<b>Order Acipenseriformes</b>	
<b>Family Acipenseridae</b>	
<i>Aci. gueldenstaedtii</i> Brandt and Ratzeburg	<i>Corynosoma caspicum</i> <i>Corynosoma strumosum</i> <i>Leptorhynchoides plagicephalus</i>
<i>Aci. nudiventris</i> Lovetsky	<i>Leptorhynchoides plagicephalus</i> <i>Leptorhynchoides polycristatus</i>
<i>Aci. persicus</i> Borodin	<i>Corynosoma strumosum</i> <i>Leptorhynchoides plagicephalus</i>
<i>Aci. stellatus</i> Pallas	<i>Corynosoma caspicum</i> <i>Corynosoma strumosum</i> <i>Leptorhynchoides plagicephalus</i> <i>Leptorhynchoides polycristatus</i> <i>Pomphorhynchus laevis</i>

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Hosts	Parasite species
<i>Hu. huso</i> (Linnaeus)	<i>Corynosoma caspicum</i> <i>Corynosoma strumosum</i> <i>Leptorhynchoides plagicephalus</i>
<b>Order Clupeiformes</b>	
<b>Family Clupeidae</b>	
<i>Clu. cultriventris</i> (Nordmann)	<i>Corynosoma strumosum</i>
<i>Clu. engrauliformis</i> (Borodin)	<i>Corynosoma strumosum</i>
<i>Clu. grimmi</i> Kessler	<i>Corynosoma strumosum</i>
<i>Clupeonella</i> sp. Kessler	<i>Corynosoma caspicum</i>
<b>Order Cypriniformes</b>	
<b>Family Cyprinidae</b>	
<i>Aspius vorax</i> (Heckel)	<i>Neoechinorhynchus</i> ( <i>Neoechinorhynchus</i> ) <i>tylosuri</i> <i>Neoechinorhynchus</i> sp.
<i>Ba. capito</i> (= <i>Luciobarbus capito</i> ) (Güldenstädt)	<i>Neoechinorhynchus</i> ( <i>Neoechinorhynchus</i> ) <i>rutili</i>
<i>Ba. grypus</i> Heckel	<i>Neoechinorhynchus</i> sp.
<i>Ba. lacerta</i> De Filippi	<i>Neoechinorhynchus</i> ( <i>Neoechinorhynchus</i> ) <i>rutili</i>
<i>Ba. luteus</i> (= <i>Carasobarbus luteus</i> ) (Heckel)	<i>Neoechinorhynchus</i> sp.
<i>Ba. sharpeyi</i> (= <i>Mesopotamichthys sharpeyi</i> ) (Günther)	<i>Neoechinorhynchus</i> ( <i>Neoechinorhynchus</i> ) <i>tylosuri</i>
<i>Barbus</i> sp. Cuvier and Cloquet	<i>Neoechinorhynchus</i> sp.
<i>Cap. aculeata</i> (Valenciennes)	<i>Pallisentis</i> ( <i>Pallisentis</i> ) <i>cholodkowskyi</i>
<i>Cap. bushei</i> Kessler	<i>Pallisentis</i> ( <i>Pallisentis</i> ) <i>cholodkowskyi</i>
<i>Cap. capoeta</i> (Güldenstädt)	<i>Dendronucleata dogieli</i> <i>Neoechinorhynchus</i> ( <i>Neoechinorhynchus</i> ) <i>rutili</i> <i>Neoechinorhynchus</i> sp. <i>Pallisentis</i> ( <i>Pallisentis</i> ) <i>cholodkowskyi</i>
<i>Cap. damascina</i> (Valenciennes)	<i>Pallisentis</i> ( <i>Pallisentis</i> ) <i>cholodkowskyi</i>
<i>Cap. trutta</i> (Heckel)	<i>Neoechinorhynchus</i> ( <i>Neoechinorhynchus</i> ) <i>zabensis</i> <i>Neoechinorhynchus</i> sp. <i>Pallisentis</i> ( <i>Pallisentis</i> ) <i>cholodkowskyi</i>
<i>Capoeta</i> sp. Valenciennes	<i>Neoechinorhynchus</i> sp.
<i>Carassius carassius</i> (Linnaeus)	<i>Pallisentis</i> ( <i>Pallisentis</i> ) <i>cholodkowskyi</i>
<i>Ctenopharyngodon idella</i> (Valenciennes)	<i>Neoechinorhynchus</i> sp.
<i>Cy. carpio</i> Linnaeus	<i>Neoechinorhynchus</i> ( <i>Neoechinorhynchus</i> ) <i>rutili</i> <i>Neoechinorhynchus</i> sp. <i>Pallisentis</i> ( <i>Pallisentis</i> ) <i>cholodkowskyi</i> <i>Pomphorhynchus perforator</i>
<i>Leuciscus leuciscus</i> (Linnaeus)	<i>Dendronucleata dogieli</i>
<i>Rutilus rutilus</i> (Linnaeus)	<i>Pallisentis</i> ( <i>Pallisentis</i> ) <i>cholodkowskyi</i>
<i>Schizothorax pelezami</i> Kessler	<i>Pallisentis</i> ( <i>Pallisentis</i> ) sp.
<b>Family Cyprinodontidae</b>	
<i>Aphanius farsicus</i> Teimori, Esmaili and Reichenbacher	<i>A. (Ac.) barmeshoori</i>
<i>Aphanius vladykovi</i> Coad	<i>Pallisentis</i> ( <i>Pallisentis</i> ) <i>cholodkowskyi</i>
<b>Order Esociformes</b>	
<b>Family Esocidae</b>	
<i>Esox lucius</i> Linnaeus	<i>Acanthocephalus lucii</i>

