

Freshwater fishes of Iran; an updated checklist

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Abstract. The present study provides a new and updated checklist of the freshwater fishes of Iran. The confirmed freshwater fishes of Iran comprise 257 species in 106 genera, 29 families, 18 orders and 3 classes. The most diverse order is the Cypriniformes with 162 species or 63.04% of the fauna, followed by Perciformes (32 species, 12.45%), Cyprinodontiformes (17 species, 6.61%) and Clupeiformes (11 species, 4.28%). The most diverse family is the Cyprinidae with 111 confirmed species (43.19%) followed by Nemacheilidae (44 species, 17.12%), Gobiidae (24 species, 9.34%), Cyprinodontidae (14 species, 5.45%), Clupeidae (10 species, 3.89%), Cobitidae (7 species, 2.72%) and Salmonidae (7 species, 2.72%). Twenty-two families have 6 or fewer species. Fourteen families have only one species. Endemics comprise 73 species (28.40% of total fauna) in seven families although this is expected to increase, as new species are describing. Cyprinidae with 30 endemics (41.10% of endemic species) is ranked first followed by Nemacheilidae with 25 (34.25%), Cyprinodontidae with 11 (15.07%), Cobitidae with 4 (5.48%), and Cichlidae, Gobiidae and Sisoridae, each with one species (1.37% each). An additional 23 species require confirmation of their presence in Iran. Twenty-seven exotic species in nine families are listed here. Cyprinidae with 11 species (40.74% of exotic species) is ranked first followed by Salmonidae (5 species, 18.52%), Poeciliidae with 3 species (11.11%), Mugilidae and Cichlidae both with 2 species (7.41% each) and 4 families each with only one species (3.70% each). Exotic species containing, *Oncorhynchus mykiss*, *Ctenopharyngodon idella*, *Hypophthalmichthys molitrix*, *Hypophthalmichthys nobilis* and *Cyprinus carpio* transplanted by Iranian Fisheries Organization (Shilat) for aquaculture developments throughout Iran, but *Alburnus hohenerkeri*, *Carassius auratus*, *Carassius gibelio*, *Hemiculter leucisculus*, *Pseudorasbora parva*, and *Gambusia holbrooki*, transferred with them inadvertently to Iranian water resources. Certain nominal species can be regarded as species complexes, probably containing several undescribed species. The genera *Capoeta*, *Squalius*, *Alburnus* and *Barbus* are wide-ranging and complexes genus in Iran, that systematics of them need careful re-assessment.

Key Words: checklist, freshwater fishes, fauna, endemic, exotic, Iran.

Introduction. Iran is located in the Palearctic region bordering the Oriental and Ethiopian zones (Esmaeili et al 2010, 2014a, 2014b; Coad 2015) and its north-west, west and south-west are parts of Irano-Anatolian hot spot with high biodiversity especially freshwater fish diversity (Esmaeili et al 2010, 2014a, 2014b). The country features containing 19 basins (Figure 1) and three main climatic zones including arid and semi-arid regions of the interior and far south, Mediterranean climate and humid and semi-humid regions. In addition, Iran's plateau with a vast desert located in the central areas, and two mountain ranges, Zagros in the west and Alborz in the north, comprise a significant portion of its territory. The complex and varied climates, topography, geological formations and anthropological management of natural resources have led to a varied and unique biological diversity. According to the Department of Environment (2010) in the Iranian ecosystems over 8,000 species of plants, 140 species of mammals, 293 species of birds, 219 species of reptiles and 23 species of amphibians, have been recorded.



Figure 1. Drainage basins map of Iran (L.M: Lake Maharlu, Hari = Tedzhen).

Many authors were interested to review the biodiversity of Iranian freshwater fishes. The most important early work on the Middle East and specifically on Iran is that of Johann Jakob Heckel, who described the collections sent by Theodor Kotschy to Vienna from "Syria" which includes places as the Quwayq and Orontes rivers near Aleppo and Antioch, Damascus, the Jordan River, Mosul on the Tigris River and Kurdistan. Latter studies increased our knowledge about the biodiversity of Iranian freshwater fishes and accounts have been published by many authors in different countries describing fishes subsequently found in Iran. Early works of particular relevance to Iran include those by Keyserling (1861, 1863), De Filippi (1863, 1864, 1865), Nikol'skii (1897, 1899) and Berg (1949).

Coad (1995) listed 150 species in 25 families, 14 orders and 3 classes found in 19 drainage basins of Iran. Coad (1998) listed 155 species in 67 genera, 24 families, 15 orders and 3 classes found in 19 drainage basins of Iran. Esmaeili et al (2010) listed the freshwater fishes of Iran and stated there are 202 species in 104 genera, 28 families, 17 orders and 3 classes found in 19 different basins which are obviously higher than those listed by Coad (1998).

A wide range of articles on Iranian freshwater fishes are recently published in terms of taxonomy (Esmaeili et al 2010, 2014a, 2014b, 2015; Habibi et al 2013; Mousavi-Sabet & Eagderi 2014; Mousavi-Sabet et al 2011b, 2012c, 2015b, 2015c, 2015d, 2015e), morphology (Anvarifar et al 2014; Heidari et al 2014; Khataminejad et al 2013b; Kohestan-Eskandari et al 2013, 2014; Vatandoust et al 2014a, 2014b, 2015), biology and population structure (Ahmadi et al 2013; Faghani-Langroudi et al 2014; Mousavi-Sabet 2012; Mousavi-Sabet & AnvariFar 2013; Mousavi-Sabet et al 2011a,

2012a, 2012b, 2013a, 2013b, 2013c, 2014a, 2014b, 2015a), osteology (Azimi et al 2014a, 2014b; Jalili et al 2015; Mafakheri et al 2015), and biogeography (Esmaeili et al 2010, 2014b, 2015; Jouladeh-Roudbar et al 2015a, 2015b; Ghasemi et al 2015). Use of accurate names is essential to communicate research results effectively. New species of fish are being described from this country almost every year, but population growth, demands for aquaculture, fish introductions and translocations, drought, pollution, and habitat destruction have marked effects on Iran's freshwater ichthyodiversity and combination of fishes in many water basins have been changed (Esmaeili et al 2010, 2014b, 2015; Jouladeh-Roudbar et al 2015a, 2015b; Ghasemi et al 2015). Furthermore, taxonomic problems of some taxa still need to be resolved. Due to ongoing changes in fish fauna, the present study provides an updated checklist including natives, endemics, exotics and transplanted species fishes of Iranian inland waters.

Material and Method. The current checklist is based on information collected from searches of databases including the Zoological Record, Biological Abstracts, Helminthological Abstracts, Web of Knowledge, Google Scholar, Aquatic Sciences and Fisheries Abstracts Bibliography, examination of ichthyological collections and extensive field expeditions from 2000–2015 in Iran.

Results. The confirmed freshwater fishes of Iran comprise 257 species in 106 genera, 29 families, 18 orders and 3 classes. The most diverse order is the Cypriniformes with 162 species or 63.04% of the fauna, followed by Perciformes (32 species, 12.45%), Cyprinodontiformes (17 species, 6.61%) and Clupeiformes (11 species, 4.28%).

The most diverse family is the Cyprinidae with 111 confirmed species (43.19%) followed by Nemacheilidae (44 species, 17.12%), Gobiidae (24 species, 9.34%), Cyprinodontidae (14 species, 5.45%), Clupeidae (10 species, 3.89%), Cobitidae (7 species, 2.72%) and Salmonidae (7 species, 2.72%). Twenty-two families have 6 or fewer species. Fourteen families have only one species.

Endemics comprise 73 species (28.40% of total fauna) in seven families expected to increase, as new species are describing. Cyprinidae with 30 endemics (41.10% of endemic species) is ranked first followed by Nemacheilidae with 25 (34.25%), Cyprinodontidae with 11 (15.07%), Cobitidae with 4 (5.48%), and Cichlidae, Gobiidae and Sisoridae, each with one species (1.37% each). An additional 23 species require confirmation of their presence in Iran.

Twenty-seven exotic species in nine families are listed here. Cyprinidae with 11 species (40.74% of exotic species) is ranked first followed by Salmonidae (5 species, 18.52%), Poeciliidae with 3 species (11.11%), Mugilidae and Cichlidae both with 2 species (7.41% each) and 4 families each with only one species (3.70% each).

Five exotic species containing, *Oncorhynchus mykiss*, *Ctenopharyngodon idella*, *Hypophthalmichthys molitrix*, *Hypophthalmichthys nobilis* and *Cyprinus carpio* transplanted by Iranian Fisheries Organization (Shilat) for aquacultural purpose across Iran, but *Alburnus hohenerkeri*, *Carassius auratus*, *Carassius gibelio*, *Hemiculter leucisculus*, *Pseudorasbora parva*, and *Gambusia holbrooki*, transferred with them inadvertently to Iranian water resources.

Certain nominal species can be regarded as species complexes, probably containing several undescribed species. For example, the genera *Capoeta*, *Squalius*, *Alburnus* and *Barbus* are wide-ranging and complexes genus in Iran, that their systematic positions needs carefully to be re-assessed.

Checklist

* = endemic, ** = exotic, Unconfirmed species mentioned in the following text, but without confirmed specimens of the museum. They have been included in total in checklist (Table 1). Some exotic species undoubtedly have a wider distribution than showed here.

Species name (Author) – Distribution.

Table 1

Distribution of fish taxa in Iran by basin

<i>Basin</i>	<i>Families</i>	<i>Genera</i>	<i>Species</i>	<i>Unconfirmed</i>	<i>Exotics</i>	<i>Iranian endemics</i>
Bedjestan	3	12	14	0	11	0
Caspian	18	63	122	22	16	5
Esfahan	5	18	22	0	13	4
Hormuz	13	32	41	0	12	10
Jaz Murian	6	15	20	0	11	3
Kavir	6	18	22	0	12	4
Kerman-Na'in	3	11	15	0	11	2
Kor	7	21	28	0	11	9
Lut	4	13	16	0	11	2
Maharlu	6	15	18	0	11	3
Makran	10	24	31	0	11	6
Mashkid	6	18	23	0	11	2
Namak	6	21	24	0	15	7
Persis	14	36	49	0	14	13
Sirjan	4	13	15	0	11	2
Sistan	4	19	23	0	11	0
Tedzhen	7	21	25	0	14	0
Tigris	19	54	91	1	15	22
Urmia	7	25	28	0	13	6

CLASS **PETROMYZONTIDA**Order **PETROMYZONTIFORMES**

(1 family, 1 genus and 1 species)

Family **Petromyzontidae**

(1 genus and 1 species)

Genus ***Caspiomyzon*** Berg, 1906*Caspiomyzon wagneri* (Kessler, 1870) – the Caspian Sea basin.Type locality: *Petromyzon wagneri* was originally described from Astrakhan, Russia.CLASS **CHONDRICHTHYES**Order **CARCHARHINIFORMES**

(1 family, 1 genus and 1 species)

Family **Carcharhinidae**

(1 genus and 1 species)

Genus ***Carcharhinus*** Blainville, 1816*Carcharhinus leucas* (Müller & Henle, 1839) – the Tigris River basin.Type locality: *Prionodon leucas* was originally described from the western Atlantic.CLASS **ACTINOPTERYGII**Order **ACIPENSERIFORMES**

(1 family, 2 genera and 6 species, 1 unconfirmed)

Family **Acipenseridae**

(2 genera and 6 species, 1 unconfirmed)

Genus ***Acipenser*** Linnaeus, 1758*Acipenser gueldenstaedtii* Brandt & Ratzeburg, 1833 – the Caspian Sea basin.

Type locality: Volga, Ural and Terek rivers of the Caspian Sea.

Acipenser nudiventris Lovetzky, 1828 – the Caspian Sea basin.

Type locality: Aral Sea.

Acipenser persicus Borodin, 1897 – the Caspian Sea basin.

Type locality: Ural and Kura rivers.

Acipenser ruthenus Linnaeus, 1758 – the Caspian Sea basin.

Type locality: Danube River.

Comment: reported from the middle and southern parts of the Caspian Sea by Naseka & Bogutskaya (2009) but not confirmed by specimens for Iran. This species is recently transported to Iran for aquaculture purpose.

Acipenser stellatus Pallas, 1771 – the Caspian Sea basin.

Type locality: Volga River near Simbirsk.

Genus **Huso** Brandt & Ratzeburg, 1833

Huso huso (Linnaeus, 1758) – the Caspian and Persis basins.

Type locality: *Acipenser huso* was originally described from the Danube and rivers of Russia.

Comment: translocated from the Caspian Sea basin to the Persis and probably Tigris basins for Aquaculture.

Order **ANGUILLIFORMES**

(1 family, 1 genus and 1 species)

Family **Anguillidae**

(1 genus and 1 species)

Genus **Anguilla** Schrank, 1798

Anguilla anguilla (Linnaeus, 1758)** – introduced to the Caspian Sea basin.

Type locality: *Muraena anguilla* was originally described from Europe.

Order **CLUPEIFORMES**

(2 families, 5 genera and 13 species, 2 unconfirmed)

Family **Clupeidae**

(4 genera and 12 species, 2 unconfirmed)

Genus **Alosa** Linck, 1790

Several members of this genus require revision.

Comment: formerly in the genus *Caspialosa* Berg, 1915. Many subspecies have been described for some species in the Caspian Sea but their status has not been assessed recently.

Alosa braschnikowi (Borodin, 1904) – the Caspian Sea basin.

Type locality: *Clupea caspiopontica* var. *braschnikowii* was originally described from near Fort Aleksandrovsk, the middle Caspian Sea, Kazakhstan.

Alosa caspia (Eichwald, 1838) – the Caspian Sea basin.

Type locality: *Clupea caspia* was originally described from the southern Caspian Sea.

Alosa curensis (Suvorov, 1907) – the Caspian Sea basin.

Type locality: *Clupea curensis* was originally described from the southern Caspian Sea, near mouth of Kura River, Azerbaijan.

Comment: reported from the middle and southern Caspian Sea by Naseka & Bogutskaya (2009) but not confirmed by specimens for Iran.

Alosa kessleri (Grimm, 1887) – the Caspian Sea basin.

Type locality: *Clupea kessleri* was originally described from the Volga River delta, Russia.

Comment: formerly placed in *A. pontica* (Eichwald, 1838) as a subspecies but Kottelat & Freyhof (2007) and Naseka & Bogutskaya (2009) consider *Alosa kessleri* as a valid species.

Alosa saposchnikowii (Grimm, 1887) – the Caspian Sea basin.

Type locality: *Clupea saposchnikowii* was originally described from the Volga River delta, Russia.

Alosa sphaerocephala (Berg, 1913) – the Caspian Sea basin.

Type locality: *Clupeonella sphaerocephala* was originally described from Agrakhan Bay, Tyulenii Island, and Turali in the northern part of the Caspian Sea.

Alosa volgensis (Berg, 1913) – the Caspian Sea basin.

Type locality: *Clupeonella caspia volgensis* was originally described from mouth of Volga River, Russia.

Comment: reported by Kottelat & Freyhof (2007) from the Caspian Sea basin. Presence in Iranian waters needs confirmation.

Genus **Clupeonella** Kessler, 1877

Clupeonella caspia Svetovidov, 1941 – the Caspian Sea basin.

Type locality: *Clupea cultriventris* was originally described from the northern shore of the Black Sea.

Comment: formerly identified as *Clupeonella cultriventris* (Nordmann, 1840).

Clupeonella engrauliformis (Borodin, 1904) – the Caspian Sea basin.

Type locality: *Clupea engrauliformis* was originally described from Buinak, central part of the Caspian Sea.

Comment: formerly identified as *Clupea engrauliformis* (Borodin, 1904).

Clupeonella grimmi Kessler, 1877 – the Caspian Sea basin.

Type locality: Central part of the Caspian Sea.

Genus **Sardinella** Valenciennes, 1847

Sardinella sindensis (Day, 1878) - the Tigris River, possibly Persis and Hormuz basins.

Type locality: *Clupea sindensis* was originally described from Karachi, Pakistan.

Genus **Tenualosa** Fowler, 1934

Tenualosa ilisha (Hamilton, 1822) - the Tigris and Persis basins; possibly Hormuz basin.

Type locality: *Clupanodon ilisha* was originally described from the Ganges estuaries in India.

Family **ENGRAULIDAE**

(1 genus and 1 species)

Genus **Thryssa** Cuvier, 1829

Thryssa hamiltonii Gray, 1835 – the Tigris River, possibly Persis and Hormuz basins.

Type locality: India. No types known.

Order **GONORYNCHIFORMES**

(1 family, 1 genus and 1 species)

Family **Chanidae**

(1 genus and 1 species)

Genus **Chanos** Lacepede, 1803

Chanos chanos (Forsskal, 1775) – the Tigris, Persis, Hormuz and Makran basins.

Type locality: *Mugil chanos* was originally described from Jeddah on the Red Sea, Saudi Arabia.

