



## Morphological characteristics of *Paracobitis longicauda* (Cypriniformes: Cobitidae) in the Sherabad River and its tributaries

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### ABSTRACT

The article presents the results of studies on the morphological and morphometric characteristics of the species *Paracobitis longicauda* (Kessler, 1872), collected in the summer of 2022 (06.06.2022) from the Sherabad River and its right tributary of Loyliksoy. The exact coordinates of the area, where the samples were taken, were obtained and a geographical map was drawn up. As ichthyological material, morphological, morphometric, and visual observations were made on samples ( $n=23$ ) with  $TL=66.1-142.3$ ,  $SL=54.4-121.2$  mm. Information on the distribution and description of the natural range of *Paracobitis longicauda* in the Republic is presented. Numerical data on meristic and plastic parameters are presented in tabular form.

### INTRODUCTION

#### Natural habitat:

*Paracobitis longicauda* (Kessler, 1872) was first described by **Kessler (1872)** and he noted at Fedchenko as the only specimen 140 mm long, brought from the basin of the Zarafshan River (Ak darya). **Berg (1949)** conducted a study of samples collected in the village of Darband on the Sherabad River (Fig. 633. Eastern crown-throated nudibranch. Sherabad River, Darband village, VI 1912). **Nikolsky (1938)** conducted research on a sample taken from the Surkhan River. (Photo 46. *Nemacheilus malapterurus longicauda* Kess. Mature sample. Surkhan, R-2522). **Amanov (1985)** noted that it can be found from the lower part of the Amudarya to the upper part, that is, in Surkhandarya, Sherabad River, in the part where the population of Darband settlements. It is reported that it is widespread in Central Asia and favors the upper reaches of rivers (**Mirabdullayev et al. 2002; Mirabdullayev et al. 2011**).

#### Studied state:

Researches on *Paracobitis longicauda* were carried out by Uzbek scientists and foreign researchers: Hamed Mousavi-Sabet et al. (**Mousavi-Sabet et al. 2013**), Hamid Reza

Esmaeili et all. (Esmaeili et all. 2018), Brain W. Coad (Coad, 2015), Jorg Freyhof et all (Freyhof et all. 2014), Bakhtiyar Kamilov et all. (Kamilov et all. 2004), Z.A. Mustafayeva and U.T. Mirzaev (Mustafayeva & Mirzaev, 2018).

This work aimed to present the morphological and morphometric characteristics of the *Paracobitis longicauda* (Kessler, 1872), collected in the summer of 2022 from the Sherabad River and its right tributary of Loyliksoy, Uzbekistan.

## MATERIALS AND METHODS

### Methodology:

Collection, sorting, fixation and processing of fish samples, as well as morphometric measurements-calculation works by I.F. Pravdin made on the basis of a dimensional drawing proposed by (Pravdin, 1966). Millimeter was used as a unit of length measurement. During statistical processing of the material, the calculation of the average indicator (M), its error (m), average square limitation ( $\sigma$ ) and coefficient of variation (Cv%) were calculated according to G.F. Lakin methods (Lakin, 1990).

