Paraschistura delvarii spec. nov. – a new species of stone loach from the Persian Gulf basin, southern Iran (Teleostei: Nemacheilidae)

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Abstract
Paraschistura delvarii, new species, from the Mond River drainage in the Persian Gulf basin, differs from other species of the genus in Iran by having a combination of the colour pattern consisting of marbled colour pattern without distinct bars on the flank, shallow and elongated body, incomplete lateral line extending to the dorsal-fin base, absence of dorsal adipose crest, bold black spot at base of first dorsal-fin rays, scatter scaled body, short and blunt snout, and suborbital groove in males.

Key words
Loach, Taxonomy, Description of a New Species, Gharaghaj River, Middle East.

Introduction

In Iran, members of the genus Paraschistura are widely distributed, commonly in the southern regions, ranging from the Tigris River basin in the West to the Makran and Mashkid basins in the East (Abdoli et al., 2011; Vatandoust & Eagderi, 2015; Freyhof et al., 2015) (Fig. 1). The nemacheilid loaches of the genus Paraschistura in Iran were reviewed by Freyhof et al. (2015), but given such a mentioned wide distribution of this genus in Iranian waters, not all of its populations have been fully examined; therefore from 2012 to 2014, we collected and
examined materials of *Paraschistura* throughout southern Iran. Comparing the collected loach from the Persian Gulf basin (Fig. 1) with nominal species based on morphological characters, as well as colour patterns and suggested molecular data by Freyhof et al. (2015), it was revealed that they represent an unnamed species which is described in this publication as new taxon.

**Material and Methods**

After anaesthesia, all fishes were fixed in 5% formaldehyde and stored in 70% ethanol. The morphological measurements were made by a dial caliper and recorded to the nearest 0.1 mm. All measurements were made point to point, never by projections. Methods for counts and measurements follow Kottelat & Freyhof (2007). Standard length (SL) was measured from the tip of the snout to the end of the hypural notch. The length of the caudal peduncle was measured from behind the base of the last anal-fin ray to the end of the hypural notch, at mid-height of the caudal-fin base. The last two branched rays articulating on a single pterygiophore in the dorsal and anal fins are noted as “1½”. In the present study, the *Paraschistura* species from Afghanistan, Pakistan and Turkey are excluded from comparison as: (1) due to the wide geographical separation and morphological differences with regards to the congeners in southern Iran, (2) we had no access to the type specimens or type localities, and (3) based on original descriptions and available literatures (Vatandoust & Eagderi, 2015; Freyhof et al., 2015) they are already superficially very different from the species discussed here. Also in Iranian endemic species, *P. susiani* is compared based on original description.

**Abbreviations used:** SL, standard length; HL, lateral head length; GUIC, Collection of the Ichthyology Museum, Department of Fisheries Sciences, Faculty of Natural Resources, the University of Guilan, Guilan province, Iran; VMFC, Vatandoust and Mousavi-Sabet Fish Collection, Tehran.
Results

**Paraschistura delvari, new species**

Fig.: 2 – 5

Material examined

**Holotype:** VMFC PSD1-H: 38.0 mm SL. Iran, Fars prov.: upstream of Mond River, Mond River drainage, the Persian Gulf basin, 29°40′22″ N, 52°08′57″ E, 13 August 2013, H. Mousavi-Sabet & S. Eagderi.

**Paratypes:** VMFC PSD1-P1 to VMFC PSD1-P5: 5 specimens, 27.2 – 42.1 mm SL, same data as holotype. GUIC PSD1-P6 and GUIC PSD1-P7: 2 specimens, 31.1 – 35.2 mm SL, same data as holotype.

Comparative Material

*Paraschistura abdolii*: VMFC PSL4: 35 exs., 21.9 – 60.5 mm SL. Iran, Kerman prov.: Halilroud River, the Hamun-e-Jaz Murian basin, H. Mousavi-Sabet & S. Eagderi.

*Paraschistura aredvii*: VMFC PSA9: 27 exs., 24.0 – 55.3 mm SL. Iran, Khouzestan prov.: stream Kheir-Abad at Kheir-Abad, Mohammad Amin.

*Paraschistura bampurensis*: VMFC PSB-B: 12 exs., 39 – 43 mm SL. Iran, Sistan-and-Baluchistan prov.: a qanat near Bampour, S. Eagderi and M. Nasri.


*Paraschistura hormuzensis*: VMFC PSH2: 34 exs., 26.2 – 51.1 mm SL. Iran, Hormozgan prov.: Rudan River, the Hormuz basin, H. Mousavi-Sabet & S. Eagderi.

*Paraschistura ilamensis*: VMFC PSI3-H: holotype; VMFC PSI3-P: 30 exs., paratypes.

*Paraschistura kessleri*: VMFC PSLK: 9 exs., 33 – 42 mm SL. Iran, Sistan-and-Baluchistan prov.: Mashkid River, near Sarbaz Town, S. Eagderi.