Order **CYPRINIFORMES**

(3 families, 52 genera and 162 species, 2 unconfirmed)

Family **Cyprinidae**

(44 genera and 111 species, 1 unconfirmed)

Genus **Abramis** Cuvier, 1816

Abramis brama (Linnaeus, 1758) – the Caspian Sea and Urmia Lake basins.

Type locality: *Cyprinus brama* was originally described from Sweden.

Genus **Acanthobrama** Heckel, 1843

Acanthobrama marmid Heckel, 1843 – the Tigris River basin.

Type locality: Aleppo (= Halab), Syria.

Acanthobrama microlepis (De Filippi, 1863) – the Caspian Sea basin.

Type locality: *Abramis microlepis* was described from the Kura River near Tbilisi, Georgia.

Comment: Küçük et al (2014) placed this species in *Acanthobrama*.

Acanthobrama persidis (Coad, 1981)* – Kor River, Persis and Hormuz basins.

Type locality: *Pseudophoxinus persidis* was originally described from the upper Shur River drainage at Koorsiah village, near Darab on Darab-Fasa road, 28°45.5'N, 54°24'E, Fars, Iran.

Comment: Bogutskaya (2002) includes this species in the genus *Petroleuciscus* based on morphological data while Perea et al (2010) using mitochondrial and nuclear DNA propose synonymy with *Acanthobrama*.

Acanthobrama urmianus (Günther, 1899)* – the Urmia Lake basin.

Type locality: *Abramis urmianus* was originally described from Ocksa River and Urmi River, Iran.

Comment: Berg (1949) placed this species in the genus *Alburnoides* Jeitteles, 1861 but Saadati (1977) placed this species in *Acanthalburnus* Berg, 1916 but recently Küçük et al (2014) placed in *Acanthobrama*.

Genus ***Alburnoides*** Jeitteles, 1861

Comment: under revision, further taxa may exist in Iran.

Alburnoides eichwaldii (De Filippi, 1863) – the Caspian Sea basin.

Type locality: *Alburnus eichwaldii* De Filippi, 1863, described from Kura River near Tbilisi, Georgia.

Comment: based on Seifali et al (2012) the mitochondrial gene tree largely supports the existence of three major clades. The western populations might be considered as *Alburnoides eichwaldii*, whereas the Talar river populations (now described as *A. tabarestanensis*) are represented as *Alburnoides* sp. 1 and the eastern populations may be a distinct taxon *Alburnoides* sp. 2.

Alburnoides holciki Coad and Bogutskaya, 2012 (Figure 2) – Tedzhen River basin.

Type locality: Hari River at Herat, 34°20'N, 62°12'E, Afganistan.



Figure 2. *Alburnoides holciki*, Hariroud River, Iran (Photograph by Hamed Mousavi-Sabet).

Alburnoides idignensis Bogutskaya and Coad, 2009* (Figure 3) – the Tigris River basin.

Type locality: Bid Sorkh River between Sahneh and Kangavar, Gav Masiab River drainage, 34°23'N, 47°52'E, Kermanshah, Iran.



Figure 3. *Alburnoides idignensis*, Bide Sorkh Stream, Gamasiab River, Iran (Photograph by Hamed Mousavi-Sabet).

Alburnoides namaki Bogutskaya and Coad, 2009* (Figure 4) – the Namak Lake basin.
Type locality: Qanat at Taveh, 35° 07'N, 49° 02'E, Hamadan, Iran.

Comment: about 25 years ago, Tave qanat has been dried and now there is no river or qanat around the type locality.



Figure 4. *Alburnoides namaki*, Qarah-Chay River, Iran (Photograph by Hamed Mousavi-Sabet).

Alburnoides nicolausi Bogutskaya and Coad, 2009* – the Tigris River basin.

Type locality: stream in Simareh River drainage, 5 km south of Nurabad, 34°03'30"N, 47°58'30"E, Lorestan, Iran.

Alburnoides petrubanarescui Bogutskaya and Coad, 2009* – the Urmia Lake basin.

Type locality: Qasemlou-Chay, Orumiyeh [Urmia] Lake basin, 37°21'N, 45°09'E, Azarbaijan-e Bakhtari, Iran.

Comment: in numerous sampling from type locality and around it, no samples record.

Alburnoides qanati Coad and Bogutskaya, 2009* – Kor River and Sirjan basins.

Type locality: stream of a Qanat at Naqsh-e Rostam, Pulvar River system, 29°59'30"N, 52°54'00"E, Fars, Iran.

Alburnoides tabarestanensis Mousavi-Sabet, Anvarifar and Azizi, 2015* (Figure 5) – the Caspian Sea basin.

Type locality: Tajan River, Mazandaran, Iran (Figure 8).

Alburnoides sp.* – Kavir basin.

Comment: under revision.

Alburnoides sp.* – Esfahan basin.

Comment: under revision.



Figure 5. *Alburnoides tabarestanensis*, Tajan River, Iran (Photograph by Hamed Mousavi-Sabet).

Genus *Alburnus* Rafinesque, 1820

Several members of this genus require revision.

Alburnus amirkabiri Mousavi-Sabet, Vatandoust, Khataminejad, Eagderi, Abbasi, Nasri, Jouladeh, and Vasileva, 2015* (Figure 6) – the Namak Lake basin.
Type locality: Ghareh-Chay River, in the Namak Lake basin; 34°53'N, 50°02'E, Markazi Province, Iran.



Figure 6. *Alburnus amirkabiri*, Qarah-Chay River, Iran (Photograph by Hamed Mousavi-Sabet).

Alburnus atropatena Berg, 1925* – the Urmia Lake basin.
Type locality: The Nazlo-Chay and Tatawa-Chay River in Urmia Lake basin proposed as type locality of this species. However, it is not clear which one is correct type locality.
Comment: Khataminejad et al (2013a) reported this species from the Namak Lake basin but this was an error, which recently described as *A. amirkabiri*.
Alburnus caeruleus Heckel, 1843 (Figure 7) – the Tigris River basin.
Type locality: Aleppo (= Halab), Syria.



Figure 7. *Alburnus caeruleus*, Goleyn River, Iran (Photograph by Hamed Mousavi-Sabet).

Alburnus chalcoides (Güldenstaedt, 1772) – the Caspian Sea basin.
Type locality: *Cyprinus chalcoides* was originally described from the Terek, Sulak and Cyrus (= Kura) rivers, Russia.
Comment: the subspecies *iranicus* Svetovidov, 1945 is a synonym.
Alburnus filippii Kessler, 1877 – the Caspian Sea basin.
Type locality: upper Kura River near Tbilisi, Georgia.
Alburnus hohenackeri Kessler, 1877 – native in the Caspian Sea basin and exotic in the other basins in Iran.
Type locality: Karabakh, Azerbaijan, on the Kura River.
Comment: previously the wide-ranging species *Alburnus alburnus* (Linnaeus, 1758) was identified as the taxon in Iran. *Alburnus charusini* Herzenstein, 1889 is a synonym. Native populations found in the Caspian Sea basin.

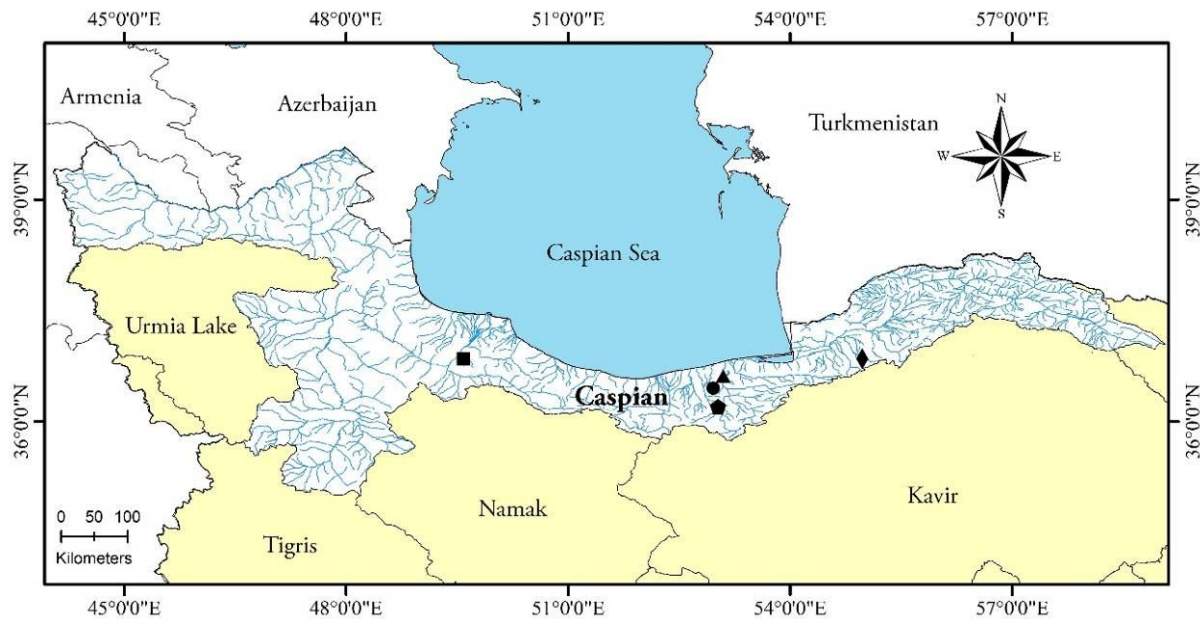


Figure 8. Type localities of endemic species in the Caspian Sea basin (the exact location is not shown): ▲, *Alburnoides tabarestanensis*; ●, *Cobitis faridpaki*; ▽, *Cobitis keyvani*; ◆, *Paracobitis hircanica*; ■, *Ponticola iranicus*.

Alburnus mossulensis Heckel, 1843 – the Tigris River, Esfahan, Kor River, Lake Maharlu, Persis and Hormuz basins.

Type locality: the Tigris River, Mosul, Iraq, according to Heckel (1843a).

Comment: a wide-ranging species with several available names usually placed in synonymy but possibly valid including *Alburnus capito* Heckel, 1843 from Kurdistan and *Alburnus iblis* Heckel, 1849, *Alburnus schejtan* Heckel, 1849, *Alburnus caudimacula* Heckel, 1849 and *Alburnus megacephalus* Heckel, 1849 from Iran. The work by Heckel, in which the descriptions of the three latter species (and many others below) are given, is dated 1846–1849 and copies we have seen do not have any dating internally, so we use the later date. The online CAS Catalog of Fishes refers to a Fowler manuscript and uses the date 1847.

Alburnus zagrosensis Coad, 2009* – the Tigris River basin.

Type locality: a stream of 3 km east of Boldaji, upper Karun River basin 31°55'N, 51°05'E, Chahar Mahal va Bakhtiari, Iran (Figure 9).

Comment: the mentioned type locality dried several years ago.

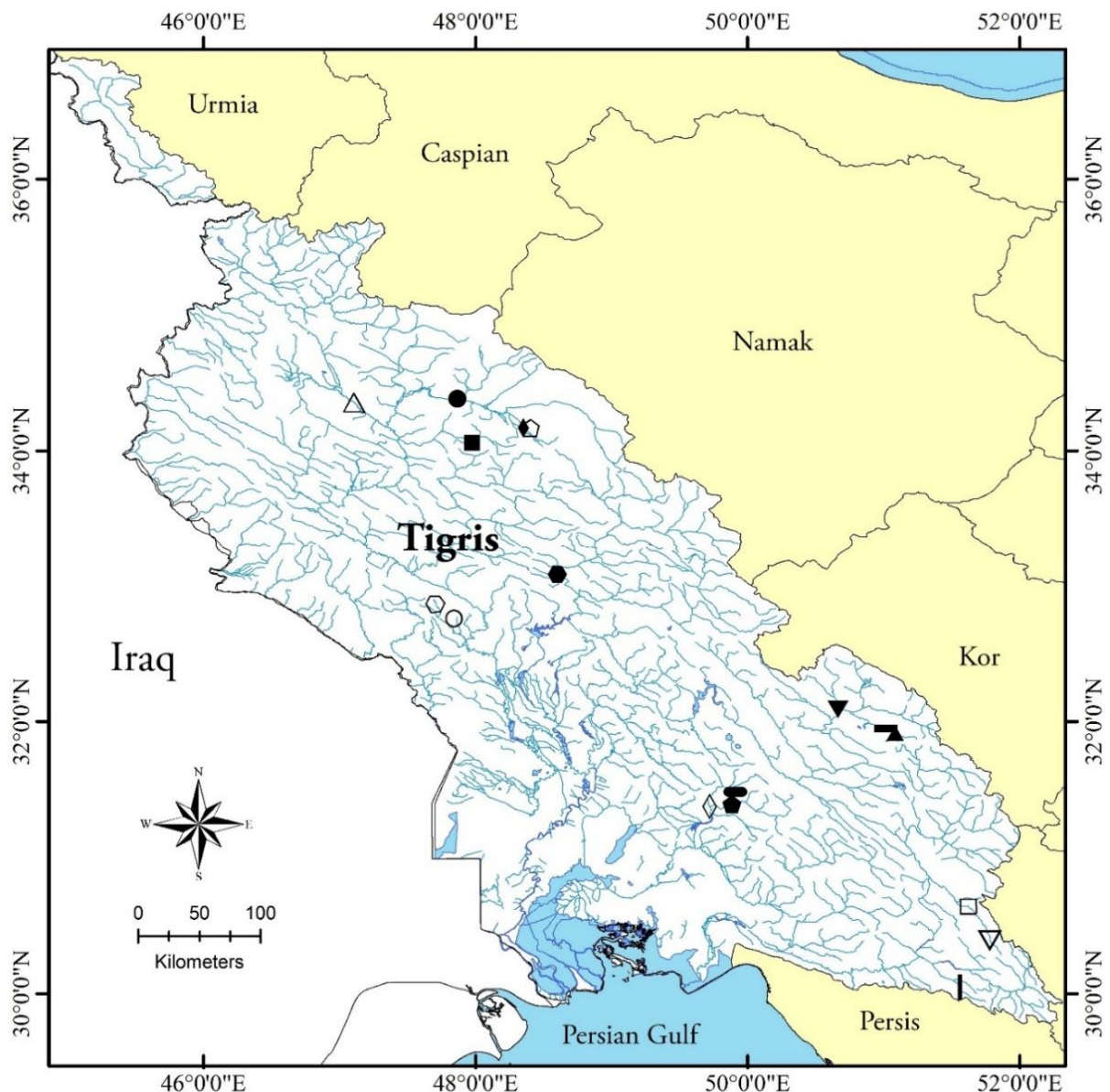


Figure 9. Type localities of endemic species in the Tigris River basin (the exact location is not shown): ●, *Alburnoides idignensis*; ■, *Alburnoides nicolausi*; ▲, *Alburnus zagrosensis*; ▬, *Aphanius vladkovi*; ◆, *Carasobarbus sublimus*; ◆, *Cobitis avicennae*; ▬, *Glyptothorax silviae*; ○, *Ilamnemacheilus longipinnis*; ●, *Iranocypris typhlops* and *Paracobitis smithi*; △, *Oxynoemacheilus kermanshahensis*; ○, *Oxynoemacheilus kiabii*; □, *Paracobitis basharensis*; ▬, *Paraschistura aredvii*; ○, *Paraschistura ilamensis*; ◇, *Paraschistura susiani*; ▼, *Turcinoemacheilus hafezi*; ▽, *Turcinoemacheilus saadii*.

Genus ***Arabibarbus*** Borkenhagen, 2014

Arabibarbus grypus (Heckel, 1843) – the Tigris River, Persis and Hormuz basins.

Type locality: *Barbus grypus* was originally described from the Tigris River, Mosul, Iraq.

Comment: Borkenhagen (2014) placed this species in *Arabibarbus*. *Labeobarbus kotschy* Heckel, 1843 is a synonym.

Genus ***Ballerus*** Heckel, 1843

Ballerus sapa (Pallas, 1814) – the Caspian Sea basin.

Type locality: *Cyprinus sapa* was originally described from the Sura, Samara and Kinel' rivers in the Volga River basin, No types known.

Comment: formerly placed in the genus *Abramis* Cuvier, 1816 but Perea et al (2010) place this species in *Ballerus*.

Genus ***Bangana*** Hamilton, 1822

Bangana dero (Hamilton, 1822) – the Mashkid River basin.

Type locality: *Cyprinus dero* was originally described from Brahmaputra River, India.

Comment: formerly placed in the genus *Labeo* but Kullander et al (1999) place this species in the genus *Bangana*.

Genus ***Barbus*** Cuvier, 1816

Under revision, further taxa may exist in Iran.

Barbus cyri De Filippi, 1865 – the Caspian Sea basin.

Type locality: Kura River near Tiflis, Georgia, Holotype (unique).

Comment: Berg (1949) refers the Caspian Sea basin specimens to *Barbus lacerta cyri*. It is recognized as a full species by Naseka & Bogutskaya (2009).

Barbus lacerta Heckel, 1843 – the Tigris and possibly Esfahan basins.

