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Biological Features of the Spotted Thicklip Loach, Triplophysa Strauchii, of the Chirchik River in Uz-Bekistan

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Annotation: In May 2023, the biological features of the spotted thicklip loach (Triplophysa strauchii) were studied in the Chirchik River, Tashkent region, Uzbekistan. The fol-lowing meristic characters of loach were determined: D III-IV 7-9, A III 5, 11-17 rakers on the first gill arch. The body is naked. The caudal peduncle at the base (behind the anal fin) is not compressed from the sides. The nostrils are located close to each other. The plastic characters of the sloth bear are given. It reaches sexual maturity at a standard body length of 5-6 cm, a total body weight of 2-4_ g. The ratio of sexually mature females to males was 2.1: 1. Individual absolute fe-cundity was 240 - 5700 eggs. In May, in the gonads at the IV stage of maturity, the eggs were 0.3 - 0.9 mm in diameter. Small, non-commercial fish, numerous in the Chirchik River in the middle reaches.

Keywords: Spotted thicklip loach, Triplophysa strauchii, meristic features, plastic features, fe-cundity, river Chirchik, Uzbekistan.

The spotted sloth bear (Triplophysa strauchii (Kessler, 1874)) was accidentally introduced into the Damachi fish farm (Tashkent region) in the 1950s during the import of tench (Tinca tinca) from the Almaty region. The tench did not survive in the ponds, but the spotted sloth bear did, experienced a population boom, penetrated into the middle reaches of the Chirchik and Akhangaran rivers, and the Boz-Su canal (near Tashkent) and became widespread there (Kamilov, 1965; Salikhov, Kamilov, 1995). The spotted sloth bear became a widespread non-commercial fish in the middle reaches of the Chirchik, where more than 20 generational changes occurred. However, the biological characteristics of the species in its new habitat have been poorly studied. The aim of this work was to determine the biological features of the spotted sloth bear under modern conditions in the Chirchik River.

Characteristics of the research region. The rivers of the Chirchik basin flow down the slopes of the Talas Alatau Mountains and its southwestern spurs and irrigate the Tashkent oasis of Uzbekistan. The Chirchik River itself is formed at the confluence of the Chatkal (the main component) and Pskem Rivers. The area of the Chirchik basin reaches 18,061 km2. The length of the river is 155 km, from the source of the Chatkal River - 328 km. In the upper section (about 30 km), the Chirchik flows in a canyon, below the valley widens and loses the characteristic features of the relief. The Chirchik River is fed by mixed, mainly snow. The average water flow in the upper reaches of the river is 221 m³ / sec. Ice phenomena are observed from November to March. The climate in the Tashkent region is sharply continental, moderate. In the flat part, the summer is hot (the average monthly air temperature in July is about 29°C, during the day it often reaches 35-42°C, and can be higher). Winter is quite cold (the average monthly temperature in January-January is -2°C, reservoirs with stagnant water are often covered with ice for up to 1.5 months).

Material and methods. Samples of spotted sloth bear were collected in May 2023. In research catches with a fine-mesh seine in the Chirchik channel (Fig. 1), we identified spotted sloth bear (Salikhov et al., 2001). All caught fish were fixed in a 4% formalin solution.

All fish were measured for total body length (TL, cm), standard body length without the caudal fin (SL, cm) with an accuracy of 1 mm. The total body weight (Q, g) was also determined with an accuracy of 0.1 g. Meristic features were calculated. Each individual was straightened, placed on its right side on a mat next to a ruler, and carefully photographed with a digital camera "Cannon" at a strict right angle of the lens axis to the plane on which the fish was.

