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First record of the striped bystranka, *Alburnoides taeniatus* (Kessler, 1874) from the Hari River basin, Iran (Teleostei: Cyprinidae)

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Abstract

The striped bystranka, *Alburnoides taeniatus* (Kessler, 1874) (Cyprinidae), is reported from the Hari River basin for the first time. In this report seven specimens were collected in July, 2016. Morphometric and meristic characteristics of the specimens were similar to those reported elsewhere for the species. Based on the obtained results *A. taeniatus* shows some major morphological differences including lacking stitched color pattern (typical in many *Alburnoides* species), having weak scale connection, and presence of a wide flank stripe especially in the formalin and ethanol preserved specimens compared to other members of the genus *Alburnoides*. Therefore, conducting molecular studies to understand its exact taxonomic status is suggested.

Keywords: Tedzhen River, Iran, Zoogeography, Cyprinidae.

1. Introduction

Iran harbors high biodiversity especially in freshwater fish diversity^[1-3] exceeding more than 257 fish species in 106 genera, 29 families and 18 orders distributed in different endorheic and exorheic basins^[3]. Among the Iranian members of the family Cyprinidae, as most diverse family with 111 confirmed species (43.19%), including the genus *Alburnoides* with 12 confirmed species. The members of this genus is found in Europe, Asia Minor and Central Asia with 30 species so far considered as valid^[3-7].

Until 2009, all populations of *Alburnoides* species in Iran were considered as *A. bipunctatus*. Based on recent research works using morphological and molecular data set, 12 species including *A. eichwaldii* (De Filippi, 1863) from the Kura River drainage, *A. namaki* Bogutskaya & Coad, 2009 from Namak Lake basin, *A. nicolausi* Bogutskaya & Coad, 2009 from the Tigris River drainage, *A. qanati* Coad & Bogutskaya, 2009 from the Pulvar River drainage, Kor River basin, *A. idignensis* Bogutskaya & Coad, 2009 from the Bid Sorkh River, Gav Masiab River system, Tigris River drainage, *A. petrubanarescui* Coad & Bogutskaya, 2009 from the Qasemlou Chay, Urmia Lake basin, *A. holciki* Coad & Bogutskaya, 2012 from the Hari River (Tedzhen River) basin, *A. tabarestanensis* Mousavi-Sabet, Anvarifar & Azizi, 2015 from the Tajan River (rivers east of the Safid River), Caspian Sea basin, *A. samiii* Mousavi-Sabet, Vatandoust & Doadrio, 2015 from the Safid River drainage, Caspian Sea basin, *A. parhami* Mousavi-Sabet, Vatandoust & Doadrio, 2015 from Atrak River drainage, Caspian Sea basin, and *A. damghani* Jouladeh Roudbar, Eagderi, Esmaili, Coad & Bogutskaya 2016 from the Cheshmeh Ali (Ali Spring), a Damghan River tributary in the endorheic Dasht-e Kavir basin were considered to occur in Iranian inland waters^[7]. It is expected more species to be recognized as various habitats are examined more closely^[7, 8].

The striped bystranka, *Alburnoides taeniatus* (Kessler, 1874) was reported from Amu Darya basin in Afghanistan^[9, 10], and Karakum Canal, Kopetdag Reservoir and Uzboi lakes^[11, 12] in Turkmenistan. Coad^[10, 13] mentioned that this species may eventually reach the Caspian Sea basin and the Hari River basin of Iran but till now there is no record of this species in Iranian freshwater basins. This species has been now found in the Iranian part of the Hari River basin during an expedition in July 2016 showing its presence in the Iranian freshwater that is reported for first time in this study.

2. Materials and Methods

Seven specimens of *A. taeniatus* were collected from the Hari River in July 2016 during field work on the ichthyofauna of Hari River basin using electrofishing device (Figures 1, 2).

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The collected specimens were preserved in 10% buffered formaldehyde after anesthetizing with 1% clove solution and transferred to the laboratory for further processing. The taxonomic key given by Coad [10] were used to identify specimens.