Type locality: Aleppo (= Halab), Syria.

Comment: *Barbus lacerta* is most probably a species complex and some of the synonyms may prove to be distinct, while populations in isolated basins in Iran and elsewhere could be new taxa.

Barbus miliaris De Filippi, 1863* (Figure 10) – the Namak Lake and possibly Kavir basins.

Type locality: a stream near Tehran.

Comment: Howes (1987) considers the generic placement of *Barbus miliaris* as problematical. It has a series of preanal scales and a prominent genital papilla similar to Schizothoracines. Karaman (1971) considers *Barbus miliaris* from the Namak Lake basin of Iran to be a subspecies of the Caspian Sea basin type subspecies. Berg (1949) recognized *miliaris* as distinct from *mursa*. Bianco & Banarescu (1982) and Almaça (1984) retained it as a full species although Bianco & Banarescu (1982) also suggested that this species may be a subspecies of their wide-ranging taxon *Barbus cyclolepis* Heckel, 1837. We considered *B. miliaris* as a full species and distinct from *mursa* on the basis of a shorter snout, less fleshy lips, an undeveloped lower lip lobe, somewhat larger scales, fewer scale rows above the lateral line, smaller dimensions and different colour.



Figure 10. *Barbus miliaris*, Qarah-Chay River, Iran (Photograph by Hamed Mousavi-Sabet).

Barbus sp.* – the Urmia Lake basin.

Comment: under revision. Base on Motamedi et al (2014) studies, the mitochondrial gene result showed, the populations of the Urmia Lake basin might be a distinct taxon.

Barbus sp.* – the Tigris River basin

Comment: under revision.

Genus **Barilius** Hamilton, 1822

Barilius mesopotamicus Berg, 1932 – the Tigris River, Kor River and Persis basins.

Type locality: Gawi River (33°20'N, 46°20'E), the Tigris River basin, Iraq.

Genus **Blicca** Heckel, 1843

Blicca bjoerkna (Linnaeus, 1758) – the Caspian Sea basin.

Type locality: *Cyprinus björkna* was originally described from Lake Mälär, Sweden.

Comment: *Cyprinus blicca* Bloch, 1782, *Cyprinus gibbosus* Pallas, 1814 and *Blicca argyroleuca* Heckel, 1843 are synonyms.

Genus **Cabdio** Hamilton, 1822

Cabdio morar (Hamilton, 1822) – Makran and Mashkid River basins.

Type locality: *Cyprinus morar* was originally described from Yamuna and Tista rivers, India. No types known.

Comment: formerly placed in the genus *Aspidoparia* but Liao et al (2011) place this species in *Cabdio*.

Genus **Capoeta** Valenciennes, 1842

Members of this genus are under revision.

Capoeta aculeata (Valenciennes, 1844) (Figure 11) – the Namak Lake, Kavir, Kerman Na'in, Esfahan, Kor River and the Tigris River basins.

Type locality: *Chondrostoma aculeatum* was originally described from "eaux douces de la Perse" (= Iran freshwater).

Comment: *Scaphiodon macrolepis* Heckel, 1847 described from probably the Pulvar (= Sivand) River, Fars near Persepolis and *Varicorhinus bergi* Derzhavin, 1929 described from Karaj River near Tehran. However, both are synonyms.



Figure 11. *Capoeta aculeata*, Namroud River, Iran (Photograph by Hamed Mousavi-Sabet).

Capoeta buhsei Kessler, 1877* (Figure 12) – the Namak, Kerman-Na'in, Kavir and possibly Sirjan basins.

Type locality: It is not clear, probably Karaj River near Tehran, Iran.

Comment: *Varicorhinus nikolskii* Derzhavin, 1929 from Iran is a synonym.



Figure 12. *Capoeta buhsei*, Qarah-Chay River, Iran (Photograph by Hamed Mousavi-Sabet).

Capoeta capoeta (Güldenstaedt, 1773) – the Caspian Sea and Urmia Lake basins.
 Type locality: *Cyprinus capoeta* was originally described from Tiflis, the Caspian Sea Basin. No types known.
 Comment: see *Capoeta gracilis*.

Capoeta damascina (Valenciennes, 1842) – the Tigris River basin.
 Type locality: *Gobio damascinus* was originally described from the river of Damascus, Syria.
 Comment: according to Alwan (2010) *C. damascina* is restricted to the Damascus basin, Syria, but populations found in the Tigris River basin that similar to *C. damascina*.

Capoeta fusca Nikol'skii, 1897 – the Tedzhen River, Kavir, Bedjestan, Sistan and Lut basins.
 Type locality: Mondechi and Kuss, Iran.
 Comment: *Capoeta nudiventris* Nikol'skii, 1897 is a synonym.

Capoeta gracilis (Keyserling, 1861) - the Caspian Sea, Urmia Lake and Esfahan basins.
 Type locality: *Scaphiodon gracilis* was originally described from rivers near Esfahan, central Iran. Syntypes not saved.
 Comment: *Capoeta capoeta gracilis* is the subspecies of much of Iran (Berg, 1949). Bianco & Banarescu (1982) limit *C. c. gracilis* to basins between the Sefidroud River and the Atrak River while *C. c. capoeta* found in the Kura-Aras basin. Bănărescu (1999) limits *C. capoeta gracilis* to the Lake Orumiyeh basin and the Sefidroud River in Iran (and the lower Kura River of Azerbaijan) while his *C. capoeta* aff. *gracilis* (an unnamed subspecies related to *C. capoeta gracilis*) is found along the rest of the Iranian Caspian shore. Esmaeili et al (2014b) list *Capoeta gracilis* as a full species. However still there is controversial debate about the systematic position of *Capoeta capoeta gracilis*.

Capoeta heratensis (Keyserling, 1861) – Tedzhen River basin.
 Type locality: *Scaphiodon heratensis* was originally described from Heri-Rud at Herat, Afghanistan. No types saved.
 Comment: *Capoeta capoeta heratensis* is the subspecies from the Tedzhen River basin (Berg, 1949). Usually has two pairs barbels. Reshetnikov & Shakirova (1993) list *Capoeta heratensis* as a full species.

Capoeta mandica Bianco and Bănărescu, 1982*– the Tigris and Persis basins.
 Type locality: Mond River (incorrectly called Mand by Bianco and Bănărescu, (1982)), near Dasht-e Arzhan (correct name is Dasht-e Arjan), Persis region, Iran.
 Comment: subspecies *Capoeta barroisi mandica* Bianco and Banarescu, 1982 described from the "Mand River near Dasht-e-Arzhan" of Fars Province. Krupp (1985) considered it synonym of the nominal subspecies, *C. b. barroisi*. Özuluğ & Freyhof (2008) and Alwan (2010) considered *Capoeta barroisi mandica* Bianco and Bănărescu, 1982 to be a valid species.

Capoeta saadii (Heckel, 1847)* – the Persis, Kor River, Lake Maharlu, Sirjan, Lut, Kerman-Na'in, Hormuz, Makran and possibly Hamun-e, Jaz Murian basins.
 Type locality: *Scaphiodon saadii* was described from Persepolis, Pulwar River (Sivand), Kor River basin, ruins northeast of Shiraz, Iran.
 Comment: under revision. Based on Alwan (2010) and Esmaeili et al (2015) the populations of Persis, Kor, Maharlu, Sirjan, Kerman-Na'in, Hormuz, and Makran referred to *Capoeta saadii*. *Scaphiodon amir* Heckel, 1849, *Scaphiodon niger* Heckel, 1849, *Scaphiodon chebisiensis* Keyserling, 1861, *Scaphiodon rostratus* Keyserling, 1861 and *Capoeta capoeta intermedia* Bianco and Bănărescu, 1982 (non *Capoeta intermedia* Temminck and Schlegel, 1846 = *Acheilognathus lanceolata* (Temminck and Schlegel, 1846) are Iranian synonyms.

Capoeta trutta (Heckel, 1843) – the Tigris River and Persis basins.
 Type locality: Aleppo (= Halab), Syria and Mosul, Iraq.
Capoeta sp.* – Makran and Mashkid River basins.
 Comment: under revision.

Capoeta sp.* – the Tigris River basin.
 Comment: under revision.

Genus **Carasobarbus** Karaman, 1971

Carasobarbus kosswigi (Ladiges, 1960) (Figure 13) - the Tigris River basin.

Type locality: *Cyclocheilichthys kosswigi* was originally described from Batman Suyu, the Batman stream enters the Tigris at 37°47.30'N, 41°00'E near Batman, Siirt Province, Turkey.

Comment: formerly placed in the Genus *Kosswigobarbus* Berg, 1916 but Borkenhagen et al (2011) placed this species in *Carasobarbus*.



Figure 13. *Carasobarbus kosswigi*, Seymareh River, Iran (Photograph by Hamed Mousavi-Sabet).

Carasobarbus luteus (Heckel, 1843) – the Tigris River, Kor River, Lake Maharlu, Persis and Hormuz basins.

Type locality: *Systemus albus* described from the Tigris and Orontes rivers and *Systemus luteus* described from Mosul, Iraq.

Comment: *Systemus albus* var. *alpina* Heckel, 1849 and *Barbus parieschanica* Wossughi, Khoshzahmat & Etemadfar, 1982 from Iran are synonyms.

Carasobarbus sublimus (Coad & Najafpour, 1997)* - the Tigris River basin.

Type locality: A'la River at Pol-e Tighen, 31°23.5'N 49°53'E, Khuzestan, Iran.

Comment: formerly placed in the genus *Kosswigobarbus* Berg, 1916 but Borkenhagen et al (2011) placed this species in *Carasobarbus*.

Genus **Carassius** Jarocki, 1822

Carassius auratus (Linnaeus, 1758)** – elsewhere in reservoirs throughout Iran.

Type locality: *Cyprinus auratus* was originally described from China and Japanese rivers.

Carassius gibelio (Bloch, 1782)** – probably mirrors distribution of *C. auratus*.

Type locality: *Cyprinus gibelio* was originally described from Odra River system, Silesia, Czech Republic.

Genus **Chondrostoma** Agassiz, 1832

Chondrostoma cyri Kessler, 1877 - the Caspian Sea basin.

Type locality: *Chondrostoma cyri* Kessler, 1877 was described from the Kura River, Tiflis (= Tbilisi), Georgia.

Chondrostoma orientale Bianco & Bănărescu, 1982* – Kor River basin.

Type locality: *Chondrostoma cyri orientale* Bianco and Banarescu, 1982 was originally described from the Pulwar River near Persepolis, Iran (Figure 17).

Comment: sometimes regarded as a synonym of *Chondrostoma regium*.

Chondrostoma regium (Heckel, 1843) – the Tigris and Esfahan basins.

Type locality: *Chondrochilus regius* Heckel, 1843 was described from the Orontes (= Asi) and Tigris.

Comment: based on Jouladeh et al (2014) studies, the populations of Esfahan basin is *C. regium*.

Chondrostoma sp.* – the Tigris River basin.

Comment: under revision.

Genus **Ctenopharyngodon** Steindachner, 1866

Ctenopharyngodon idella (Valenciennes, 1844)** – introduced elsewhere in reservoirs throughout Iran.

Type locality: *Leuciscus idella* was originally described from China.

Genus **Cyprinion** Heckel, 1843

Cyprinion kais Heckel, 1843 (Figure 14) - the Tigris and Persis basins.

Type locality: *Cyprinion kais* was originally described from Aleppo (= Halab) and Mosul for *Cyprinion cypris* the Tigris, Mosul (Heckel 1843b).

Comment: *Cyprinion cypris* Heckel, 1843 is a synonym.



Figure 14. *Cyprinion kais*, Seymareh River, Iran (Photograph by Hamed Mousavi-Sabet).

Cyprinion macrostomum Heckel, 1843 - the Tigris and Persis basins.

Type locality: *Cyprinion macrostomus* is given by Heckel (1843a) as Aleppo (= Halab) and Mosul.

Cyprinion microphthalmum (Day, 1880) – Makran and Mashkid River basins.

Type locality: *Scaphiodon microphthalmus* was originally described from Quetta, Pakistan.

Comment: Iranian synonyms are *Cyprinion kirmanense* Nikol'skii, 1900, *Cirrhina afghana* var. *nikolskii* Berg, 1905, *Scaphiodon macmahoni* Regan, 1906 and *Scaphiodon baluchiorum* Jenkins, 1910. Iranian populations from southeast and eastern Iran have been considered as *C. watsoni* (Coad, 2015).

Cyprinion milesi (Day, 1880) – the Makran, Hormuz, Hamun-e Jaz Murian basins.

Type locality: *Barbus milesi* was described from "a spring at Trâl", Pakistan.

Comment: Iranian synonyms are *Barbus bampurensis* Nikol'skii, 1899 and *Barbus baschakirdi* Holly, 1929.

Cyprinion tenuiradius Heckel, 1847* – the Lake Maharlu and Persis basins.

Type locality: Qarah-Aqaj River and the Kor River, Fars Province, Iran.

Cyprinion watsoni (Day, 1872) – the Hormuz, Hamun-e Jaz Murian, Mashkid River, Sirjan, Kerman-Na'in, Lut, Makran, Sistan, Bedjestan and Lut basins.

Type locality: *Scaphiodon watsoni* was originally described from rivers on Sind Hills, Pakistan and the Salt Range of the Punjab.

Comment: Iranian synonyms are *Cyprinion kirmanense* Nikol'skii, 1900, *Cirrhina afghana* var. *nikolskii* Berg, 1905, *Scaphiodon macmahoni* Regan, 1906 and *Scaphiodon baluchiorum* Jenkins, 1910.

Genus **Cyprinus** Linnaeus, 1758

Cyprinus carpio Linnaeus, 1758 (native and exotic) – elsewhere in reservoirs throughout Iran.

Type locality: described from Europe.

Comment: native populations in the Caspian Sea basin; also introduced there and elsewhere in Iran.

Genus **Garra** Hamilton, 1822

Comment: under revision, further taxa may exist.

Garra persica Berg, 1913* – Hormuz, Makran and Hamun-e Jaz Murian basins.

Type locality: Bampur River, southern Iran.

Garra rossica (Nikol'skii, 1900) – Tedzhen River, Bedjestan, Sistan, Lut, Hamun-e Jaz Murian, Mashkid River and Makran basins.

Type locality: it is not clear, probably Tedzhen River, Turkmenistan.

Comment: *Discognathus phryne* Annandale, 1919 and *Discognathus rossicus* var. *nudiventris* Berg, 1905 are Iranian synonyms.

Garra rufa (Heckel, 1843) (Figure 15) – the Tigris River, Kor River, Lake Maharlu, Persis and Hormuz basins.

Type locality: *Discognathus obtusus* described from Aleppo (= Halab), Syria and Mosul, Iraq.

Comment: *Discognathus crenulatus* Heckel, 1849 and *Garra rufa gymnothorax* Berg, 1949 are synonyms. The taxon in Iran has been referred to as *G. r. obtusa* Heckel, 1843.



Figure 15. *Garra rufa*, Dinevar River, Iran (Photograph by Hamed Mousavi-Sabet).

Garra variabilis (Heckel, 1843) – the Tigris River basin.

Type locality: *Discognathus variabilis* was originally described from Mosul.

Comment: needs confirmation by specimens for Iran.

Genus **Gobio** Cuvier, 1816

Gobio lepidolaemus Kessler, 1872 – Tedzhen River basin.

Type locality: *Gobio gobio lepidolaemus* Kessler, 1872, originally described as *Gobio fluviatilis* var. *lepidolaemus* from Ak-darja and Chodshaduk in the Zeravshan River basin, Uzbekistan and the Syr Darya at Khodzhent, Tajikistan.

Comment: formerly considered as a subspecies of *Gobio gobio* (Linnaeus, 1758).

Genus **Gonorhynchus** McClelland, 1839

Comment: it has been considered as synonym of *Crossocheilus* Kuhl & van Hasselt, 1823.

Gonorhynchus adiscus (Annandale, 1919) (Figure 16) – Sistan basin.

Type locality: The type locality of *Discognathus adiscus* is Sistan by implication, as no locality is given for the holotype in Annandale (1919). Distribution is given as "small watercourses and pools in the plains of Seistan" and "Nasratabad, irrigation channel in Consulate garden; pool in the desert 5 miles south of Nasratabad; pools in stream-bed 12 miles north of Nasratabad; channels in the reed-beds of the Hamun-i-Helmand near Lab-i-Baring, and channel leading out of the Hamun 12 miles east of Lab-i-Baring; small watercourse, Lutak, southern Seistan", and one of these is presumably the type locality.

Gonorhynchus diplocheilus McClelland, 1839 - Makran and Mashkid River basins.

Type locality: *Cyprinus latius* was described from the Tista River in India/Bangladesh and types are unknown.

Comment: this species is represented in Sistan and Baluchestan by *Crossocheilus latius diplocheilus* (Heckel, 1838). *Discognathus adiscus* Annandale, 1919 is a synonym from Iran (see also Bianco & Banareescu 1982; Bănărescu 1968).