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Hosts	Parasite species
	<i>Corynosoma strumosum</i>
<b>Order Gasterosteiformes</b>	
<b>Family Gasterosteidae</b>	
<i>Gasterosteus aculeatus</i> Linnaeus	<i>Bolbosoma caenoforme</i> <i>Corynosoma strumosum</i>
<b>Order Mugiliformes</b>	
<b>Family mugilidae</b>	
<i>Li. abu</i> (Heckel)	<i>Neoechinorhynchus</i> ( <i>Neoechinorhynchus</i> ) <i>tylosuri</i> <i>Neoechinorhynchus</i> sp.
<i>Li. macrolepis</i> (Smith)	<i>Neoechinorhynchus</i> sp.
<b>Order Perciformes</b>	
<b>Family Carangidae</b>	
<i>Parastromateus niger</i> (Bloch)	<i>Serrasentis</i> sp.
<b>Family Coryphaenidae</b>	
<i>Coryphaena hippurus</i> Linnaeus	<i>Serrasentis sagittifer</i>
<b>Family Gobiidae</b>	
<i>Neogobius bathybius</i> (Kessler)	<i>Corynosoma strumosum</i>
<i>Neogobius fluviatilis</i> (Pallas)	<i>Corynosoma strumosum</i>
<i>Neogobius kessleri</i> (Günther)	<i>Corynosoma strumosum</i>
<i>Neogobius melanostomus</i> (Pallas)	<i>Corynosoma strumosum</i>
<b>Family Haemulidae</b>	
<i>Pomadasys kaakan</i> (Cuvier)	<i>Serrasentis</i> sp.
<b>Family Lutjanidae</b>	
<i>L. coccineus</i> (= <i>L. gibbus</i> ) (Cuvier)	<i>Serrasentis sagittifer</i>
<i>L. fulviflammus</i> (Forsskål)	<i>Serrasentis sagittifer</i>
<i>L. malabaricus</i> (Bloch and Schneider)	<i>Serrasentis</i> sp.
<b>Family Nemipteridae</b>	
<i>Nem. japonicas</i> (Bloch)	<i>Serrasentis sagittifer</i>
<i>Nem. tolu</i> (= <i>N. peronei</i> ) (Valenciennes)	<i>Serrasentis sagittifer</i>
<b>Family Percidae</b>	
<i>Lucioperca lucioperca</i> (= <i>Sander lucioperca</i> ) (Linnaeus)	<i>Corynosoma caspicum</i>
<b>Family Sciaenidae</b>	
<i>Otolithus argenteus</i> Cuvier (= <i>O. ruber</i> )	<i>Serrasentis sagittifer</i>
<i>O. ruber</i> (Bloch and Schneider)	<i>Serrasentis</i> sp.
<b>Family Serranidae</b>	
<i>Epi. coioides</i> (Hamilton)	<i>Serrasentis</i> sp.
<i>Epi. tauvina</i> (Forsskål)	<i>Serrasentis sagittifer</i>
<b>Family Siganidae</b>	
<i>Sig. oramin</i> (= <i>Sig. canaliculatus</i> ) (Bloch and Schneider)	<i>Sclerocollum rubrimaris</i>
<b>Family Stromateidae</b>	
<i>Stromateus cinereus</i> (= <i>Pampus argenteus</i> ) Bloch	<i>Serrasentis</i> sp.
<b>Order Pleuronectiformes</b>	
<b>Family Bothidae</b>	