### Materials:

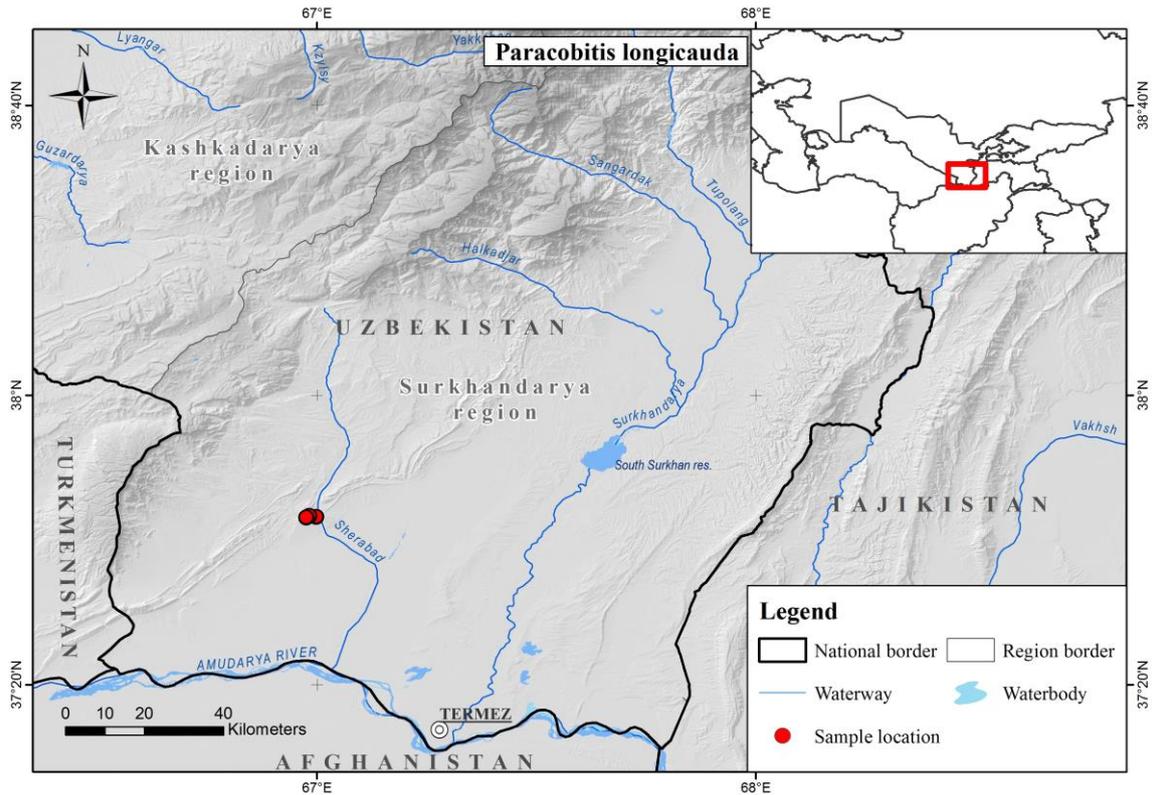
Specimens were collected in the summer season of 2022 (06.06.2022) from the Sherabad River, a tributary of the Amudarya river basin, and from its right tributary Loyliksoy stream ( $n=23$ ) (37°43'14.33"N, 66°59'52.60"E, 37°43'20.85"N, 66°58'57.03"E; 37°43'9.00"N, 66°58'30.43"E) (Fig. 1). They were fixed in 10 % formalin solution in the field and 4 % formalin solution in the laboratory.

Morphological and morphometric studies were carried out on samples of *Paracobitis longicauda*, the smallest body size of which was  $SL=54.4$  mm, and the largest was 121.2 (average 66.2) mm. The data were not separated into male and female.

### Classification

According to the morphological features of *Paracobitis longicauda*, the body color is pale yellow. The sides of the abdomen and lower part of the head were white in color. The top and sides of the body are covered with black spots of various shapes in young and small specimens. In big-sized samples ( $SL=121.2$  mm), the spots can be viewed clearly in the abdomen (Fig. 2). These spots become smaller and thicker on the neck and head (Fig. 3). Black spots on the body are extended along the body and if you draw a fantastically long line along the body, they are on the same level and do not fall below the base of the pectoral fin (on the ventral side). Spots are present on all fins, except for the ventral ones. In small species ( $SL 60\pm 5$  mm) the spots are imperceptible or absent, and all mustaches of adults or sized specimens are in good condition. The tail fins are undercut, with rounded corners.

It is mainly distributed in slow-flowing, clogged sections of the stream. It has been observed to form an association with species such as *Sabanejewia aralensis*, *Varicorhinus capoeta steindachneri* in the underwater ecosystem.