Figure 16. *Gonorhynchus adiscus*, Zahak River, Iran (Photograph by Hamed Mousavi-Sabet).

Genus ***Hemiculter*** Bleeker, 1859

Hemiculter leucisculus (Basilewsky, 1855)** – elsewhere in reservoirs throughout Iran.

Type locality: *Culter leucisculus* was originally described from Peking, China.

Comment: *Hemiculter eigenmanni* (Jordan & Metz, 1913) is a synonym.

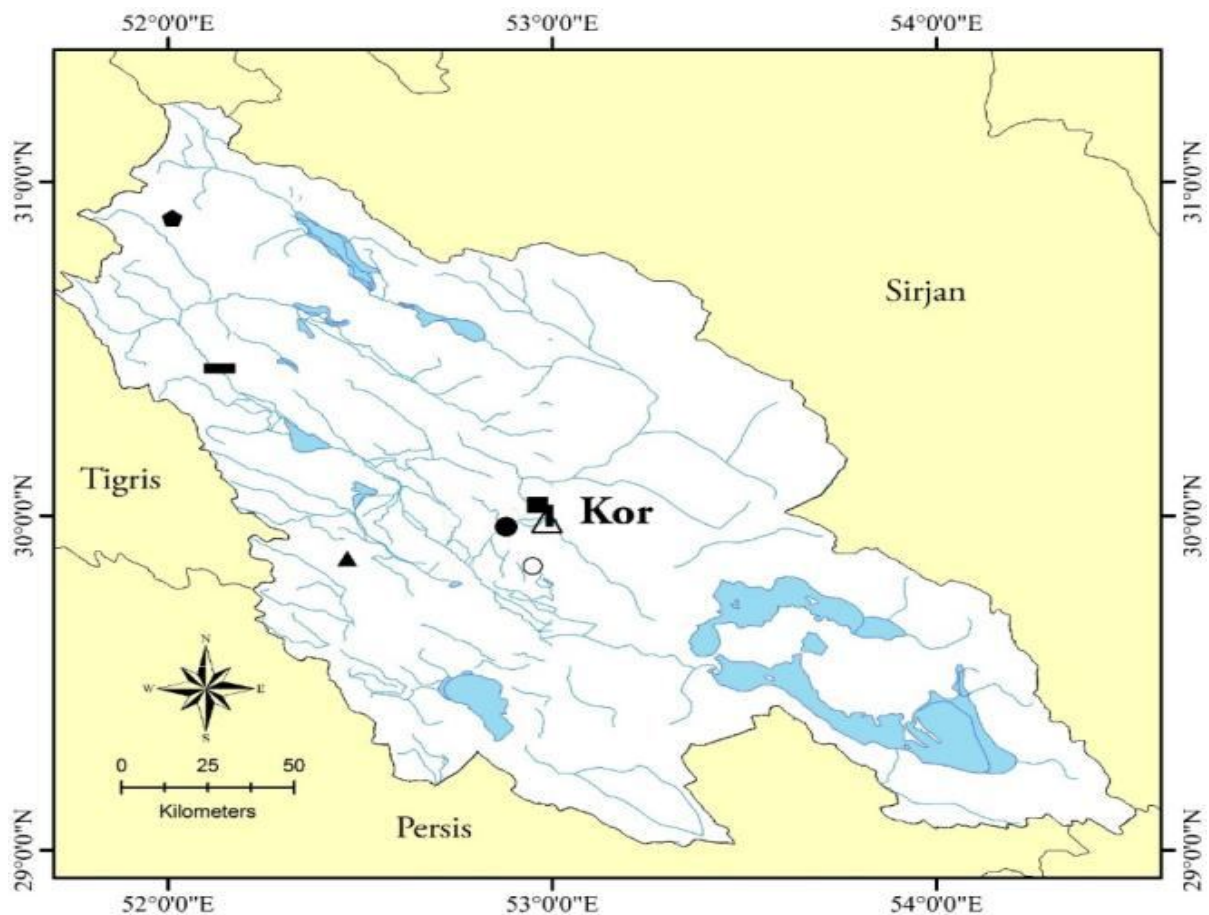


Figure 17. Type localities of endemic species in the Kor basin (the exact location is not shown): \triangle , *Alburnoides qanati*; \blacklozenge , *Aphanius shirini*; \blacksquare , *Aphanius sophiae*; \circ , *Capoeta saadii*; I , *Chondrostoma orientale*; \bullet , *Cobitis linea*; \blacksquare , *Oxynocheilus persa*; \blacktriangle , *Paracobitis persa*.

Genus ***Hemigrammocapoeta*** Pellegrin, 1927

Hemigrammocapoeta elegans (Günther, 1868) – the Tigris River basin.

Type locality: Mesopotamia?, The type locality of this species is unknown.

Comment: formerly placed in the genus *Tylognathus* Heckel, 1843 and *Hemigarra* Karaman, 1971.

Genus ***Hypophthalmichthys*** Bleeker, 1859

Hypophthalmichthys molitrix (Valenciennes, 1844)** – introduced to reservoirs throughout Iran.

Type locality: *Leuciscus molitrix* was originally described from China.

Hypophthalmichthys nobilis (Richardson, 1844)** – introduced to reservoirs throughout Iran.

Type locality: *Leuciscus nobilis* was originally described from Canton, China.

Genus ***Iranocypris*** Bruun & Kaiser, 1948

Comment: the date of authorship for this genus and species is variously listed as 1943 on an official reprint, as 1944–49 in one set of contents and “ready from the press 1944” in another set of contents. Proudlove (2006) states that it did not appear until 1948 because of World War II.

Iranocypris typhlops Bruun & Kaiser, 1944* (Figure 18) – the Tigris River basin.

Type locality: from a flood resurgence at Kaaje-Ru, valley of Ab-i-Serum, Lorestan Province, the Zagros mountains, Iran, 33°05'N, 48°36'E (Figure 19).



Figure 18. *Iranocypris typhlops*, Loen cave, Iran (Photograph by Hamed Mousavi-Sabet).



Figure 19. Loen cave, Natural habitat of *Iranocypris typhlops* and *Paracobitis smithi* (Photograph by Hamed Mousavi-Sabet).

Genus ***Leucaspius*** Heckel & Kner, 1858

Leucaspius delineatus (Heckel, 1843) – the Caspian Sea basin.

Type locality: *Squalius delineatus* was originally described from Wien and Mähren, Austria.

Comment: the Caspian Sea basin taxon is given by Berg (1949) as *Leucaspius delineatus delineatus natio caucasicus* Berg, 1949, described from Transcaucasia, which is distinguished by a lower average dorsal fin branched ray count (7-8 rather than 8 or rarely 9 for the typical form of Europe). This natio has no taxonomic standing but has been applied as a subspecies by some authors (Arnold & Längert 1995).

Genus **Leuciscus** Cuvier, 1816

Esmaeili et al (2014b) consider author of the *Leuciscus* is Agassiz (1832) that seems to be an error.

Leuciscus aspius (Linnaeus, 1758) – the Caspian Sea basin.

Type locality: *Cyprinus aspius* was described originally from lakes of Sweden.

Comment: formerly placed in the genus *Aspius* Agassiz, 1832 but Perea et al (2010) placed this species in *Leuciscus*.

Leuciscus latus (Keyserling, 1861) – Tedzhen River basin.

Type locality: *Squalius latus* was originally described from the Hari-Rud, Herat, Afqanistan.

Leuciscus vorax (Heckel, 1843) (Figure 20) – the Tigris River basin.

Type locality: *Aspius vorax* was originally described from the Tigris near Mosul, Iraq.

Comment: formerly placed in the genus *Aspius* Agassiz, 1832 but Perea et al (2010) placed this species in *Leuciscus*.



Figure 20. *Leuciscus vorax*, Shadegan Wetland, Iran (Photograph by Hamed Mousavi-Sabet).

Genus **Luciobarbus** Heckel, 1843

Luciobarbus barbulus (Heckel, 1847) – the Tigris River, Persis and Kor River basins.

Type locality: *Barbus barbulus* is the Qarah-Aqaj or Mand [Mond] River, Fars Province; possibly near Kereft, 29°01'N, 52°52'E

Luciobarbus capito (Güldenstaedt, 1773) (Figure 21) – the Caspian Sea basin.

Type locality: *Cyprinus capito* was originally described from the Kura River, Transcaucasia. No types are extant.



Figure 21. *Luciobarbus capito*, Tajan River, Iran (Photograph by Hamed Mousavi-Sabet).

Luciobarbus caspius (Berg, 1914) – the Caspian Sea basin.

Type locality: *Barbus brachycephalus* was originally described from the Syr Darya in Uzbekistan.

Comment: the subspecies *Barbus brachycephalus caspius* Berg, 1914 has also been regarded as a synonym or a distinct species in the Caspian Sea. Fricke et al (2007) considered *Barbus brachycephalus caspius* Berg, 1914 as a distinct species.

Luciobarbus esocinus Heckel, 1843 (Figure 22) – the Tigris and Persis basins.

Type locality: the Tigris River, Mosul, Iraq.



Figure 22. *Luciobarbus esocinus*, Armand River, Iran (Photograph by Hamed Mousavi-Sabet).

Luciobarbus kersin (Heckel, 1843) (Figure 23) – the Tigris and Persis basins.

Type locality: *Barbus kersin* was originally described from Aleppo (= Halab).



Figure 23. *Luciobarbus kersin*, Shadegan Wetland, Iran (Photograph by Hamed Mousavi-Sabet).

Luciobarbus mursa (Güldenstaedt, 1773) – the Caspian Sea and Urmia Lake basins.

Type locality: *Cyprinus mursa* was originally described from the Kura River at Tbilisi, Georgia.

Comment: *Barbus kessleri* Derzhavin, 1929 is a synonym.

Luciobarbus pectoralis (Heckel, 1843) – the Tigris River, Persis and Kor River basins.

Type locality: *Barbus pectoralis* was described from the Orontes, Syria.

Luciobarbus subquincunciatus (Günther, 1868) – the Tigris River basin.

Type locality: Mesopotamia?, the type locality of this species is unknown.

Luciobarbus xanthopterus Heckel, 1843 – the Tigris River basin.

Type locality: the Tigris River, Mosul, Iraq.

Genus **Mesopotamichthys** Karaman, 1971

Mesopotamichthys sharpeyi (Günther, 1874) – the Tigris and Persis basins.

Type locality: *Barbus sharpeyi* was described from Baghdad, Iraq.

Natural habitat of this species is shown in Figure 24.



Figure 24. Shadegan Wetland, natural habitat of *Luciobarbus kersin*, *Luciobarbus xanthopterus*, *Mesopotamichthys sharpeyi*, *Leuciscus vorax* and many other species (Photograph by Hamed Mousavi-Sabet).

Genus **Mylopharyngodon** Peters, 1881

Mylopharyngodon piceus (Richardson, 1846)** – introduced to the Caspian Sea basin.

Type locality: *Leuciscus piceus* originally was described from Canton, China.

Genus **Pelecus** Agassiz, 1835

Pelecus cultratus (Linnaeus, 1758) – the Caspian Sea basin.

Type locality: *Cyprinus cultratus* was originally described from the Baltic Sea.

Genus **Petroleuciscus** Bogutskaya, 2002

Perea et al (2010) using mitochondrial and nuclear DNA concluded that *Petroleuciscus* is not monophyletic. The taxonomy of this genus needs further study.

Petroleuciscus esfahani Coad & Bogutskaya, 2010* (Figure 25) – Esfahan and the Tigris River basins.

Type locality: stream at Dizaj in the southern Zayandehroud River basin, 31°55'N, 51°30'E, Esfahan, Iran (Figure 26).



Figure 25. *Petroleuciscus esfahani*, Zayandehroud River, Iran (Photograph by Hamed Mousavi-Sabet).

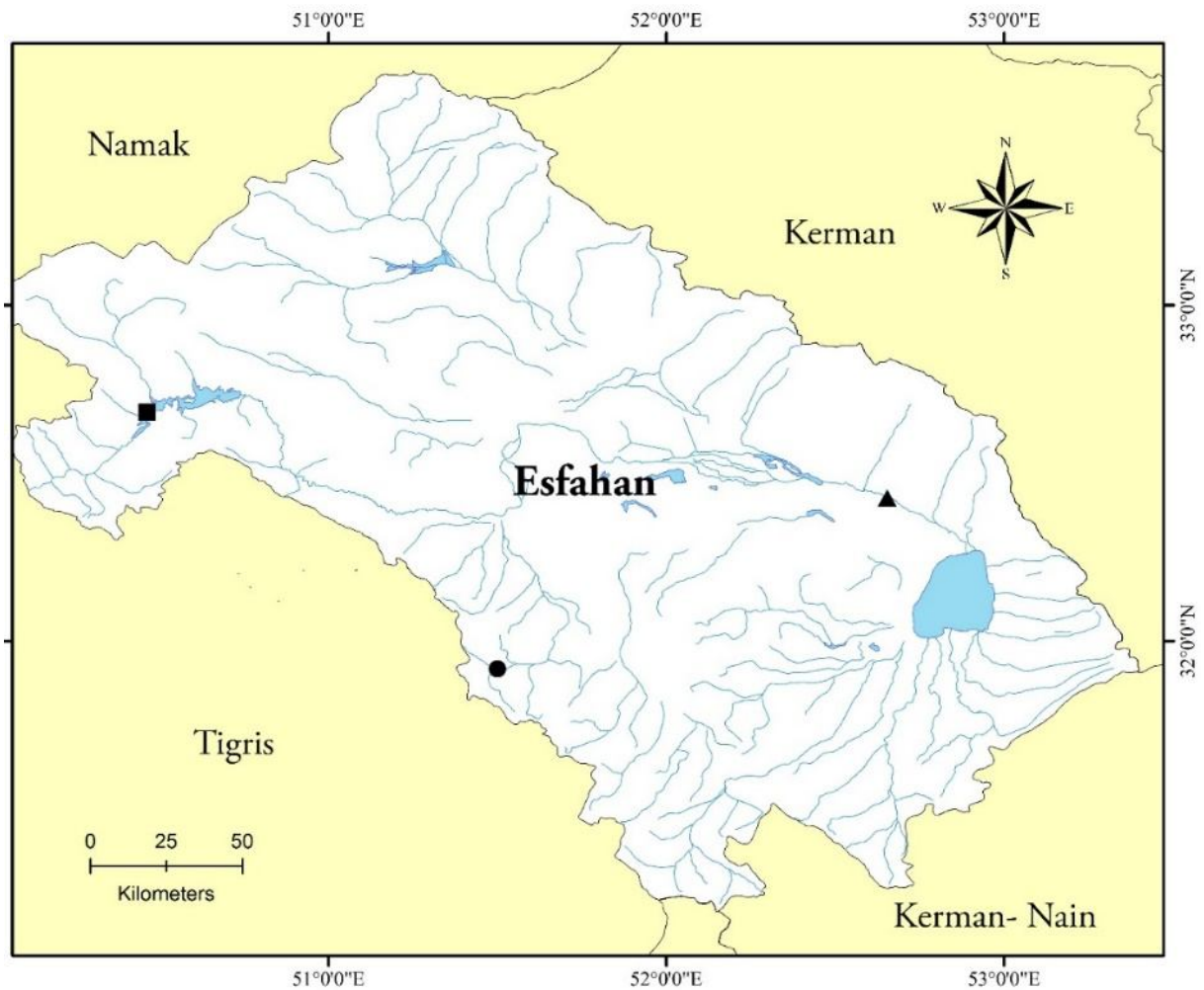


Figure 26. Type localities of endemic species in the Esfahan basin (the exact location is not shown): ▲, *Aphanius isfahanensis*; ●, *Petroleuciscus esfahani*; ■, *Turcinoemacheilus bahaii*.

Petroleuciscus ulanus (Günther, 1899)* (Figure 27) – the Urmia Lake basin.
 Type locality: this species was originally described in the genus *Leuciscus*. Two type localities for this species are proposed, including Ula on the Zola-Chai and mouth of

Nazlu-Chai at Superghan, northwestern Iran. However, it is not clear which one is correct type locality.

Comment: *Leuciscus gaderanus* Günther, 1899 from Iran is a synonym.