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Continued.

Hosts	Parasite species
<i>Bothus</i> sp. Rafinesque	<i>Serrasentis sagittifer</i>
<b>Family Paralichthyidae</b>	
<i>Pseudorhombus arsius</i> (Hamilton)	<i>Neoechinorhynchus</i> sp.
<b>Order Salmoniformes</b>	
<b>Family Salmonidae</b>	
<i>Oncorhynchus mykiss</i> (Walbaum)	<i>Pomphorhynchus laevis</i>
<b>Order Siluriformes</b>	
<b>Family Siluridae</b>	
<i>Sil. triostegus</i> Heckel	<i>Neoechinorhynchus</i> sp.
<i>Sil. glanis</i> Linnaeus	<i>Corynosoma strumosum</i> <i>Dendronucleata dogieli</i> <i>Neoechinorhynchus (Neoechinorhynchus) rutili</i> <i>Pomphorhynchus perforator</i>
<b>Class Aves</b>	
<b>Order Anseriformes</b>	
<b>Family Anatidae</b>	
<i>Anas crecca</i> Linnaeus	<i>Corynosoma tunita</i> <i>Polymorphus boschadis</i>
<i>Anas platyrhynchos</i> Linnaeus	<i>Polymorphus trochus</i> <i>Polymorphus mutabilis</i>
<b>Order Falconiformes (Accipitriformes)</b>	
<b>Family Accipitridae</b>	
<i>Buteo buteo</i> (Linnaeus)	<i>Centrorhynchus aluconis</i>
<i>Buteo rufinus</i> (Cretzschmar)	<i>Centrorhynchus globocaudatus</i>
<b>Order Passeriformes</b>	
<b>Family Alaudidae</b>	
<i>Alauda arvensis</i> Linnaeus	<i>Mediorhynchus micracanthus</i>
<i>Galerida cristata</i> (Linnaeus)	<i>Mediorhynchus micracanthus</i>
<b>Family Corvidae</b>	
<i>Corvus corone</i> Linnaeus	<i>Sphaerirostris picae</i>
<i>Corvus frugilegus</i> Linnaeus	<i>Sphaerirostris picae</i>
<i>Pica pica</i> (Linnaeus)	<i>Sphaerirostris picae</i>
<b>Family Sturnidae</b>	
<i>Sturnus vulgaris</i> Linnaeus	<i>Plagiorhynchus (Prosthorhynchus) cylindraceus</i>
<b>Class Mammalia</b>	
<b>Order Artiodactyla</b>	
<b>Family Suidae</b>	
<i>S. scrofa</i> Linnaeus	<i>Macracanthorhynchus hirudinaceus</i>
<b>Order Carnivora</b>	
<b>Family Canidae</b>	
<i>Ca. aureus</i> Linnaeus	<i>Macracanthorhynchus hirudinaceus</i> <i>Macracanthorhynchus</i> sp. <i>Oncicola</i> sp.