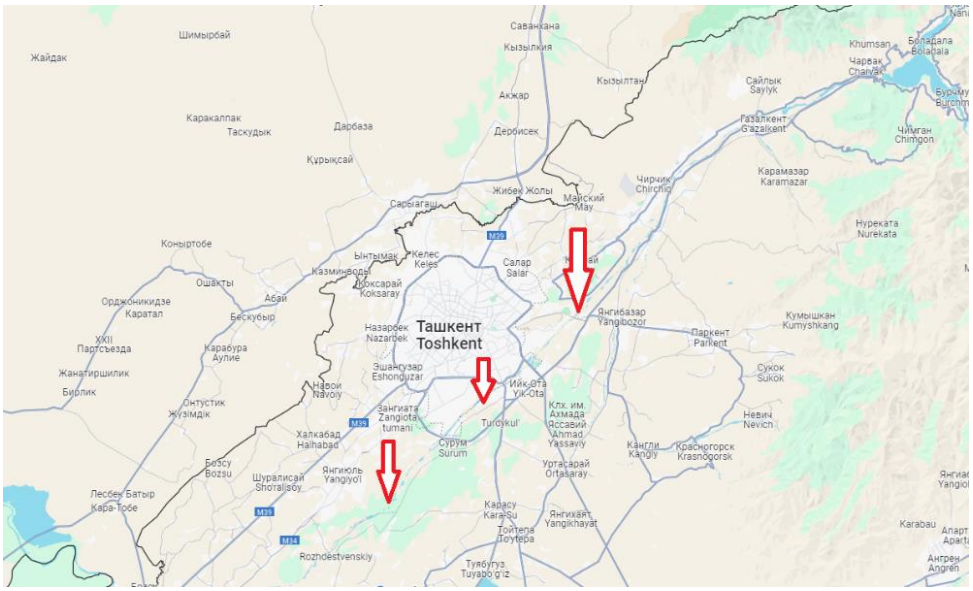

Fig. 1. Chirchik River basin, arrows indicate sample collection sites

The plastic indices were measured on a computer using digital photographs with the Ruler tool in Photoshop; the scale was determined and the results were converted into absolute units of length (mm). Classic plastic characteristics were measured using the measurement scheme for carp (Pravdin, 1966). Ten landmarks were established along the perimeter of the fish body (Fig. 2), straight lines between the landmarks were measured, and the so-called “truss protocol” was compiled (Strauss, Bookstein, 1982; Strauss, Bond, 1990). The measurements were indicated in the following format: for example, “2–4” indicates a straight-line measurement between landmarks 2 and 4. Absolute measurements of plastic characteristics were converted into indices in % of the standard body length; head measurements were also converted into % of the head length. Statistical parameters including the coefficient of variation (Cv, %) were calculated; for statistical tests, P values ≤ 0.05 were considered significant.