Counts and measurements follow Hubbs and Lagler [14]. Eight meristic characteristics of the specimens were counted using a stereomicroscope. A total of 28 morphometric features were measured using a caliper to the nearest 0.1 mm. Standard length (SL) was measured from the tip of the upper jaw to the end of the hypural complex, and total length (TL) was measured from the tip of the upper jaw to the end of the longest caudal-fin lobe. Head length and interorbital width were measured to their bony margins. Fin ray counts separate unbranched and branched rays. The last two branched rays articulated on a last compound pterygiophore in the dorsal and anal fins and are noted as "1½". Mean and standard deviation were calculated without the "½". Lateral-line scale count includes pierced scales, from the first one just behind the supracleithrum to the posteriormost one at the base of the caudal-fin rays (i.e., posterior margin of the hypurals) excluding 1 or 2 scales located on the bases of the caudal-fin rays, total number of lateral-line scales is also provided.



Fig 1: Lateral view of *Alburnoides taeniatus* recorded from Hari River, Hari River basin, Iran.



Fig 2: Hari River, natural habitat of *Alburnoides taeniatus*, in the border between Iran and Turkmenistan.



Fig 3: Lateral view of *Alburnus hohenackeri*, found in sympatry with *Alburnoides taeniatus* in Hari River.



Fig 4: Lateral view of *Alburnoides holciki*, found in sympatry with *Alburnoides taeniatus* in Hari River.

3. Results

Seven specimens of *Alburnoides taeniatus* range 36-47 mm (Figure 1) were collected from Hari River near Pol-e Khaton bridge in the Khorasan-e Razavi Province, Hari river basin, Iran (35°57'54.8"N 61°07'05.5"E). The Morphometric measurement and meristic counts of the preserved specimens are presented in Tables 1 and 2. Meristic and morphometric characteristics of the collected specimen were in the range of those reported by Coad [10].

Table 1: Morphometric data for *Alburnoides taeniatus* recorded from Hari River, Hari River basin, Iran (measurement in mm).

Characters	Min	Max	Mean	SD
Total length	47.02	61.11	54.36	7.06
Standard length	36.98	47.66	42.59	5.36
Snout length	2.01	2.46	2.28	0.24
Eye horizontal diameter	2.99	3.54	3.29	0.28
Postorbital distance	4.35	5.49	4.98	0.58
Head length (HL)	9.38	11.54	10.63	1.12
Head depth at nape	7.69	9.73	8.71	1.02
Head depth through eye	5.37	7.13	6.20	0.88
Upper jaw length	2.61	3.58	3.19	0.52
Lower jaw length	2.02	2.95	2.59	0.50
Operculum depth	5.93	7.20	6.51	0.65
Body depth maximal	11.20	14.45	12.96	1.64
Caudal peduncle depth	4.49	5.69	5.07	0.60
Predorsal length	21.31	27.87	24.77	3.29
Postdorsal length	16.56	21.18	19.01	2.32
Prepelvic length	19.48	25.85	22.59	3.19
Preanal length	24.82	33.50	29.15	4.34
Caudal peduncle length	6.92	9.45	8.16	1.26
Dorsal-fin base length	4.64	5.96	5.42	0.70
Dorsal-fin depth	8.34	9.10	8.83	0.42
Anal-fin base length	5.63	7.26	6.64	0.88
Anal-fin depth	6.02	7.04	6.63	0.54
Pectoral fin length	7.28	9.42	8.31	1.07
Pelvic fin length	5.97	7.54	6.77	0.79
Pectoral – pelvic-fin origin distance	9.53	13.42	11.21	2.00
Pelvic – anal-fin origin distance	6.03	7.82	7.07	0.93
Upper caudal-fin lobe length	10.53	13.23	12.12	1.41
Lower caudal-fin lobe length	10.82	14.65	12.77	1.91

Table 2: Meristic data for *Alburnoides taeniatus* recorded from Hari River, Hari basin, Iran

characters	Min	Max	Mean	SD
Total lateral line scales	41	42	41.33	0.58
Scales between lateral line and dorsal-fin origin	6	6	6.00	0.00
Scales between lateral line and anal-fin origin	3	3	3.00	0.00
Anal fin branched rays	11	11	11.00	0.00
Dorsal fin branched rays	8	9	8.33	0.58
Pectoral fin branched rays	10	12	11.00	1.00
Pelvic fin branched rays	7	7	7.00	0.00
Caudal fin branched rays	18	19	18.67	0.58

4. Discussion

Hari River, forming the border of three countries i.e. Iran, Afghanistan and Turkmenistan, is a poorly explored River drainage of Iran due to lacking a proper sampling and limited studies. However, its ichthyofauna, including 10 species has been presented in the book of "Fishes of Afghanistan" by Coad [10]. Whereas Jouladeh-Roudbar *et al.* [3] reported 25 species from this River drainage showing its poor exploration. In addition, this river has been usually dried out in Iranian part even at Sarakhs (northeast of Iran) before construction of the Doosti Dam over the Hari River on the Iran-Turkmenistan border that was inaugurated in 2005 [10, 15].