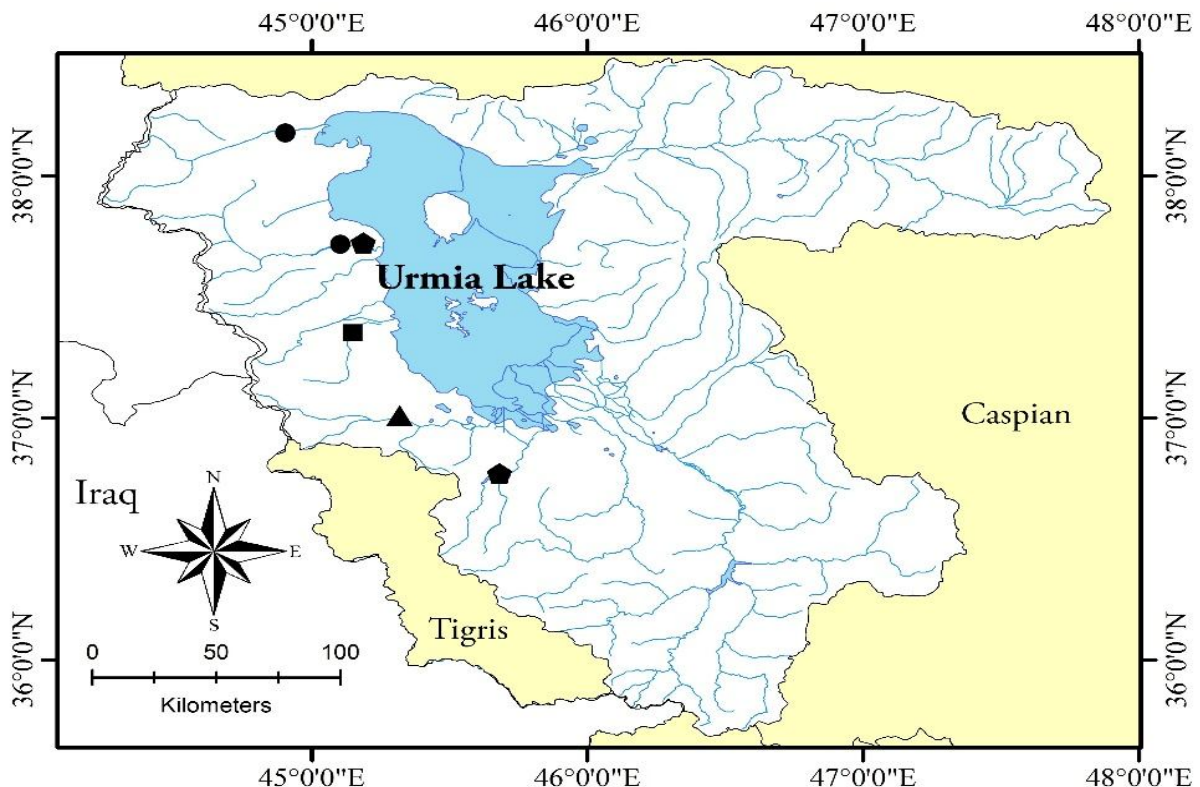


Figure 27. Type localities of endemic species in the Urmia Lake basin (the exact location is not shown): ▲, *Acanthobrama urmianus*; ■, *Alburnoides petrubanarescui*; ◆, *Alburnus atropatenae*; ●, *Petroleuciscus ulanus*.

Genus ***Pimephales*** Rafinesque, 1820

Pimephales promelas Rafinesque, 1820** – introduced to the Namak Lake basin.

Type locality: Lexington, Kentucky, U.S.A.

Comment: in recent years, not recorded.

Genus ***Pseudorasbora*** Bleeker, 1859

Pseudorasbora parva (Temminck & Schlegel, 1846)** (Figure 28) – elsewhere in reservoirs throughout Iran.

Type locality: *Leuciscus parvus* was originally described from Nagasaki, Japan.



Figure 28. *Pseudorasbora parva*, Tajan River, Iran (Photograph by Hamed Mousavi-Sabet).

Genus **Rhodeus** Agassiz, 1832

Rhodeus amarus (Bloch, 1782) – the Caspian Sea basin, introduced to the Urmia Lake and Tigris basins (Eagderi & Nasri 2012).

Type locality: *Cyprinus amarus* was described from the Elbe basin, Germany and no types are known.

Comment: formerly identified as *Rhodeus sericeus* (Pallas, 1776). Naseka & Bogutskaya (2009) refer to the Caspian Sea taxon as *Rhodeus* sp.

Genus **Romanogobio** Bănărescu, 1961

Romanogobio macropterus (Kamensky, 1901) – the Caspian Sea basin.

Type locality: *Gobio macropterus* Kamenskii, 1901 was originally described from the Caucasus.

Romanogobio persus (Günther, 1899)* – the Urmia Lake basin.

Type locality: *Gobio persa* was originally described from Ocksa in the Gader-Chai, northwestern Iran.

Comment: formerly placed in the genus *Gobio* but Naseka & Bogutskaya (1998) placed it in *Romanogobio*. Naseka & Freyhof (2004) recognize these taxa as distinct species.

Genus **Rutilus** Rafinesque, 1820

Rutilus caspicus (Yakovlev, 1870) – the Caspian Sea basin.

Type locality: *Leuciscus rutilus* var. *caspicus* was originally described from Volga River Delta, Russia.

Rutilus kutum Kamenskii, 1901 – the Caspian Sea basin.

Type locality: *Leuciscus frisii kutum* Kamenskii, 1901 was originally described from the southern Caspian Sea and its tributaries.

Comment: Naseka & Bogutskaya (2009) and Esmaeili et al (2014a) regarded *Rutilus kutum* Kamenskii, 1901 as a distinct species.

Rutilus rutilus (Linnaeus, 1758) – the Caspian Sea basin.

Type locality: *Cyprinus rutilus* was originally described from lakes in Europe.

Comment: *Rutilus caspicus* is recognized as the Caspian Sea resident species and *R. rutilus* as the freshwater species (Kottelat & Freyhof 2007; Bogutskaya & Naseka 2004).

Genus **Scardinius** Bonaparte, 1837

Scardinius erythrophthalmus (Linnaeus, 1758) – the Caspian Sea basin.

Type locality: *Cyprinus erythrophthalmus* was originally described from northern Europe.

Genus **Schizocypris** Regan, 1914

Schizocypris altidorsalis Bianco & Bănărescu, 1982 – Sistan basin.

Type locality: Nahr-Taheri, near Zabol, Sistan, Iran, about 31°02'N, 61°30'E.

Comment: formerly identified as *S. brucei* Regan, 1914.

Genus **Schizopygopsis** Steindachner, 1866

Schizopygopsis stoliczkai Steindachner, 1866 – Sistan basin.

Type locality: a stream near Hanle Monastery, Ladakh, India.

Genus **Schizothorax** Heckel, 1838

Schizothorax intermedius McClelland, 1842 – Sistan basin.

Type locality: Cabul River at Jullalabad. Tarnuck River in the Indus River basin.

Comment: *Schizothorax schumacheri* Fowler & Steinitz, 1956 is an Iranian synonym.

Schizothorax pelzami Kessler, 1870 (Figure 29) – Tedzhen River and Kavir basins.

Type locality: Shah-Rud River, northeastern Iran.

Comment: *Schizothorax pelzami iranicus* Karaman, 1969 is a synonym.

Natural habitat of this species shown in Figure 31.



Figure 29. *Schizothorax pelzami*, Hariroud River, Iran (Photograph by Hamed Mousavi-Sabet).

Schizothorax zarudnyi (Nikol'skii, 1897) – Sistan basin.

Type locality: *Aspiostoma zarudnyi* originally described from Neizar marsh in Seistan [Sistan], Iran.

Comment: *Oreinus anjac* Fowler & Steinitz, 1956 is a synonym from Iran.

Genus ***Squalius*** Bonaparte, 1837

Under revision.

Squalius cephalus (Linnaeus, 1758) – the Tigris River basin.

Type locality: *Cyprinus cephalus* was originally described from southern Europe.

Comment: *Squalius cephalus* is most probably a species complex and some of the synonyms may prove to be distinct, while populations in isolated basins in Iran and elsewhere could be new taxa. We examined four populations of this complex from Kavir, Namak, Urmia Lake and Tigris River basins using meristic and morphometric characters. Results showed that the populations were distinct with a low degree of overlap. Seems this variation as insufficiently different to warrant taxonomic distinction. Further study is needed.

Squalius lepidus Heckel, 1843 – the Tigris River basin.

Type locality: Mosul, Iraq.

Comment: Durand et al (2000) using cytochrome *b* suggest that this species is fully introgressed with *L. cephalus* (= *S. cephalus*) mtDNA and so question the taxonomic validity of this species. Morphological data contradicts this conclusion. Durand et al (2000) conclude that their data does indicate, "*L. lepidus* and *L. cephalus* might have had different dispersion histories over the same geographical range" and that "*L. lepidus* introgression by the chub (*L. cephalus*) is ancient, explaining the complete sorting of the *lepidus* lineage". However further study is needed.

Squalius orientalis (Nordmann, 1840) (Figure 30) – the Caspian Sea, Namak, Urmia Lake, and Kavir basins.

Type locality: *Leuciscus orientalis* was originally described from Abkhazia Georgia, No types known.

Comment: it has been considered as valid species (Bogutskaya & Zupančič 2010; Turan et al 2009; Perea et al 2010; Esmaeili et al 2014a).



Figure 30. *Squalius orientalis*, Tajan River, Iran (Photograph by Hamed Mousavi-Sabet).

Genus **Tinca** Cuvier, 1816

Tinca tinca (Linnaeus, 1758) – the Caspian Sea basin.

Type locality: *Cyprinus tinca* was originally described from European lakes.

Genus **Vimba** Fitzinger, 1873

Vimba persa (Pallas, 1814) – the Caspian Sea basin.

Type locality: *Cyprinus persa* was originally described from lakes along the Kura River.

No types known.

Comment: *Vimba vimba persa* was the subspecies in the Caspian Sea basin but recognized as a full species by Naseka & Bogutskaya (2009).



Figure 31. Hariroud River Natural habitat of *Alburnoides holciki*, *Paracobitis longicauda*, *Paraschistura cristata*, *Gobio lepidolamus*, *Capoeta heratensis*, *Rhinogobius similis* and *Schizothorax pelzami* (Photograph by Hamed Mousavi-Sabet).

Family **Cobitidae**

(2 genera and 7 species)

Genus **Cobitis** Linnaeus, 1758

Cobitis avicennae Mousavi-Sabet, Vatandoust, Esmaeili, Geiger and Freyhof, 2015* – the Tigris River basin.

Type locality: Gamasiab River at Dehno, a tributary to Karkheh, 34°10'15"N, 48°21'19"E, Hamedan, Iran.

Cobitis faridpaki Mousavi-Sabet, Vasil'eva, Vatandoust and Vasil'ev, 2011* (Figure 32) – the Caspian Sea basin.

Type locality: Siahroud River, 36°26'85.05"N, 52°56'70.08"E, Mazandaran, Iran.



Figure 32. *Cobitis faridpaki*, Tajan River, Iran (Photograph by Hamed Mousavi-Sabet).

Cobitis keyvani Mousavi-Sabet, Yerli, Vatandoust, Özeren and Moradkhani, 2012* – the Caspian Sea basin.

Type locality: Talar River, southeast of the Caspian Sea basin, 36°11'74" N, 53°00'92" E, Mazandaran, north of Iran.

Cobitis linea (Heckel, 1847)* – Kor River and Hormuz basins.

Type locality: *Acanthopsis linea* according to Heckel (1847b) was originally described from Persepolis, at 29°57'N, 52°52'E in Fars, Iran.

Genus ***Sabanejewia*** Vladykov, 1929

Comment: species of this genus formerly placed in the genus *Cobitis*.

Sabanejewia aurata (De Filippi, 1863) (Figure 33) – the Caspian Sea and Tedzhen River basins.

Type locality: *Cobitis aurata* possibly described from Sarcham-e Sofla (37°07'N, 47°54'E) in the Qezel Owzan River drainage of the Caspian Sea basin in Iran.



Figure 33. *Sabanejewia aurata*, Balekhlo-Chay River, Iran (Photograph by Hamed Mousavi-Sabet).

Sabanejewia caspia (Eichwald, 1838) – the Caspian Sea basin.

Type locality: *Cobitis caspia* was originally described from the Caspian Sea at Lenkoran, Azerbaidjan. No types known.

Sabanejewia caucasica (Berg, 1906) – the Caspian Sea basin.

Type locality: *Cobitis caucasica* was originally described from Laba River, upper Kubun River, Russia.

Comment: reported by Kottelat & Freyhof (2007) from Babol that seems to be an error.

Family **Nemacheilidae**

(6 genera and 44 species, 1 unconfirmed)

Comment: formerly included in the family Cobitidae or the family was named Balitoridae (Tang et al 2006; Kottelat & Freyhof 2007). Species were placed in the genera *Nemacheilus*, *Adiposia*, *Barbatula*, *Orthrias* and *Schistura* in earlier literatures.

Genus ***Ilanemacheilus*** Coad & Nalbant, 2005

Ilanemacheilus longipinnis Coad & Nalbant, 2005* – the Tigris River basin.

Type locality: Meymeh River, 32°45'30"N, 47°05'30"E, formerly a tributary of the Tigris River, 17 km west of Dehloran and about 21 km east of the Iraq border, Iran.

Genus ***Oxynoemacheilus*** Bănărescu & Nalbant, 1966

Comment: The date of authorship for this genus given by Esmaeili et al (2014b) as 1967, that seems to be an error.

Oxynoemacheilus angorae (Steindachner, 1897) – the Caspian Sea basin.

Type locality: *Nemacheilus angorae* was originally described from Tabakane-Sir and Tschibuk-Tschai, Turkey.

Comment: This taxon has been widely reported from northern Iran and several subspecies have been described under it. Freyhof et al (2011) doubt that *O. angorae* s.s. occurs in the Caspian Sea basin and it may not be present in Iran at all. If *O. angorae* is

restricted to Turkey, then the species for the western Caspian is *lenkoranensis*. Based on Esmaeili et al (2014b) *Oxynoemacheilus angorae* is a valid species from the Caspian Sea basin.

Oxynoemacheilus araxensis (Bănărescu & Nalbant, 1978) – the Caspian Sea or the Tigris River basins (needs confirmation).

Type locality: *Orthrias angorae araxensis* was originally described from Kandili Karassu, upper Araxes basin, eastern Turkey.

Comment: the holotype of *Orthrias angorae araxensis*, from the "Kandili Karassu, oberes Araxes Becken, Osttürkei" is in the Zoologischen Instituts und Zoologischen Museums der Universitat Hamburg (ZMH 4827). This subspecies was formerly referred to as *Nemacheilus angorae bureschi* (Drensky, 1928) by Bănărescu & Nalbant (1964) and Bănărescu (1968). Nalbant & Bianco (1998), Fricke et al (2007) and Freyhof et al (2011) elevate this taxon to a species. Presence in Iran needs confirmation.

Oxynoemacheilus bergianus (Derzhavin, 1934) (Figure 34) – the Caspian Sea basin.

Type locality: *Nemachilus bergianus* was originally described from Kisum village, Shah-Roud River, Sefidroud drainage, Guilan, Iran.



Figure 34. *Oxynoemacheilus bergianus*, Balekhlo-Chay River, Iran (Photograph by H. Mousavi-Sabet).

Oxynoemacheilus brandtii (Kessler, 1877) (Figure 35) – the Caspian Sea and Urmia Lake basins.

Type locality: *Nemacheilus brandtii* was originally described from upper Kura River at Tbilisi (= Tiflis), Georgia.

Comment: placed in the genus *Orthrias* by Nalbant & Bianco (1998) and in *Oxynoemacheilus* by Freyhof et al (2011).



Figure 35. *Oxynoemacheilus brandtii*, Saqezchi River, Iran (Photograph by Hamed Mousavi-Sabet).

Oxynoemacheilus chomanicus Kamangar, Prokofiev, Ghaderi and Nalbant, 2014 – the Tigris River basin.

Type locality: Baneh River, Baneh, 36°01'03"N, 45°55'20"E, Kurdistan, Iran.

Oxynoemacheilus frenatus (Heckel, 1843) – the Tigris River basin.

Type locality: *Cobitis frenata* presumably presumably was described from "Tigris", at Mosul (Heckel 1843b).

Oxynoemacheilus kermanshahensis (Bănărescu & Nalbant, 1967)* (Figure 36) – the Tigris River basin.

Type locality: *Noemacheilus kermanshahensis* was originally described from Kermanshah in the drainage of the Karun River, tributary of lower Euphrates, western Iran.



Figure 36. *Oxynoemacheilus kermanshahensis*, Gamasiab River, Iran (Photograph by Hamed Mousavi-Sabet).

Oxynoemacheilus kiabii Golzarianpour, Abdoli and Freyhof, 2011* (Figure 37) – the Tigris River basin.

Type locality: Dehnoo Stream, 3 km west of Nahavand, 34°10'N, 48°24'E, Hamadan, Iran.



Figure 37. *Oxynoemacheilus kiabii*, Gamasiab River, Iran (Photograph by Hamed Mousavi-Sabet).

Oxynoemacheilus kurdistanicus Kamangar, Prokofiev, Ghaderi and Nalbant, 2014 – the Tigris River basin.

Type locality: Choman River, Baneh, 35°56'53"N, 45°41'40"E, Kurdistan, Iran.

Oxynoemacheilus persa (Heckel, 1847)* – Kor, Persis and Lake Maharlou basins.

Type locality: *Cobitis persa* was originally described from Kor River near Persepolis, Fars, Iran.