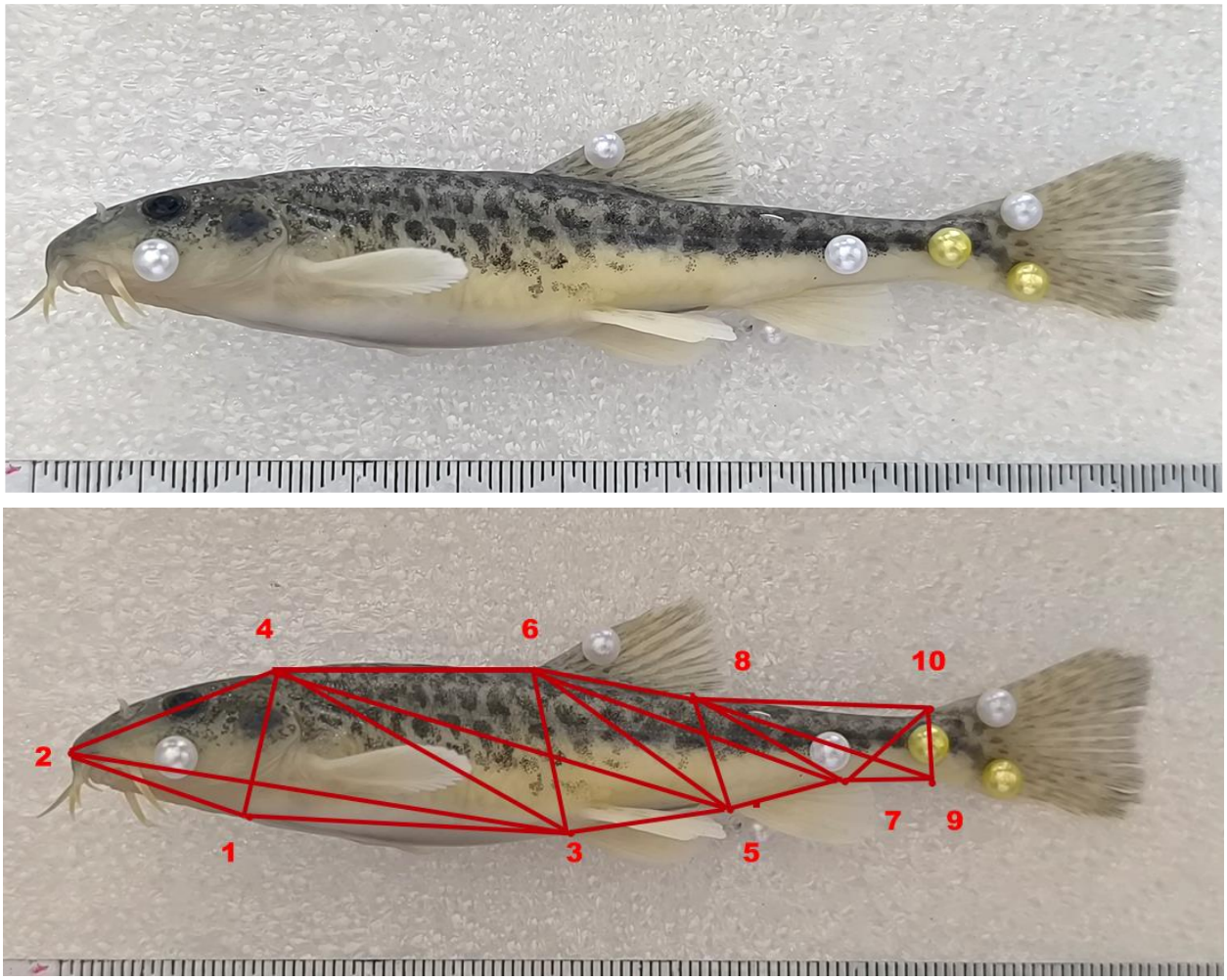

Fig. 2. Spotted sloth beetle, general appearance (top), reference points for the diameter of the body shape of the spotted sloth beetle and constructed truss measurements (bottom)

During dissection, the sex of the individual and the maturity stage of the gonads were determined, and the gonads were completely removed. The maturity coefficient was calculated as the ratio of the gonad mass to the total body mass in percent. Samples of gonads (about 0.5 g) were taken from females and fixed in a 4% formalin solution. In laboratory conditions, the number of eggs (yolk oocytes) in the sample was counted and absolute fertility was determined. In a microfilm reader "Mikrofot-5PO-1", the contours of 100 random eggs were drawn in a row and the half-sum of each was determined as the size of the sex cell. For each individual, statistical indicators of the size of mature eggs were determined.

Results. A total of 44 specimens of the spotted sloth bear with a total length of 6.5–15 cm, a standard length of 5.5–13 cm, and a total weight of 2–28 g were analyzed. A strong relationship was found between the standard body length and the total body length of the sloth bear, which is reliably

described by the linear regression equation: SL = 0.89*TL – 0.6 (r = 0.99). A strong positive relationship was also found between the total body weight and the standard body length: Q = 0.016*SL2.946 (r = 0.97) (Fig. 3).