*Paraschistura naumanni*: VMFC PSN7: 10 exs., 34.1 – 49.3 mm SL. Iran, Fars prov.: spring Golab, near Darab, the Hormuz basin, H. Mousavi-Sabet & S. Eagderi.

*Paraschistura nielseni*: VMFC PSM: 21 exs., 31 – 49 mm SL. Iran, Bushehr prov.: Shapur River, S. Eagderi and H. Mousavi-Sabet.

*Paraschistura turcomana*: VMFC PST: 11 exs., 41 – 53 mm SL. Iran, Khorasan prov.: a stream near Dargaz, at the border of Turkmenistan, H. Mousavi-Sabet, A. Jouladeh & B. Ganjbakhsh. MMSU P-57353: 1 ex.; MMSU P-5734: 3 exs.; Synotypes of *Paraschistura turcomana*.

*Oxynoemacheilus persa*: VMFC OXP: 10 specimens, 59.5 – 68.7 mm SL. Iran, Fars prov.: upstream of Mond River, Mond River drainage, the Persian Gulf basin, H. Mousavi-Sabet & S. Eagderi.

Diagnosis

*Paraschistura delvari* sp. nov. can be distinguished from all known species in Iran by having a combination of the colour pattern consisting of marbled colour pattern without distinct bars on the flank (vs. vertical bars in all *Paraschistura* species, with the exception of *P. turcomanica*), thin and elongated body (vs. stout body in *P. cristata, P. bampurensis, P. ilamensis* and *P. nielseni*), absence of dorsal adipose keel (vs. presence a deep dorsal adipose keel with procurent rays in *P. cristata*), an incomplete lateral line, extending to the dorsal-fin base (vs. complete and reaching to caudal-fin base in *P. cristata*, lateral line usually reaching beyond dorsal fin base in *P. hormuzensis* and *P. bampurensis*), scatter scaled body (vs. completely scaleless in *P. kessleri*, and *P. turcomanica*; predorsal flank scaleless in *P. abdolii*), blunt snout (vs. pointed in *P. hormuzensis* and *P. bampurensis*), and suborbital groove in males (vs. without suborbital flap or groove in *P. naumannii* and *P. aredvii*; suborbital flap in *P. bampurensis*, *P. hormuzensis*, *P. susiani*, and *P. ilamensis*).

Description


**Colouration.** In live specimens (Fig. 5) body is cream yellow above lateral line and becomes faint from lateral line to ventral surface, with dark to pale brown marbled pattern on flank and back, without distinct bars at least in the study specimens (less than 52.1 mm in total length). An obvious dark spot at the base of dorsal fin. A thick and obvious black bar at caudal-fin base. Upper part of
Table 1. Morphometric data of *P. delvarii* sp. nov. (n = 7). H, holotype.

<table>
<thead>
<tr>
<th>Morphometric character</th>
<th>H</th>
<th>min</th>
<th>max</th>
<th>mean</th>
<th>SD</th>
</tr>
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<tbody>
<tr>
<td><strong>In percent of standard length</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head length</td>
<td>24.6</td>
<td>21.7</td>
<td>24.7</td>
<td>23.4</td>
<td>1.4</td>
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<tr>
<td>Body depth at dorsal-fin origin</td>
<td>13.5</td>
<td>12.0</td>
<td>13.5</td>
<td>12.7</td>
<td>0.8</td>
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<tr>
<td>Prepectoral length</td>
<td>26.1</td>
<td>21.0</td>
<td>25.3</td>
<td>22.6</td>
<td>2.0</td>
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<tr>
<td>Predorsal length</td>
<td>51.5</td>
<td>52.5</td>
<td>55.8</td>
<td>54.7</td>
<td>1.8</td>
</tr>
<tr>
<td>Postdorsal length</td>
<td>36.0</td>
<td>33.8</td>
<td>35.8</td>
<td>34.6</td>
<td>0.9</td>
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<tr>
<td>Preanal length</td>
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<td>80.4</td>
<td>81.3</td>
<td>80.7</td>
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<tr>
<td>Prepelvic length</td>
<td>54.8</td>
<td>54.9</td>
<td>56.8</td>
<td>56.2</td>
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<td>Distance between pectoral and pelvic-fin origins</td>
<td>32.4</td>
<td>32.6</td>
<td>35.9</td>
<td>34.4</td>
<td>1.4</td>
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<tr>
<td>Distance between pelvic and anal-fin origins</td>
<td>25.6</td>
<td>24.6</td>
<td>27.2</td>
<td>25.9</td>
<td>1.1</td>
</tr>
<tr>
<td>Distance between vent and anal-fin origin</td>
<td>4.3</td>
<td>2.9</td>
<td>4.3</td>
<td>3.6</td>
<td>0.5</td>
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<td>Depth of caudal peduncle</td>
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<td>6.3</td>
<td>10.1</td>
<td>8.5</td>
<td>1.7</td>
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<tr>
<td>Length of caudal peduncle</td>
<td>11.0</td>
<td>11.4</td>
<td>15.5</td>
<td>14.1</td>
<td>1.8</td>
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<tr>
<td>Dorsal-fin depth</td>
<td>13.8</td>
<td>13.9</td>
<td>18.4</td>
<td>16.6</td>
<td>2.1</td>
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<td>Anal-fin base length</td>
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<td>6.5</td>
<td>9.3</td>
<td>7.4</td>
<td>1.5</td>
</tr>
<tr>
<td>Pectoral-fin length</td>
<td>21.0</td>
<td>15.8</td>
<td>20.6</td>
<td>18.4</td>
<td>2.3</td>
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<tr>
<td>Pelvic-fin length</td>
<td>16.9</td>
<td>14.2</td>
<td>16.8</td>
<td>15.2</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>In percent of head length</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head depth at eye</td>
<td>44.0</td>
<td>40.4</td>
<td>44.2</td>
<td>42.8</td>
<td>1.5</td>
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<tr>
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<td>37.8</td>
<td>48.2</td>
<td>41.3</td>
<td>4.5</td>
</tr>
<tr>
<td>Eye diameter</td>
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<td>16.0</td>
<td>21.1</td>
<td>18.6</td>
<td>2.1</td>
</tr>
<tr>
<td>Postorbital distance</td>
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<td>44.2</td>
<td>50.6</td>
<td>46.5</td>
<td>3.2</td>
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<tr>
<td>Maximum head width</td>
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<td>48.4</td>
<td>59.3</td>
<td>53.6</td>
<td>4.6</td>
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<tr>
<td>Interorbital width</td>
<td>27.5</td>
<td>28.2</td>
<td>38.7</td>
<td>31.8</td>
<td>4.5</td>
</tr>
</tbody>
</table>