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Hosts	Parasite species
<i>Ca. lupus</i> Sykes	<i>Macracanthorhynchus hirudinaceus</i>
<i>Ca. lupus familiaris</i> Linnaeus	<i>Macracanthorhynchus hirudinaceus</i> <i>Macracanthorhynchus</i> sp.
<i>Canine coprolite</i>	<i>Macracanthorhynchus hirudinaceus</i>
<i>V. vulpes</i> (Linnaeus)	<i>Centrorhynchus pinguis</i> <i>Macracanthorhynchus hirudinaceus</i> <i>Macracanthorhynchus</i> sp. <i>Oncicola canis</i> <i>Oncicola</i> sp. <i>Pachysentis canicola</i>
<b>Family Felidae</b>	
<i>F. catus</i> Linnaeus	<i>Corynosoma strumosum</i> <i>Oncicola</i> sp.
<i>F. silvestris</i> Schreber	<i>Oncicola</i> sp.
<b>Family Phocidae</b>	
<i>Pusa caspica</i> (Gmelin)	<i>Corynosoma strumosum</i> <i>Corynosoma</i> sp.
<b>Order Erinaceomorpha</b>	
<b>Family Erinaceidae</b>	
<i>E. concolor</i> Martin	<i>Nephridiacanthus major</i>
<i>He. auritus</i> (Gmelin)	<i>Nephridiacanthus major</i>
<b>Order Primates</b>	
<b>Family Hominidae</b>	
<i>Homo sapiens</i> Linnaeus	<i>Moniliformis moniliformis</i>
<b>Order Rodentia</b>	
<b>Family Cricetidae</b>	
<i>Cricetulus migratorius</i> (Pallas)	<i>Moniliformis moniliformis</i>
<b>Family Muridae</b>	
<i>Meriones libicus</i> Lichtenstein	<i>Moniliformis moniliformis</i>
<i>Meriones persicus</i> (Blanford)	<i>Moniliformis moniliformis</i>

## Discussion

Despite the diversity of animals in Iran (approximately 446 species of fishes, 517 species of birds, 214 species of reptiles and 168 species of mammals) (Firouz 2005; Rastegar-Pouyani *et al.* 2008; Esmaeili *et al.* 2010), our knowledge of the biodiversity of their helminth fauna, especially the acanthocephalans, is still very limited. Relatively few species from Iran have been checked for helminths. The present checklist, although presenting the composition of known acanthocephalans in Iran, covers fewer than 10% of potential species of vertebrates that potentially could be infected. In this report, the Oligacanthorhynchidae and Rhadinorhynchidae are the most commonly represented families, with 5 species that are parasites of mammals and fishes.

Based on the present data, acanthocephalans are host specific to vertebrates at the class level. Among the three classes that are listed, hosts with greatest number of reported species of acanthocephalan belong in the Actinopterygii (ray-finned fishes) and the most parasitized families are the Acipenseridae and Cyprinidae, each with five species of acanthocephalan.

There are some reports of *Leptorhynchoides plagicephalus* from sturgeons in the Caspian Sea. Another species of this genus, *Leptorhynchoides polycristatus*, which is also found in *Aci. stellatus* and *Aci. nudiventris*, overlaps in

host distribution with *Leptorhynchoides plagicephalus*. Because of the many similarities, such as general shape of the trunk, proboscis and organ systems, each species can be confused easily with the other (Amin *et al.* 2013). The identification of available specimens of *Leptorhynchoides plagicephalus* should be re-examined to eliminate the confusion with the closely related *Leptorhynchoides polycristatus*, as discussed by Amin *et al.* (2013).

The present work reflects the current state of knowledge of the acanthocephalan fauna of Iran. It will serve as a reference line against which future reports can be based. Undoubtedly, more species will be reported in the future. It also points to the need for future research. For example, acanthocephalans identified only as *Neoechinorhynchus* sp. have been reported from 13 different species of hosts. Elucidating the specific identity of these species of *Neoechinorhynchus* from this diverse group of hosts would be an interesting undertaking.

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