Oxynoemacheilus tongiorgii (Nalbant and Bianco, 1998)* – Hormuz basin.

Type locality: *Seminemacheilus tongiorgii* was originally described from large water spring near Darab town, Kul River basin, Iran.

Comment: records by some authors in the Kor river basin are in error, based on collecting expeditions by Hamid Reza Esmaeili, Shiraz University, consider that the Darab (Kol River) locality could be in error and Kol and Kor were confused.

Oxynoemacheilus zagrosensis Kamangar, Prokofiev, Ghaderi and Nalbant, 2014 – the Tigris River basin.

Type locality: Shooei River, Baneh, 35°58'01"N, 45°42'43"E, Kurdistan, Iran.

Oxynoemacheilus sp.* – the Namak Lake basin.

Comment: under revision.

Genus ***Paracobitis*** Bleeker, 1863

Paracobitis atrakensis Esmaeili, Mousavi-Sabet, Sayyadzadeh, Vatandoust and Freyhof, 2014 (Figure 38) – the Caspian Sea and Kavir basins.

Type locality: Atrak River about 10 km east of Bojnurd, 37°29'37"N, 57°26'25"E, Khorasan-e-Shomali, Iran.



Figure 38. *Paracobitis atrakensis*, Atrak River, Iran (Photograph by Hamed Mousavi-Sabet).

Paracobitis basharensis Freyhof, Esmaeili, Sayyadzadeh, and Geiger, 2014* – the Tigris River basin.

Type locality: Bashar River at Dehno, 30°38.42.6"N, 51°37'14.26"E, Iranian Tigris catchment, Iran.

Paracobitis hircanica Mousavi-Sabet, Sayyadzadeh, Esmaeili, Eagderi, Patimar, and Freyhof, 2015* – the Caspian Sea basin.

Type locality: Zarrin Gol stream, a tributary of Gorgan River, 36°50'39"N, 54°58'24"E, Golestan, Iran.

Paracobitis iranica Nalbant & Bianco, 1998* (Figure 39) – the Namak Lake basin.

Type locality: River Qom near the town of Qom, Iran.

Comment: Freyhof et al (2014) considered this species as a synonym of *Paracobitis malapterura* based on molecular evidence, which contradicts morphology. It seems that the populations of both species are presented in the Namak Lake basin. Further study is needed.



Figure 39. *Paracobitis iranica*, Qomroud River, Iran (Photograph by Hamed Mousavi-Sabet).

Paracobitis longicauda (Kessler, 1872) – Tedzhen River basin.

Type locality: *Cobitis longicauda* was originally described from the Ak-Darya in the Zeravshan River basin of Uzbekistan.

Paracobitis malapterura (Valenciennes, 1846) – the Namak Lake, Kavir and the Tigris River basins.

Type locality: *Cobitis malapterura* possibly described from the Namak Lake basin.

Natural habitat of this species shown in Figure 40.

Paracobitis molavii Freyhof, Esmaeili, Sayyadzadeh, and Geiger, 2014 – the Tigris River basin.

Type locality: Zalm at Khormal, 35°18.38'N, 45°58.26'E, Sulaymaniyah, Iraq.

Paracobitis persa Freyhof, Esmaeili, Sayyadzadeh, and Geiger 2014* – Kor River basin.

Type locality: Maloosjan spring east of Beiza, Kor basin, 29°52'23"N 52°27'57"E, Fars, Iran.

Paracobitis rhadinaeus (Regan, 1906) – Sistan basin.

Type locality: *Nemacheilus rhadinaeus* possibly described from Helmand delta in Sistan, Iran.

Comment: according to Kottelat (2012) and Coad (2015), affluents (= headwaters) is an error for effluents (= delta) and the species is not from the upper reaches of the Helmand River basin in Afghanistan and the Helmand delta located in Sistan. *Nemacheilus macmahoni* Chaudhuri, 1909 is a synonym.



Figure 40. Namroud River, Natural habitat of *Alburnoides* sp., *Paracobitis malapterura*, *Capoeta aculeata*, *Barbus miliaris* and *Capoeta buhsei* (Photograph by Hamed Mousavi-Sabet).

Paracobitis smithi (Greenwood, 1976)* (Figure 41) – the Tigris River basin.

Type locality: *Nemacheilus smithi* described from a natural well at Kaaje-Ru, 33°05'N, 48°36'E, near Baq-e-Loveh Oasis, the Zagros Mountains, Iran.



Figure 41. *Paracobitis smithi*, Loen cave, Iran (Photograph by Hamed Mousavi-Sabet).

Paracobitis vignai Nalbant & Bianco, 1998 – Sistan basin.

Type locality: Helmand delta in Sistan, Iran.

Comment: Esmaeili et al (2010) consider this species as endemic, but with respect to the distribution of this species on the Helmand River seems this species is native.

Genus ***Paraschistura*** Prokofiev, 2009

Paraschistura abdolii Freyhof, Sayyadzadeh, Esmaeili and Geiger, 2015* – Lut, Sirjan, Hormuz and Hamun-e Jaz Murian basins.

Type locality: Pol River at road between Rayen and Jiroft, Lut basin, 29°21'06"N 57°29'09"E, Kerman, Iran (Figure 43).

Paraschistura aredvii Freyhof, Sayyadzadeh, Esmaeili and Geiger, 2015* – the Tigris and Persis basins.

Type locality: Sarab-e Bahram spring at Sarab-e Bahram, a tributary of Fahlian River, 30°02'48"N 51°33' 34"E, Fars, Iran.

Paraschistura bampurensis (Nikolskii, 1900) – Mashkid, Makran and Hamun-e Jaz Murian basins.

Type locality: *Nemacheilus bampurensis* was originally described from Kjagur and Kashin [Kaekin] rivers, Bampur River near Bazman, Iran.

Paraschistura cristata (Berg, 1898) (Figure 42) – Tedzhen River basin.

Type locality: *Nemacheilus cristata* was originally described from Tedzhen River near Ashgabat [Askhabad], Turkmenistan.

Comment: formerly placed in the genus *Metaschistura* but Freyhof et al (2015) placed this species in *Paraschistura*.



Figure 42. *Paraschistura cristata*, Hariroud River, Iran (Photograph by Hamed Mousavi-Sabet).

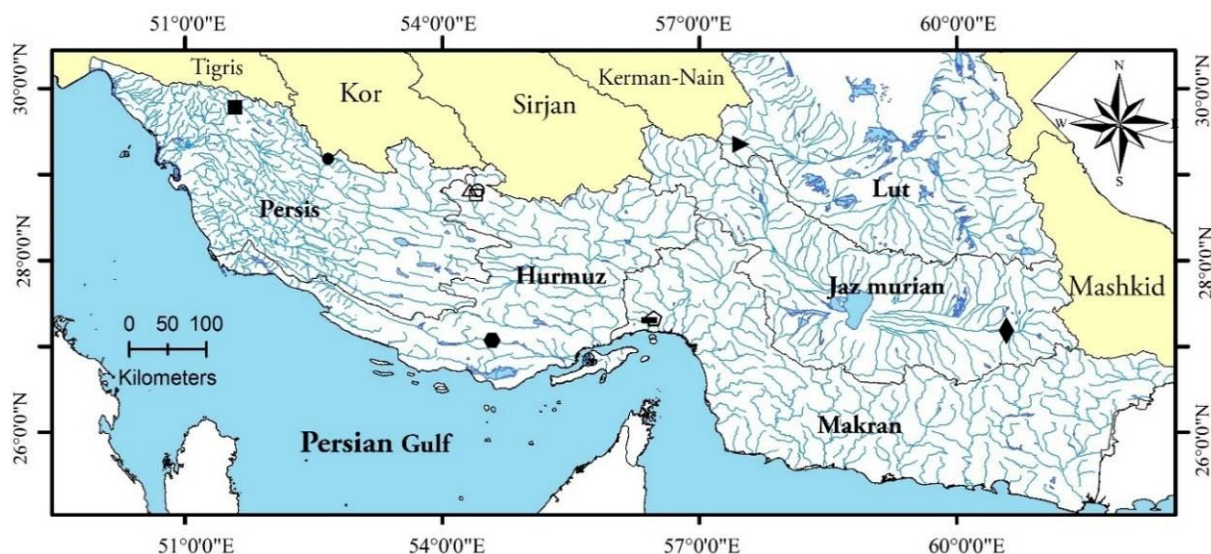


Figure 43. Type localities of endemic species in the Persis, Hormuz, Makran, Jaz Murian and Lut basins (The exact location is not shown): □, *Acanthobrama persidis*; ○, *Aphanius darabensis*; ◊, *Aphanius furcatus*; ■, *Aphanius ginaonis*; ●,

Capoeta mandica; ◆, *Garra persica*; ●, *Iranocichla hormuzensis*; ►, *Paraschistura abdolii*; △, *Paraschistura naumanni*; ■, *Paraschistura nielseni*.

Paraschistura delvarii Mousavi-Sabet and Eagderi, 2015* - the Persis basin.

Type locality: Mond River drainage, Fars Province, Iran.

Paraschistura hormuzensis Freyhof, Sayyadzadeh, Esmaeili and Geiger, 2015* – Hormuz basin.

Type locality: Rudan River at Abnama bridge, a tributary of Minab River, 27°28'24"N 57°15'14"E, Hormuzgan, Iran.

Paraschistura ilamensis Vatandoust and Eagderi, 2015* (Figure 44) – the Tigris River basin.

Type locality: Spring Siahgav, the Tigris River drainage, 32°51'54"N, 47°42'2"E, Ilam province, Iran.

Comment: *Paraschistura pasatigris* Freyhof, Sayyadzadeh, Esmaeili and Geiger, 2015, is a synonym of *Paraschistura ilamensis*.



Figure 44. *Paraschistura ilamensis*, Siyah Gav spring, Iran (Photograph by Hamed Mousavi-Sabet).

Paraschistura kessleri (Günther, 1889) – Mashkid River basin.

Type locality: *Nemachilus kessleri* was originally described from Nushki, Pishin Lora River basin, Afghanistan or Pakistan.

Paraschistura naumanni Freyhof, Sayyadzadeh, Esmaeili and Geiger, 2015* – Lake Maharlu, Hormuz and Persis basins.

Type locality: Golabi spring, about 35 km west of Darab, a tributary of Kol River, 28°47'15" N 54°22'19" E, Fars, Iran.

Paraschistura nielseni (Nalbant & Bianco, 1998)* – Persis basin.

Type locality: *Schistura nielseni* was originally described from Shapur Rivar, 12 km northwest of Kazerun, Iran.

Paraschistura sargadensis Nikolskii, 1900 – the Mashkid River basin.

Type locality: near Kuh-i-Tuftan volcano, Sargado [Sarhad region], eastern Iran.

Comment: Freyhof et al (2015) suggested this species is a synonym of *P. kessleri*, but our data contradicts with this conclusion. Further study is needed.

Paraschistura susiani Freyhof, Sayyadzadeh, Esmaeili and Geiger, 2015* – the Tigris River basin.

Type locality: Zard River close to Rudzard village at road from Ramhormoz to Baghmalek, a tributary of Jarahi, 31°22'34"N 49°43'11"E, Khozestan, Iran.

Paraschistura turcmenica (Berg, 1932) – Tedzhen River and Kavir basins.

Type locality: *Nemachilus turcmenicus* was originally described from Keltechinar River [Cherokh River] near Gyaur, 37°47'N, 58°44'E, Turkmenistan.

Paraschistura sp.* - the Makran or Mashkid basins.

Comment: according to Esmaeili et al (2015), under revision.

Genus ***Triplophysa*** Rendahl, 1933

Triplophysa stoliczkai (Steindachner, 1866) – Sistan basin.

Type locality: *Cobitis stoliczkai* was originally described from Umgebung River, Rupshu Province, western Tibet.

Genus ***Turcinoemacheilus*** Bănărescu & Nalbant, 1964

Turcinoemacheilus bahaii Esmaeili, Sayyadzadeh, Özulug, Geiger and Freyhof, 2014* (Figure 45) – Esfahan basin.

Type locality: Zayandehroud River between Azadegan and Qalee Shahrokh, 32°40'54"N, 50°27'47"E, Esfahan, Iran.

Turcinoemacheilus hafezi Golzarianpour, Abdoli, Patimar and Freyhof, 2013*– the Tigris River basin.

Type locality: stream at Joneqon, 32°05'22"N, 50°39'48"E, a tributary to Kohrang River, Chaharmahal va Bakhtiari, Iran.

Turcinoemacheilus kosswigi Bănărescu & Nalbant, 1964 – the Tigris River basin.

Type locality: Kapozik Kadun, Hakkari, 37°34'40"N, 43°44'10"E, Tigris (Dicle Nehri basin), Turkey.

Turcinoemacheilus saadii Esmaeili, Sayyadzadeh, Özulug, Geiger and Freyhof, 2014*– the Tigris River basin.

Type locality: stream Tang-e-Tizab, a tributary to Bashar River that drains to the Karoun, 30°23'12"N, 51°46'50"E, Fars, Iran.



Figure 45. *Turcinoemacheilus bahaii*, Zayandehroud River, Iran (Photograph by Hamed Mousavi-Sabet).

Order **SILURIFORMES**

(4 families, 4 genera and 6 species)

Family **Bagridae**

(1 genus and 1 species)

Genus ***Mystus*** Scopoli, 1777

Mystus pelusius (Solander, 1794) (Figure 46) – the Tigris River, Persis and Hormuz basins.

Type locality: *Silurus pelusius* was originally described from Kowick River, Aleppo (= Halab), Syria.

Comment: *Bagrus halepensis* Valenciennes, 1840, *Macrones aleppensis* Günther, 1864, *Macrones colvillii* Günther, 1874, and *Mystus misrai* Anuradha, 1986 are synonyms.



Figure 46. *Mystus pelusius*, Alvand River, Iran (Photograph by Hamed Mousavi-Sabet).

Family **Siluridae**

(1 genus and 2 species)

Genus ***Silurus*** Linnaeus, 1758

Silurus glanis Linnaeus, 1758 - the Caspian Sea and Urmia Lake basins.

Type locality: Kura River, Tiflis [Tbilisi], Georgia.
Silurus triostegus Heckel, 1843 – the Tigris River basin.
Type locality: Tigris River, near Mosul, Iraq.

Family **Sisoridae**

(1 genus and 2 species)

Genus ***Glyptothorax*** Blyth, 1860

The Middle Eastern members of this genus are in revision.

Glyptothorax kurdistanicus (Berg, 1931) – the Tigris River basin.

Type locality: *Glyptosternum kurdistanicum* was originally described from Serdesht, at Little Zab, River Bane basin, Iran. Natural habitat of this species is shown in Figure 47.

Glyptothorax silviae Coad, 1981* – the Tigris and Persis basins.

Type locality: stream 3 kilometers south of Bagh-e Malek, 31°29'00"N, 49°54'30"E, Khuzestan, Iran.



Figure 47. Joneqan River Natural habitat of *Glyptothorax kurdistanicus* and *Aphanius vladykovi* (Photograph by Hamed Mousavi-Sabet).

Family **Heteropneustidae**

(1 genus and 1 species)

Genus ***Heteropneustes*** Müller, 1840

Heteropneustes fossilis (Bloch, 1794)** – introduced to the Tigris River basin.

Type locality: *Silurus fossilis* was originally described from Tranquebar [Tharangambadi], India.

Order **SALMONIFORMES**

(1 family, 5 genera and 7 species)

Family **Salmonidae**

(5 genera and 7 species)

Genus ***Coregonus*** Linnaeus, 1758

Coregonus lavaretus (Linnaeus, 1758)** – introduced to reservoirs in the Namak Lake basin.

Type locality: *Salmo lavaretus* was originally described from Lake Bourget, France.

Genus ***Oncorhynchus*** Suckley, 1861

Oncorhynchus keta (Walbaum, 1792)** – introduced to the Caspian Sea basin.

Type locality: *Salmo keta* was originally described from rivers of Kamchatka, Russia.
Oncorhynchus mykiss (Walbaum, 1792)** – introduced to the Tigris River, Caspian Sea, Lake Urmia, Namak Lake, Kavir, Esfahan and Kor River basins, and widely farmed.
Type locality: *Salmo mykiss* was originally described from Kamchatka, Russia.

Genus **Salmo** Linnaeus, 1758

Salmo caspius Kessler, 1877 – the Caspian Sea basin.

Type locality: *Salmo caspius* Kessler, 1877 was described from Kura River near Bozhii Promysel fishing grounds, Azerbaijan.

Comment: *Salmo trutta* Linnaeus, 1758 was recognized in the Caspian Sea but its subspecies is now regarded as a full species (Naseka & Bogutskaya 2009). Other taxa probably exist in Iran, particularly in the Urmia Lake basin.

Salmo trutta Linnaeus, 1758 – (native and exotic) the Caspian, Namak Lake, and Urmia Lake basins; widely introduced to streams, lakes and reservoirs.

Type locality: *Salmo trutta* was originally described from European rivers.