Fig. 2. *Paraschistura delvarii*, VMFC PSD1-H: 38.0 mm SL; Iran: Mond River drainage, holotype.
head, opercula and snout covered by dark brown small blotches. Dorsal and caudal fins with irregular dark spots, except distally so the fin margin is white. The lateral line is light, sometimes in marked contrast to the rest of the flank. In preserved specimens body is whitish with irregular dark brown marbled pigmentation in dorsal and lateral parts. The belly is white, and all fins are hyaline (in preserved specimens).

**Distribution.** *Paraschistura delvarii* sp. nov., is known from upstream tributaries of Gharaghaj River, Mond River drainage, the Persian Gulf basin, in Fars province, southern Iran.

**Etymology.** The species name *delvarii* is in honor of “Rais-Ali Delvari” (1882–1915), the anti-colonialism in Bushehr province, the region where the Mond River drainage (type locality of *P. delvarii*) is located. Rais-Ali Delvari now remembered as the national hero of Iran.

**Remarks**

The presence of *Paraschistura* in the Persian Gulf basin was firstly reported by Banarescu & Nalbant (1966), who identified it, as *Nemacheilus bampurensis* (*Paraschistura bampurensis*). After that, Nalbant & Bianco (1998) separated the *Paraschistura* specimens from the Persian Gulf basin as distinct taxa and described them as a new species, *Paraschistura nielseni*. There are two main drainages in the Persian Gulf basin including Shapour-Dalaki and Gharaghaj-Mond rivers. *Paraschistura delvarii* sp. nov., is described from Gharaghaj-Mond drainage, while *P. nielseni* is found in Shapur-Dalaki drainage.

Beside color pattern and elongated body, *Paraschistura delvarii* sp. nov., is distinguished from *P. nielseni* which is described from the same basin, by longer snout and barbels, and caudal fin with irregular dark spots (vs. 3 distinct rows). In the Mond River drainage, *Oxynoemacheilus persa* (Fig. 6) occurs in sympatry with...
Fig. 4. *Paraschistura delvarii*, VMFC PSD1-P and GUIC PSD1-P: a: 38 mm SL; b: 36 mm SL; c: 35 mm SL, and d: 33 mm SL, Iran: Mond River, paratypes.

Fig. 5. *Paraschistura delvarii*, VMFC PSD1-H, 38.0 mm SL; Iran: Mond River, holotype.

Fig. 6. *Oxynoemacheilus persa*, VMFC OXP, 45 mm SL; Iran: Mond River.
P. delvarii sp. nov., which is superficially differs from P. delvari sp. nov.

Paraschistura delvarii sp. nov., is further distinguished from P. kessleri and P. turcmenica by scaled body (vs. completely scaleless); from P. cristata by incomplete lateral line and absence of dorsal adipose crest (vs. lateral line complete, caudal peduncle with a prominent dorsal adipose crest supported by 22 – 25 procurent caudal-fin rays); from P. abdolii by suborbital groove in males, scatter scaled body (vs. suborbital flap or groove absent, predorsal flank scaleless, scales present on caudal peduncle); from P. naumanni and P. aredvi by presence of suborbital groove in male (male without suborbital flap or groove); from P. ilamensis and P. susiani by suborbital groove in males, bold black spot at base of first dorsal-fin rays, shallow caudal peduncle (vs. suborbital flap in males, faint black spot at base of first dorsal-fin rays or spot absent, deep caudal peduncle).

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References