**Fig. (1).** Sample collection points. Surkhandarya region of the Republic of Uzbekistan, Sherabad district, Loyliksoy stream of the Sherabad River



**Fig. (2).** Ventral view of a large-sized of *Paracobitis longicauda*. (Author of the photo: A. Quvatov)



**Fig. (3).** Anterior view of a large-sized of *Paracobitis longicauda* and its structure of the head and whiskers were illustrated. (Author of the photo: A. Quvatov)

## RESULTS

### Meristic features:

Morphological and morphometric tests were carried out on the materials, and design parameters were determined. According to tests, meristic symptoms were as follows: According to number of shadows on the pectoral fins: dorsal (*D*) III (II) 7, anal (*A*) III 5 (calculated by adding the last two setae of the anal fin), ventral (*V*) I 7, pectoral (*P*) I 9, caudal (*C*) 21-23 (only branched scales were counted), the number of coins in the lateral line was 100-105 (average, 101.1).

The external appearance of the sample with the length  $TL=68.4$  mm,  $SL=57.2$  mm is presented in **Fig. (4)**.



Figure 4. General view of *Paracobitis longicauda* collected in June 2022 from the lower side of the Loyliqsoy stream of the Sherabad River. Samples were stored in 4% formalin solution. (Author of the photo: A. Quvatov)

### Plastic features:

As a percentage of body length forehead width (*io*) 13.1%, eye diameter (*o*) 10.1%, body height (*H*) 10.5%, anal fin base length (*IA*) mean volatility 10.0 %; head length (*c*) 3.8%, head behind eyes (*po*) 6.8%, head height (*hc*) 8.8%, lower body height (*h*) 6.9%, antidorsal distance (*aD*) 3.5%, postdorsal distance (*pD*) 4, 1%, length of the tail axis (*lca*) 9.6%, length of the base of the humeral fin (*ID*) 6.4%, height of the humeral fin (*hD*) 8.6%, height of the anal fin (*hA*) 5.9%, length of the pectoral fin (height) (*IP*) was 8.3%, the length of the ventral fin (height) (*IV*) was 7.0%, the distance between the pectoral and ventral fins (*PV*) was 6.5%, the distance between the ventral and anal fins (*VA*) – 5.0%.

As a percentage of head length forehead width (*io/c*) accounted for 12.7% of mean variability, eye diameter (*o/c*) accounted for 9.9%, head behind eye area (*po/c*) accounted for 6.8%, per head height (*hc/c*) was 7.6% and was expressed as low variability.

No high variability was observed in the parameters of plastic features of *Paracobitis longicauda* samples. The indicators of plastic features are presented in **Table (1)**.

**Table (1). Indicators of plastic features of *Paracobitis longicauda* species in the Sherabad River ( $n=23$ )**

Characteristics	Min-Max	M $\pm$ m	$\sigma$	Cv, %
<i>SL</i> (mm)	54-121	66.2 $\pm$ 3.2	15.2	3.8
In % of body length ( <i>SL</i> )				
<i>c</i>	21.5-25	23.2 $\pm$ 0.2	0.9	3.8
<i>o</i>	2.5-3.8	3.3 $\pm$ 0.1	0.3	10.1
<i>po</i>	9.7-12.3	11.3 $\pm$ 0.2	0.8	6.8
<i>hc</i>	9.9-15	12.2 $\pm$ 0.2	1.1	8.8
<i>io</i>	4.8-7.4	6.1 $\pm$ 0.2	0.8	13.1
<i>H</i>	12.4-19.3	17.1 $\pm$ 0.4	1.8	10.5
<i>h</i>	8.3-11.1	9.7 $\pm$ 0.1	0.7	6.9
<i>aD</i>	44.6-52.6	49.7 $\pm$ 0.4	1.8	3.5
<i>pD</i>	36.7-43	39.3 $\pm$ 0.3	1.6	4.1
<i>lca</i>	12.1-19	16.5 $\pm$ 0.3	1.6	9.6
<i>ID</i>	10-13	11.7 $\pm$ 0.2	0.8	6.4
<i>hD</i>	14.9-21.4	18.5 $\pm$ 0.3	1.6	8.6
<i>IA</i>	6.3-8.8	7.6 $\pm$ 0.2	0.8	10.0
<i>hA</i>	13.6-16.7	15.1 $\pm$ 0.2	0.9	5.9
<i>IP</i>	12.4-19.6	17.1 $\pm$ 0.3	1.4	8.3
<i>IV</i>	12.4-16.7	14.8 $\pm$ 0.2	1.0	7.0
<i>PV</i>	26.8-33.8	31.2 $\pm$ 0.4	2.0	6.5
<i>VA</i>	19.5-24.8	21.8 $\pm$ 0.2	1.1	5.0
In % of head length ( <i>c</i> )				
<i>o/c</i>	10.5-16.7	14.3 $\pm$ 0.3	1.4	9.9
<i>po/c</i>	42.9-53.8	48.8 $\pm$ 0.7	3.3	6.8
<i>hc/c</i>	46.2-64.3	52.3 $\pm$ 0.8	4.0	7.6
<i>io/c</i>	21.1-30.8	26.4 $\pm$ 0.7	3.3	12.7