Genus **Salvelinus** Richardson, 1836

Salvelinus fontinalis (Mitchill, 1814)** – introduced to the Namak Lake basin.

Type locality: *Salmo fontinalis* was originally described from the vicinity of New York City, USA.

Genus **Stenodus** Richardson, 1836

Stenodus leucichthys (Güldenstaedt, 1772) – the Caspian Sea basin.

Type locality: *Salmo leucichthys* was originally described from the Volga and Ural rivers, the Caspian Sea and Kamchatcka, Russia.

Order **ESOCIFORMES**

(1 family, 1 genus and 1 species)

Family **Esocidae**

(1 genus and 1 species)

Genus **Esox** Linnaeus, 1758

Esox lucius Linnaeus, 1758 (Figure 48) – the Caspian Sea basin; introduced in lakes and reservoirs throughout Iran.

Type locality: Europe.



Figure 48. *Esox lucius*, the Anzali Wetland, Iran (Photograph by Hamed Mousavi-Sabet).

Order **GADIFORMES**

(1 family, 1 genus and 1 species)

Family **Lotidae**

(1 genus and 1 species)

Genus **Lota** Oken, 1817

Lota lota (Linnaeus, 1758) – the Caspian Sea basin.

Type locality: *Gadus Lota* was originally described from European lakes.

Order **MUGILIFORMES**

(1 family, 4 genera and 6 species)

Family **Mugilidae**

(4 genera and 6 species)

Genus **Chelon** Artedi, 1793

Chelon auratus (Risso, 1810)** – introduced to the Caspian Sea basin.

Type locality: *Mugil auratus* was originally described from Nice, France.

Comment: formerly placed in the genus *Liza* but Durand et al (2012) placed in the genus *Chelon*.

Chelon saliens (Risso, 1810)** – introduced to the Caspian Sea basin.

Type locality: *Mugil saliens* was originally described from Nice, France.

Comment: formerly placed in the genus *Liza* but Durand et al (2012) placed in the genus *Chelon*.

Genus **Ellochelon** Whitley, 1930

Ellochelon vaigiensis (Quoy & Gaimard, 1824) – the Tigris River basin; possibly other coastal rivers in the Persian Gulf.

Type locality: *Mugil vaigiensis* was originally described from Waigeo, Indonesia.

Comment: synonyms are *Mugil dussumieri* Valenciennes in Cuvier and Valenciennes, 1836 and *Mugil jerdoni* Day, 1876.

Genus **Mugil** Linnaeus, 1758

Mugil cephalus Linnaeus, 1758 – the Caspian Sea (Exotic), Tigris River and Makran basins; possibly other coastal rivers in the Persian Gulf.

Type locality: Atlantic Ocean at the shores of Europe, entering rivers.

Genus **Planiliza** Whitley 1945

Planiliza abu (Heckel, 1843) – the Tigris River, Persis and Hormuz basins; possibly introduced in the Lake Maharlu basin.

Type locality: *Mugil abu* was originally described from the Tigris River, near Mosul, Iraq.

Comment: formerly placed in the genus *Liza* but Durand et al (2012) placed in the genus *Planiliza*. *Mugil pseudotelestes* Pietschmann, 1912 and *Mugil hishni* Misra, 1943 are synonyms. The subspecies *Mugil abu zarudnyi* Berg, 1949 from Iran is of doubtful validity.

Planiliza subviridis (Valenciennes, 1836) – the Tigris and Persis basins.

Type locality: *Mugil subviridis* was originally described from Malabar, India.

Comment: formerly placed in the genus *Liza* but Durand et al (2012) placed in the genus *Planiliza*.

Order **ATHERINIFORMES**

(1 family, 1 genus and 1 species)

Family **Atherinidae**

(1 genus and 1 species)

Genus **Atherina** Linnaeus, 1758

Atherina caspia Eichwald, 1831 – the Caspian Sea basin.

Type locality: the Caspian Sea. No types known.

Comment: *Atherina mochon pontica natio caspia* Eichwald, 1831 was recognised as the taxon in Iran, later synonymized with *Atherina boyeri* Risso, 1810, but now considered distinct (Naseka & Bogutskaya 2009).

Order **CYPRINODONTIFORMES**

(2 families, 4 genera and 17 species)

Family **Cyprinodontidae**

(1 genus and 14 species)

Genus **Aphanius** Nardo, 1827

Comment: formerly placed in the genus *Lebias* Goldfuss, 1820 or *Cyprinodon* Lacepède, 1809.

Aphanius arakensis Teimori, Esmaeili, Gholami, Zarei and Reichenbacher, 2012* – the Namak Lake basin.

Type locality: small pond, Namak Lake basin, 34°00'N, 49°50'E, 5 km southeast of the city of Arak, Iran.

Aphanius darabensis Esmaeili, Teimori, Gholami and Reichenbacher, 2014* – Hormuz basin.

Type locality: Darab, Korsiah Banaki spring-stream system, Kol River, 28°46'24.96"N, 54°23'35.48"E, Fars, Iran.

Aphanius dispar (Rüppell, 1829) - the Tigris River, Persis, Hormuz, Makran, Hamun-e Jaz Murian and Mashkid River basins.

Type locality: *Lebias dispar* was originally described from Northern Africa.

Aphanius farsicus Teimori, Esmaeili and Reichenbacher, 2011* – Lake Maharlu basin.

Type locality: spring on the edge of Shiraz [Maharlu] Lake, southern Iran.

Aphanius furcatus Teimori, Esmaeili, Erpenbeck and Reichenbacher, 2014* – Makran basin.

Type locality: Shur River along the Bandar Abbas–Minab road, 20 km East of Bandar Abbas, 27°19'37"N, 56°28'10"E, Hormozgan, Iran.



Figure 49. *Aphanius kavirensis* (above: female, below: male), Cheshmeh Ali Spring, Iran (Photograph by Hamid Reza Esmaeili).

Aphanius ginaonis (Holly, 1929)* – the Hormuz basin.

Type locality: *Cyprinodon ginaonis* was originally described from Ab Garm-e Ganow at 27°26' 28"N, 56°18' 20"E, north of the Iranian port of Bandar Abbas at the Straits of Hormuz.

Aphanius isfahanensis Hrbek, Keivany and Coad, 2006* – Esfahan basin.

Type locality: Zayandehroud (Zayandeh River) at Varzaneh Bridge, 32°25'32"N, 52°39'14"E, Esfahan, Iran.

Aphanius kavirensis Esmaeili, Teimori, Gholami and Reichenbacher, 2014* (Figure 49) – Kavir basin.

Type locality: Damghan, Cheshmeh Ali Spring, Kavir basin, 36°16'45.6"N, 54°05'01.6"E, Semnan, Iran.

Aphanius mento (Heckel, 1843) – the Tigris River basin.

Type locality: *Lebias mento* was originally described from Mosul, northern Iraq (36°18'N, 43°18'E).

Comment: *Lebias cypris* Heckel, 1843 is a synonym.

Aphanius mesopotamicus Coad, 2009 – the Tigris River basin.

Type locality: Canal branch of Karkheh River, 31°40'N, 48°35'E, Khuzestan, Iran.

Aphanius pluristriatus (Jenkins, 1910)* – Persis basin.

Type locality: *Cyprinodon pluristriatus* was originally described from East of Shiraz, stream running to Fussa [Fasa], southern Iran.

Aphanius shirini Gholami, Esmaeili, Erpenbeck and Reichenbacher, 2013* – Kor River and Persis basins.

Type locality: Paselari spring of the Khosroshirin spring-stream system, Khosroshirin Village, Abadeh City, Fars, uppermost reaches of Kor River basin, 30°53'29.5"N, 52°00'36.8"E, Iran.

Aphanius sophiae (Heckel, 1847)* – Kor River and Persis basins.

Type locality: Endorheic Kor River basin north of Shiraz, Fars, Iran.

Aphanius vladykovi Coad, 1988* (Figure 50) – the Tigris River basin.

Type locality: Large pool in Shahrestan-e Bakhtiari va Chahar Mahall, 3 kilometers west of Boldaji, 31°57'N, 51°01'E, Iran.



Figure 50. *Aphanius vladykovi* (above: male, below: female), Joneqan River, Iran (Photograph by Hamed Mousavi-Sabet).

Family **Poeciliidae**

(3 genera and 3 species)

Genus ***Gambusia*** Poey, 1854

Gambusia holbrooki Girard, 1859** – elsewhere in reservoirs throughout Iran.

Type locality: Eastern Florida and South Carolina, U.S.A.

Genus ***Poecilia*** Bloch & Schneider, 1801

Poecilia reticulata Peters, 1859** – Esfahan basin.

Type locality: Guayre River, Caracas, Venezuela.

Genus **Xiphophorus** Heckel, 1848

Xiphophorus hellerii Heckel, 1848** – introduced to the Esfahan and Persis basins.

Type locality: Orizaba, Mexico.

Order **GASTEROSTEIFORMES**

(1 family, 2 genera and 2 species)

Family **Gasterosteidae**

(2 genera and 2 species)

Genus **Gasterosteus** Linnaeus, 1758

Gasterosteus aculeatus Linnaeus, 1758** – introduced to the Caspian Sea, Kavir and Tedzhen River basins.

Type locality: Europe.

Genus **Pungitius** Coste, 1848

Pungitius platygaster (Kessler, 1859) – the Caspian Sea basin.

Type locality: *Gasterosteus platygaster* was originally described from Odessa and Aleshki on the Dnieper in the Ukraine.

Order **SYNGNATHIFORMES**

(1 family, 1 genus and 1 species)

Family **Syngnathidae**

(1 genus and 1 species)

Genus **Syngnathus** Linnaeus, 1758

Syngnathus caspius Eichwald, 1831 – the Caspian Sea basin.

Type locality: *Syngnathus abaster* was originally described from Nice, France.

Comment: *Syngnathus nigrolineatus caspius* Eichwald, 1831 was considered to be the taxon in Iran, later synonymized with *Syngnathus abaster* Risso, 1827 but now recognized as distinct taxa (Naseka & Bogutskaya 2009).

Order **SYNBRANCHIFORMES**

(1 family, 1 genus and 1 species)

Family **Mastacembelidae**

(1 genus and 1 species)

Genus **Mastacembelus** Scopoli, 1777

Mastacembelus mastacembelus (Banks & Solander, 1794) – the Tigris River, Kor River and Persis basins.

Type locality: *Ophidium mastacembelus* was originally described from Kowick River, [Quwayq River, Halab, Syria].

Comment: *Rhynchobdella haleppensis* Bloch & Schneider, 1801 is a synonym. *Mastacembelus aleppensis* Günther, 1861 is an unjustified emendation of *haleppensis*.

Order **PERCIFORMES**

(5 families, 22 genera and 32 species, 18 unconfirmed)

Family **Percidae**

(2 genera and 3 species)

Genus **Perca** Linnaeus, 1758

Perca fluviatilis Linnaeus, 1758 – the Caspian Sea basin.

Type locality: Europe.

Genus **Sander** Oken, 1817

Sander lucioperca (Linnaeus, 1758) – the Caspian Sea, Urmia, Namak and Tigris basins.

Type locality: *Perca Lucioperca* was originally described from European lakes.

Sander marinus (Cuvier, 1828) – the Caspian Sea basin.

Type locality: *Lucioperca marina* was originally described from the Black Sea at Feodosiya. No types are known

Family **Sparidae**

(1 genus and 1 species)

Genus ***Acanthopagrus*** Peters, 1855

Acanthopagrus arabicus Iwatsuki 2013 – the Tigris River and Persis basins.

Type locality: Western Coast of Qatar (market specimen).

Family **Cichlidae**

(3 genera and 3 species)

Genus ***Amatitlania*** Schmitter-Soto 2007

Amatitlania nigrofasciata (Günther 1867)** – Hormuz basin.

Type locality: *Heros nigrofasciatus* was originally described Lake Amatitlán, Guatemala.

Genus ***Iranocichla*** Coad, 1982

Iranocichla hormuzensis Coad, 1982* – Hormuz basin.

Type locality: Mehran River at 27°04'N, 54°35'E, Hormozgan, Iran.

Genus ***Coptodon*** Gervais, 1848

Coptodon zillii (Gervais, 1848)** – the Tigris River basin

Type locality: *Acerina zillii* was originally described from Artesian well, Tuggurth, Algeria [North Africa].

Comment: formerly placed in the genus *Tilapia* Smith, 1840, Dunz & Schlieven (2013) placed in *Coptodon*.

Family **Gobiidae**

(15 genera and 42 species, 18 unconfirmed)

Genus ***Anatirostrum*** Iljin, 1930

Anatirostrum profundorum (Berg, 1927) – the Caspian Sea basin.

Type locality: *Benthophilus profundorum* was originally described from the southern Caspian Sea, 37°58'N, 52°22'E.

Genus ***Babka*** Iljin, 1927

Comment: members of this genus were formerly placed in the genus *Neogobius* Iljin, 1927.

Babka gymnotrachelus (Kessler, 1857) – the Caspian Sea basin.

Type locality: *Gobius gymnotrachelus* was originally described from Dniester River and tributaries, especially Slutsch River, Ukraine.

Comment: presence in Iranian waters needs confirmation. Reported by Kottelat & Freyhof (2007).

Babka macrophthalmus (Kessler, 1877) – the Caspian Sea basin.

Type locality: *Gobius macrophthalmus* was originally described from the middle and southern parts of the Caspian Sea.

Comment: reported from the middle and southern parts of the Caspian Sea by Naseka & Bogutskaya (2009) but not confirmed by specimens for Iran.

Genus ***Benthophiloides*** Beling & Iljin, 1927

Benthophiloides brauneri Beling & Iljin, 1927 – the Caspian Sea basin.

Type locality: lower Dnieper River between Kherson and Kakhovka and southern Bug River between Novaya Odessa and Nikolayev, Ukraine.

Comment: reported from the middle and southern parts of the Caspian Sea by Naseka & Bogutskaya (2009) but not confirmed by specimens for Iran.

Benthophiloides turcomanus (Iljin, 1941) – the Caspian Sea basin.

Type locality: *Asra turcomanus* was originally described from the Caspian Sea, off Chikishlar [Chikishlyar], 37°45.5'N, 53°47'E. 9.3 meters; southwest of Ulsky Bank, 38°05'N, 52°34'E, depth 26.5 meters, Turkmenistan.

Comment: reported from the middle and southern parts of the Caspian Sea by Naseka & Bogutskaya (2009) but not confirmed by specimens for Iran.

Genus ***Benthophilus*** Eichwald, 1831

Benthophilus abdurahmanovi Ragimov, 1978 – the Caspian Sea basin.

Type locality: *Benthophilus magistri abdurahmanovi* was originally described from East coast of Tyuleniy Island, the northern Caspian Sea.

Comment: reported from the middle and southern parts of the Caspian Sea by Naseka & Bogutskaya (2009) but not confirmed by specimens for Iran.

Benthophilus baeri Kessler, 1877 – the Caspian Sea basin.

Type locality: Mangyshlak Penninsula, Kazakhstan; the southern Caspian Sea.

Benthophilus casachicus Ragimov, 1978 – the Caspian Sea basin.

Type locality: *Benthophilus stellatus casachicus* was originally described from Kenderli Spit, eastern shore of the middle Caspian Sea.

Comment: reported from the middle and southern parts of the Caspian Sea by Boldyrev & Bogutskaya (2007) and Naseka & Bogutskaya (2009) but not confirmed by specimens for Iran.

Benthophilus ctenolepidus Kessler, 1877 – the Caspian Sea basin.

Type locality: the Caspian Sea, 40°08'N, 0°26'E, Baku, Azerbaijan.

Benthophilus granulatus Kessler, 1877 – the Caspian Sea basin.

Type locality: Baku Bay, the Caspian Sea, Azerbaijan.

Comment: presence in Iranian waters needs confirmation. Reported by Kottelat & Freyhof (2007).

Benthophilus grimmi Kessler, 1877 – the Caspian Sea basin.

Type locality: the middle and southern parts of the Caspian Sea.

Comment: reported from the middle and southern parts of the Caspian Sea by Boldyrev & Bogutskaya (2007) and Naseka & Bogutskaya (2009) but not confirmed by specimens for Iran.

Benthophilus kessleri Berg, 1927 – the Caspian Sea basin.

Type locality: *Benthophilus grimmi kessleri* was originally described from Caspian Sea 41°51'N, 52°15'E, depth 75 meters.

Comment: reported from the middle and southern parts of the Caspian Sea by Boldyrev & Bogutskaya (2007) and Naseka & Bogutskaya (2009) but not confirmed by Iranian specimens.

Benthophilus leobergius Berg, 1949 – the Caspian Sea basin.

Type locality: *Benthophilus stellatus leobergius* was originally described from Astrabadskiy Bay, the Caspian Sea, Iran.

Comment: originally described as a subspecies of *B. stellatus* (Sauvage, 1874) but Pinchuk et al in Miller (2003) give it full species rank.

Benthophilus leptcephalus Kessler, 1877 – the Caspian Sea basin.