Hari River origins in the Kuh-e Baba Mountains of Afghanistan and flows west for about 490 km before turning north as the Iran-Afghanistan border for 160 km. At Sarakhs after forming the Iran-Turkmenistan border, it enters Turkmenistan and is eventually lost in the Karakum Desert. Most of the water in the Hari River remains in Afghanistan where it is used for irrigation of the Herat valley. Spring floods (March-April) can increase flow ten-fold for short periods of time. Various tributaries from Iran such as Kashaf River (with the over 300 km long) enter this River drainage [10].

Alburnoides taeniatus was described originally from the Syr Darya as *Alburnus taeniatus* and *Alburnoides taeniatus taeniatus* natio *nikolsky* Turdakov & Piskarev 1955 from Amu-Darya River (Uzbekistan) was considered as synonym. No types of both taxa are available. This species is found in the Amu Darya from the former delta to the mouth of the Surkhan Darya and Kafirnigan Rivers, the Qonduz River near Qonduz, and the Khanabad River at Khanabad [9-1617]. Also, it is reported from the Karakum Canal, Kopetdag Reservoir and Uzboi lakes [11, 12] in Turkmenistan on the northern border of Afghanistan and Iran.

The new record of *A. taeniatus* from the Hari River drainage shows presence of this species in the Iranian part of this basin. Small size of this benthopelagic temperate freshwater fish that reaches up to 9 cm in length, along with lacking economic value may be the reason why this species not drawn the attention of collectors and fishermen. In addition, its superficial similarity to *Alburnus hohenackeri*, an exotic fish of this river [3], may be caused its misidentification (Figure 3). *Alburnus hohenackeri* was most likely introduced to this River by fisheries department into the Doosti Dam Lake along with Chinese carp, including *Hypophthalmichthys molitrix*, *H. nobilis*, and *Cyprinus carpio* that were collected during sampling of this study. In addition, *Rhinogobius similis* (Gobiidae) and *Gambusia holbrooki* (Poeciliidae) were other collected exotic species in the present study. Aquaculture, control of malaria, and accidental introduction can be the main reasons for these introductions [1, 18]. In addition, *Alburnoides holciki* is found in sympatry with *A. taeniatus* in Hari River (Figure 4); hence small sized *A. taeniatus* could be misidentified as juvenile stage of *A. holciki* by previous researchers.

Furthermore, Sal'nikov [12, 19, 20] and Coad [10] mentioned that other species such as *Pseudoscaphirhynchus kaufmanni* (Acipenseridae), *Aspiolucius esocinus*, *Aspius iblioides*, *Luciobarbus conocephalus*, *Capoetobrama kuschakewitschi*, *Alburnus aralensis*, *Parabramis pekinensis*, *Pelecus cultratus*, *Pseudogobio rivularis*, *Rhodeus ocellatus*, *Rutilus aralensis* (Cyprinidae), *Sabanejewia uralensis*, *Misgurnus anguillicaudatus* (Cobitidae), *Oxynoemacheilus oxianus* (Nemacheilidae) and *Oryzias latipes* (Oryziatidae) may be

found in this River entering from Karakum Canal (a 1372 km long diversion from the Amu Darya) of Turkmenistan Berg [16] transferred this species from the genus *Alburnus* to the genus *Alburnoides*. *Alburnoides taeniatus* shows some major morphological differences including lacking stitched color pattern (typical in many *Alburnoides* species), having weak scale connection, and presence of a wide flank stripe especially in the formalin and ethanol preserved specimens compared to other members of the genus *Alburnoides*. Therefore, conducting a molecular studies to understand the exact taxonomic status of *Alburnus* and *Alburnoides* species from Hari River is suggested.

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