**Note:** *SL* – Is the length of the fish without a tail, *c* – Is the length of the head, *o* – Is the diameter of the eye, *po* – Is the length of the head behind the eyes, *hc* – Is the height of the head at the throat, *io* – Is the width of the forehead, *H* – Is the highest part of the body, *h* – Is the lowest part of the body, *aD* – antidorsal distance, *pD* – postdorsal distance, *lca* – length of the tail axis, *ID* – length of the base of the humeral fin, *hD* – height of the humeral fin, *IA* – length of the base of the anal fin, *hA* – height of the anal fin, *IP* – length of the pectoral fin, *IV* – length of the pelvic fin, *PV* – distance between the pectoral and ventral fins, *VA* – distance between the pelvic and anal fins, *o/c* – ratio of eye diameter to head length, *po/c* – ratio of occiput to head length, *hc/c* – Is the ratio of head height to head length, *io/c* – Is the ratio of forehead width to head length.

## DISCUSSION

Samples with average dimensions  $SL=66.17$  mm and number  $n=23$  was used. In relation to the length of the body without a tail (*SL*), it is 1/4 of the length of the head 1/5 of the total length (*TL*). And this is K.F. Kessler explains that the morphological features of the mentioned species are the same as in the original record (Kessler, 1872). Head length without tail 8.0 times, maximum body height 6.2 times, minimum body height 11.1 times, antidorsal distance 2.1 times, postdorsal distance 2.5 times, tail axis length 6.01 times, the distance

between the pectoral and ventral fins is 3.1 times, the abdomen and the distance between the fins of the anal fin are 4.7 times less than the length of the head (average 15.3 mm); it was found that the diameter of the eye is 7.6 times, the section of the head behind the eyes is 1.9 times, the height of the head is 1.9 times, the width of the forehead is 3.8 times less.

## CONCLUSION

Morphometric observations of *Paracobitis longicauda* samples taken from the Loyliksoy stream of Sherabad River, show that the coefficient of variation of plastic features can range from 3.8 to 13.1% (7.8% on average). When taking indicators of signs in relation to the length of the body and head, high variability was not observed in them. When compared with literary sources (Kessler, 1872; Berg, 1949, 2; Amanov, 1985), there was no significant difference between morphological and morphometric parameters between early and modern samples. Descriptions based on morphological features were explained with color photographs.

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## CONTRIBUTION OF AUTHORS IN THE ARTICLE

Materials collection and fixation works were done by A. Quvatov and M. Atamuratova. Cameral processing, calculation, article formation by A. Quvatov. Editing was carried out by U. Mirzaev.

## CONFLICT OF INTEREST

There were no conflicts between the authors on the collection, sorting, cameral processing, and distribution of the materials.

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