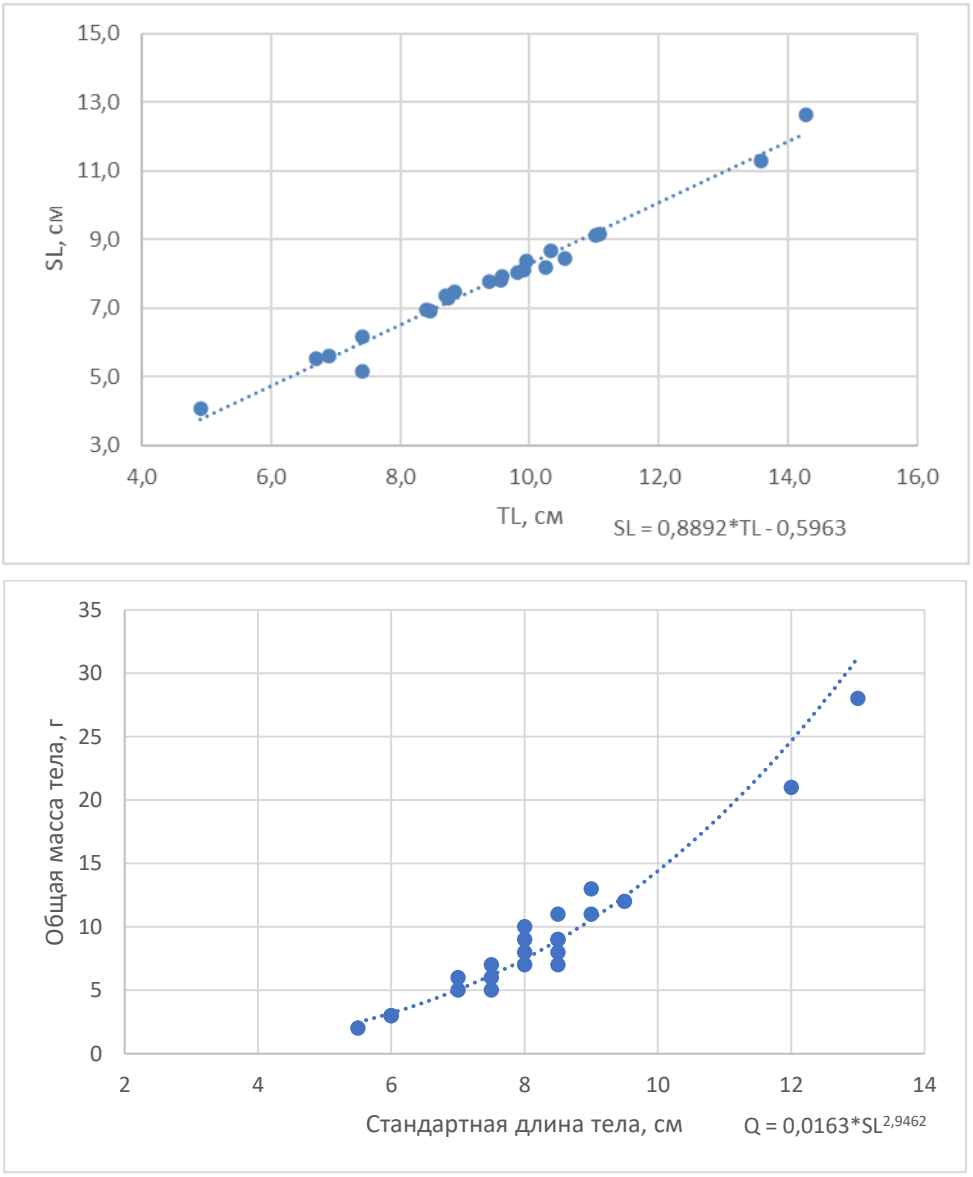

Fig. 3. Dependence of standard length on total body length (top) and total weight on standard body length (bottom) of spotted sloth bear from the Chirchik River, 2023

Meristic indices. The formula of the rays of the dorsal fin of the spotted sloth bear is determined as D III-IV 7-9, in A III 5 rays. On the first gill arch, 11-17 rakers were identified. The spotted sloth bear has a spindle-shaped naked (without scales) body. It is clearly visible that the caudal peduncle behind the anal fin at the base is not compressed from the sides.

The indices of the plastic indices of the spotted sloth bear according to the classical scheme for carp fish are given in Table 1, according to the "truss-protocol" - in Table 2.

Table 1. Indices of plastic features of the Tashkent sloth bear (%% of the standard body length), Chirchik River, 2023

Indicator	Minimum	Maximum	*Average + Sx*	*Cv, %*
In %% of standard body length				
Total body length	112,8	143,7	121,68 + 1,13	4,4
Torse length	70,6	78,9	75,86 + 0,33	2,1
Snout length	8,9	12,7	10,14 + 0,19	8,8