Type locality: Southern part of the Caspian Sea.

Comment: reported from the middle and southern parts of the Caspian Sea by Boldyrev & Bogutskaya (2007) and Naseka & Bogutskaya (2009) but not confirmed by specimens for Iran.

Benthophilus leptorhynchus Kessler, 1877 – the Caspian Sea basin.

Type locality: the middle of Caspian Sea.

Comment: reported from the middle and southern parts of the Caspian Sea by Boldyrev & Bogutskaya (2007) and Naseka & Bogutskaya (2009) but not confirmed by specimens for Iran.

Benthophilus macrocephalus (Pallas, 1787) – the Caspian Sea basin.

Type locality: *Gobius macrocephalus* was originally described from the Caspian Sea, no types known.

Benthophilus mahmudbejovi Ragimov, 1976 – the Caspian Sea basin.

Type locality: off Cape Peschanyy, middle Caspian Sea, Kazakhstan.

Comment: reported from the middle and southern parts of the Caspian Sea by Boldyrev & Bogutskaya (2007) and Naseka & Bogutskaya (2009) but not confirmed by specimens for Iran.

Benthophilus pinchuki Ragimov, 1982 – the Caspian Sea basin.

Type locality: *Benthophilus ctenolepidus pinchuki* was originally described from off Belyy Bugor, 37°40'N, the southeastern Caspian Sea, Turkmenistan.

Comment: formerly a subspecies of *B. ctenolepidus* but Pinchuk & Miller in Miller (2003) give it full species status.

Benthophilus ragimovi Boldyrev & Bogutskaya, 2004 – the Caspian Sea basin.

Type locality: Western coast of the Caspian Sea, off Yamma-Kilyazi, Azerbaijan.

Comment: reported from the middle and southern parts of the Caspian Sea by Boldyrev & Bogutskaya (2007) and Naseka & Bogutskaya (2009) but not confirmed by specimens for Iran.

Benthophilus spinosus Kessler, 1877 – the Caspian Sea basin.

Type locality: the middle Caspian Sea.

Comment: reported from the middle and south part of the Caspian Sea by Boldyrev & Bogutskaya (2007) and Naseka & Bogutskaya (2009) but not confirmed by specimens for Iran.

Benthophilus svetovidovi Pinchuk & Ragimov, 1979 – the Caspian Sea basin.

Type locality: the Caspian Sea.

Comment: reported from the middle and south part of the Caspian Sea by Boldyrev & Bogutskaya (2007) and Naseka & Bogutskaya (2009) but not confirmed by specimens for Iran.

Genus ***Boleophthalmus*** Valenciennes, 1837

Boleophthalmus dussumieri Valenciennes, 1837 – the Tigris River, Persis, Hormuz and Makran basins.

Type locality: Mumbai, India.

Genus ***Glossogobius*** Gill, 1859

Glossogobius giuris (Hamilton, 1822) – the Tigris River, Persis, Hormuz and Makran basins.

Type locality: *Gobius giuris* was originally described from the Ganges River, India.

Genus ***Hyrceanogobius*** Iljin, 1928

Comment: Considered as a synonym of *Knipowitschia* by Kottelat & Freyhof (2007).

Hyrceanogobius bergi Iljin, 1928 – the Caspian Sea basin.

Type locality: the northern Caspian Sea, near mouths of rivers Volga, Ural, and Emba, Russia and Kazakhstan.

Comment: presence in Iranian waters needs confirmation. Reported by Kottelat & Freyhof (2007).

Genus ***Knipowitschia*** Iljin, 1927

Knipowitschia caucasica (Berg, 1916) – the Caspian Sea basin.

Type locality: *Pomatoschistus caucasicus*, was originally described from Swamp near Batum and Inkit Lake near Pitzunda, Georgia.

Knipowitschia iljini Berg, 1931 – the Caspian Sea basin.

Type locality: the middle part of the Caspian Sea.

Knipowitschia longicaudata (Kessler, 1877) – the Caspian Sea basin.

Type locality: *Gobius longicaudatus* was originally described from the southern and middle Caspian Sea.

Comment: presence in Iranian waters needs confirmation. Reported by Kottelat & Freyhof (2007).

Genus ***Mesogobius*** Bleeker, 1874

Mesogobius nigronotatus (Kessler, 1877) – the Caspian Sea basin.

Type locality: *Gobius nigronotatus* was originally described from the Caspian Sea, Kazakhstan.

Comment: reported from the middle and southern parts of the Caspian Sea by Naseka & Bogutskaya (2009) but not confirmed by specimens for Iran.

Mesogobius nonultimus (Iljin, 1936) – the Caspian Sea basin.

Type locality: *Gobius nonultimus* was originally described from 24 miles southwest of Ulsky Bank, the Caspian Sea.

Genus **Neogobius** Iljin, 1927

Neogobius caspius (Eichwald, 1831) – the Caspian Sea basin.

Type locality: *Gobius caspius* was originally described from the Caspian Sea. No types known.

Neogobius melanostomus (Pallas, 1814) – the Caspian Sea basin.

Type locality: *Gobius melanostomus* was originally described from Sevastopol and Balaklava, Ukraine, on the Black Sea. No types known.

Comment: *Gobius affinis* Eichwald, 1831 is synonym or subspecies depending on authors.

Neogobius pallasii (Berg, 1916) – the Caspian Sea basin.

Type locality: *Gobius fluviatilis* was originally described in part from near the mouths of rivers falling into the Black Sea and similarly the Caspian Sea. No types are known.

Comment: this taxon was regarded as a subspecies of *N. fluviatilis* (Pallas, 1814).

Genus **Periophthalmus** Bloch & Schneider, 1801

Periophthalmus waltoni Koumans, 1941 – the Tigris River, Persis, Hormuz and Makran basins.

Type locality: probably Iraq and Pakistan. The type locality is unclear.

Comment: the Memoirs of the Indian Museum for 1938–1942 were published in 1955, according to catalog of fishes this species described in 1941.

Genus **Ponticola** Iljin, 1927

Comment: members of this genus were formerly placed in the genus *Neogobius* Iljin, 1927.

Ponticola bathybius (Kessler, 1877) – the Caspian Sea basin.

Type locality: *Gobius bathybius* was originally described from Svinoi Island, south of Baky, the Caspian Sea, Azerbaijan.

Comment: formerly in the genus *Chasar* Vasil'eva, 1996 but Neilson & Stepien (2009) placed it in *Ponticola*.

Ponticola cyrius (Kessler, 1874) – the Caspian Sea basin.

Type locality: *Gobius cyrius* was originally described from Kura River near Borzhomi, Georgia.

Comment: see Vasil'eva (1995) and Vasil'eva and Vasil'ev (1995) for taxonomy.

Ponticola goebellii (Kessler, 1874) – the Caspian Sea basin.

Type locality: *Gobius goebellii* was originally described from Baku, Azerbaijan.

Comment: regarded as a subspecies of *Ponticola rattan* (Nordmann, 1840) by authors although Naseka & Bogutskaya (2009) give it full species status.

Ponticola gorlap (Iljin, 1949) – the Caspian Sea basin.

Type locality: *Neogobius kessleri gorlap* was originally described from the Caspian Sea and tributary rivers.

Comment: formerly a subspecies of *Gobius kessleri* Günther, 1861. *Neogobius iljini* Vasil'eva and Vasil'ev, 1996 is a synonym.

Ponticola iranicus Vasil'eva, Mousavi-Sabet, Vasil'ev, 2015* (Figure 51) – the Caspian Sea basin.

Type locality: upper Sefidroud River drainage, Tutkabon Stream, 36°50.756'N, 49°35.021'E, Guilan, Iran (Figure 2).

Ponticola syrman (Nordmann, 1840) – the Caspian Sea basin.

Type locality: *Gobius syrman* was originally described from Odessa, Ukraine; Kryni, Ukraine.

Comment: *Ponticola syrman euryostomus* (Kessler, 1877) is the subspecies in the Caspian Sea basin.



Figure 51. *Ponticola iranica*, Gisum Stream, Iran (Photograph by Hamed Mousavi-Sabet).

Genus ***Proterorhinus*** Smitt, 1900

Proterorhinus nasalis (DeFilippi, 1863) – the Caspian Sea basin.

Type locality: *Gobius nasalis* was originally described from the Caspian Sea near Baku.

Comment: previously recognized as *P. marmoratus* (Pallas, 1814); some authors consider it a synonym of this species.

Genus ***Rhinogobius*** Gill, 1859

Rhinogobius similis Gill, 1859** (Figure 52) – the Caspian Sea, Urma Lake and Tedzhen River basins.

Type locality: *Rhinogobius similis* described from Shimoda, Japan

Comment: reported from the Anzali Wetland by Keyvan Abbasi personal comment (Esmaeili et al 2014a). The identification of the introduced *Rhinogobius* in Iran needs further study. Vasil'eva (2007), and Vasil'eva and Kuga (2008) have identified the introduced Central Asian species as *R. cheni* (Nichols, 1931).



Figure 52. *Rhinogobius similis*, Hariroud River, Iran (Photograph by Hamed Mousavi-Sabet).

Genus ***Scartelaos*** Swainson, 1839

Scartelaos tenuis (Day, 1876) – the Tigris River, Persis, Hormuz and Makran basins.

Type locality: Estuaries of Karachi, Sind, Pakistan.

Comment: *Boleophthalmus tenuis* was originally described from Estuaries of Karachi, Sind, Pakistan. It is found on mud flats with *Boleophthalmus dussumieri* and *Periophthalmus waltoni* in Hellehestuary.

Family ***Channidae***

(1 genus and 1 species)

Genus ***Channa*** Scopoli, 1777

Channa gachua (Hamilton, 1822) – Mashkid and Hamun-e Jaz Murian basins.

Type locality: *Ophicephalus gachua* was originally described from Ponds and ditches of Bengal, India.

Comment: formerly placed in the genus *Ophicephalus* but Shrestha (1978) placed in *Channa*.

Discussion. Based on the present checklist, we have documented the presence of 257 species from the Iranian freshwaters that comprising 109 genera, 29 families, 18 orders and 3 classes. Compared with the last published checklist of freshwater fishes of Iran which contains 202 species (Esmaeili et al 2010), the present checklist shows an increase about 27.22% in the number of species (55 species). This increase has resulted mainly by newly recorded species and taxonomic re-evaluations of existing taxa based on new information and adoption of a new systematic concept. For example, in the recent checklist (Esmaeili et al 2010), *Paraschistura* comprised three species but Freyhof et al (2015), Mousavi-Sabet & Eagderi (2015), and Vatandoust & Eagderi (2015) reviewed this genus and described seven new species from Iran.

In contrast with the species number increasing, the habitat degradation, pollution, introduction of exotic fishes and the impact of high kindness to nature are the main threats to this unique ichthyofauna of Iran. Hence, there are many causes for the extinction of some freshwater fish species in Iran. The following some cases will be mentioned.

Chondrostoma orientale and *Aphanius farsicus* are endemic species from the Kor River and Maharlu Lake basins respectively, but in recent years, drought and the indiscriminate use of water from these regions caused the extinction of this species (Teimori et al 2011; Coad 2015).

Oncorhynchus mykiss, *Sander lucioperca* and *Esox lucius* are translocated species, which introduced to many basins by the Iranian Fisheries Organization (Shilat). Following this introduction, due to the piscivorous behaviour of them, caused populations of other endemic and native species (e.g. *Oxynoemacheilus kiabi*) have been declined sharply. However some of the introduced species could not breed naturally (e.g. *Oncorhynchus mykiss*) but this species continue to presence in freshwater habitats by continuing to escape from aquaculture unit (authors observations).

Salmo caspius, *Acipenser stellatus*, *A. nudiventris*, *A. persicus*, *Huso huso*, *Luciobarbus caspius* and *L. capito* are commercially important species in the Caspian Sea basin, but after the construction of dams in watershed including the Sefidroud and Aras rivers populations of these fishes have seen a sharp decline (Ivanov & Katunin 2001).

In this study, some records were disregarded and excluded from Iran's freshwater ichthyofauna for example, *Acanthopagrus latus* which was listed in previous checklists (Esmaeili et al 2010), but the species is naturally limited to the east Asia Shelf, recorded only from the coasts of Honshu, Shikoku and Kyushu Is., Japan, southern Korea, Taiwan, China and northern Vietnam. So it seems previous reports from Iran had some misidentifications on some species, e.g. *A. latus*.

While some invasive species spread rapidly and colonized into aquatic habitats after introduction (e.g. *Carassius auratus*, *Pseudorasbora parva* and *Hemiculter leucisculus*), some of them could not become widespread, and even some ones have failed to establish self-sustaining populations in the wild environment after introduction (e.g. *Mugil cephalus* in the Caspian Sea basin) (Coad 1995; Esmaeili et al 2014b; Jouladeh-Roudbar et al 2015a, 2015b).

Gambusia affinis and *Carassius carassius* are invasive species and listed in the previous studies, *G. holbrooki* was reported from many basins of Iran in recent years. However, only presence of *G. holbrooki* could be confirmed recently according to our morphological result. This species probably has been confused with *G. affinis* and further study is needed to confirm the occurrence of *G. affinis* into inland waters of Iran.

Presence of some species in Iranian freshwaters needs new confirmation. *Pelecus cultratus*, *Pimephales promelas*, *Coregonus lavaretus*, *Oncorhynchus keta*, *Salvelinus fontinalis*, *Stenodus leucichthys*, and *Lota lota*, which were reported in the previous checklists, with no recent caught from Iran.

Some species of *Capoeta* is very similar to each other and this issue makes them difficult to identify, for example in previous checklist from Iran reported *Capoeta capoeta* from the Tigris River basin probably are *Capoeta damascina* with low scale counts (Coad 2015).

However, some new species were reported from single basin or region with very narrow geographically range to each other. For example, *Chondrostoma cyri* shows

narrow distribution range in western river tributaries of the southern Caspian Sea basin (Aras River system). In addition, *Iranocypris typhlops* and *Paracobitis smithi* found only at Loen Cave in Lorestan Province (the Tigris River basin).

Iran and neighboring countries were compared in terms of the numbers of species of freshwater ichthyofauna (Table 2). Nonetheless, this comparison highlights the species richness of Iran is the richest one of any other country. Owing to the increased efforts paid to taxonomic studies carried out in poorly known region of Iran, it will be probable that many new fish species will be recorded from Iran. Additionally, number of the fish species will be increase with the influx of exotic fish species into Iran also should not be ignored.

Although many new species were reported in recent years from Iran in just recent years, there is not still an applicable identification keys, also there are many lack of zoogeography information about freshwater fishes of Iran. Therefore, further research and taxonomic revisions are urgently needed on the freshwater fish fauna of Iran. In this context, we believe that some of the newly reported species are ambiguous and need additional discussion and deliberation by the ichthyological authorities. Not only new records but also old records being revised as new information, which received with the point of view historical data. Errors are thus propagated over long periods. Actually, the same case applies for the freshwater ichthyofauna of Iran.

Precisely for this reason, recent new-recorded fish species from Iran should be carefully evaluated, argued and revised with a deep knowledge and with a wide perspective.

Table 2

Diversity of fishes of neighboring countries

Country	Total species	Endemic	Exotic	Source
Afghanistan	85	-	-	Coad (1981)
Armenia	39	3 (8%)	11 (28%)	Gabrielyan (2001)
Azerbaijan	82	-	4 (5%)	Froese & Pauly (2015)
Iran	202	39 (19%)	23 (11%)	Esmaeili et al (2010)
Iraq	84	-	13 (15%)	Coad (2015)
Pakistan	193	43 (22%)	-	Rafique & Khan (2012)
Syria	73	-	8 (11%)	Froese & Pauly (2015)
Turkey	248	-	-	Fricke et al (2007)
Turkmenistan	64	-	11 (17%)	Froese & Pauly (2015)
Iran	257	73 (28%)	27 (10%)	(The present study)

There are few faunistics studies conducted on eastern parts of Iran. The ichthyofauna of eastern parts of Iran has been still poorly known. Besides distributions of occurrence of some fish species into Iran's water basins are controversial. In this way there is no doubt that exploration of the Iran's fish fauna is still far from complete. Notwithstanding had been conducted many researches on the freshwater fishes of Iran, numerous new records have been expected, as well as a number of endemic species.

Conclusions. An understanding of the diversity of the freshwater ichthyofauna of any country is crucial so that scientists, politicians, resources managers, government and community members can better evaluate the impact of human activities on the freshwater fishes within the country. The freshwater ichthyofauna of Iran still not completed. Therefore, this checklist may provide policy for continuing studies of the freshwater ichthyofauna of Iran. Because of the checklist prepared mainly based on the earlier data provided by previous checklists, in the future more research is required in addition, and refinements of our knowledge of species-level diversity of fauna, major components of which remain poorly understood or in many instances unknown. One must not read too much into this ratio in light of the numerous uncertainties involving the number of freshwater species resident in Iran and the often-demonstrated major gaps in our knowledge of their actual geographic distributions.

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