Eye diameter	3,5	6,3	4,83 + 0,13	12,8
Postorbital region of head	9,2	11,3	10,09 + 0,12	5,9
Head length	21,1	29,4	24,14 + 0,33	6,5
Head height at occiput	12,3	17,8	14,99 + 0,22	7,1
Greatest body height	16,8	24,2	20,37 + 0,37	8,7
Smallest body height	6,2	8,5	7,12 + 0,15	9,9
Antedorsal distance	53,7	67,3	56,84 + 0,57	4,8
Postdosal distance	30,5	40,6	35,49 + 0,51	6,9
Length of caudal peduncle	13,4	24,5	18,93 + 0,54	13,6
Length of base D	13,1	22,7	16,78 + 0,54	13,3
Greatest height D	11,1	19,2	15,89 + 0,35	10,7
Length of base A	9,5	13,9	12,03 + 0,26	10,2
Greatest height A	9,7	16,1	12,69 + 0,32	12,0
Length P	12,8	20,9	16,28 + 0,45	13,3
Length V	14,0	19,3	15,86 + 0,30	9,0
Distance P-V	31,0	39,4	34,80 + 0,40	5,6
Distance V - A	14,0	20,4	16,98 + 0,27	7,5
In %% of head length				
Eye diameter	16,3	24,3	19,97 + 0,39	9,4
Postorbital region of the head	37,5	45,4	41,85 + 0,44	5,1
Head height at the back of the head	55,5	67,1	62,16 + 0,60	4,6

Table 2. Indices of body shape measurements of the spotted sloth bear ("truss-protocol") (%% of standard body length), Chirchik River, 2022

Indicator	Minimum	Maximum	*Average + Sx*	*Cv, %*
2-4	20,1	31,5	23,98 + 0,51	10,1
4-6	19,6	38,4	32,87 + 0,78	11,3
6-8	13,1	22,7	16,78 + 0,54	15,5
8-10	26,0	37,9	30,82 + 0,53	8,2
9-10	7,2	17,6	9,06 + 0,42	22,3
7-9	10,0	18,2	13,26 + 0,42	15,1
5-7	9,5	13,9	12,03 + 0,26	10,2
3-5	14,2	19,9	17,45 + 0,28	7,8
2-3	17,5	68,0	54,09 + 0,35	20,8
1-2	16,1	32,2	21,52 + 0,76	17,0
1-4	14,1	21,5	16,53 + 0,33	9,6
1-3	22,7	39,6	35,91 + 0,71	9,4
3-4	16,7	47,3	37,96 + 1,12	14,2
5-6	15,9	31,7	25,70 + 0,68	12,8
7-8	14,2	23,5	19,43 + 0,48	11,9
4-5	48,0	85,8	56,59 + 1,47	12,4
3-6	17,0	22,9	19,41 + 0,32	7,9
6-7	33,3	39,4	35,82 + 0,37	5,0
5-8	11,2	16,7	13,53 + 0,31	11,0
7-10	12,9	28,3	16,86 + 0,84	24,0
8-9	28,0	39,3	31,49 + 0,53	8,1

In our collections, all sloth bears larger than 6.5 cm in total length and 5.5 cm in standard length were sexually mature. We collected all the fish we caught, and it can be noted that the ratio of

females to males was 2.1: 1. In May, sexually mature females had gonads at maturity stage IV. The weight of female gonads varied from 0.4 to 4 (1.7 on average) g. By May, the maturity coefficient in females reached 11.1 to 25.6%. Individual absolute fertility of sloth bear females was 246 to 5712 (1446 on average) eggs. Individual relative fertility of spotted sloth bear females was 69 to 260 (146 on average) eggs/g of total body weight of fish. The sizes of yolk oocytes in the gonads in May were variable: the minimum sizes in different females varied within 0.2 - 0.4 mm, the maximum - 0.7 - 1.0 mm, the average individual sizes varied from 0.6 to 0.9 (on average 0.7) mm.

In males, the gonads were also at the IV stage of maturity, the mass of the gonads was 1-2.1 g.

Discussion. The spotted sloth bear is an unauthorized invader from the reservoirs of Kazakhstan to the flat part of the Chirchik River basin. In general appearance and meristic characters, we have not found any changes compared to the description of the species at the end of the twentieth century. In D III-IV 7-9, in A III 5 rays. On the first gill arch there are 11-17 rakers. The caudal peduncle at the base (behind the anal fin) is not compressed from the sides. The body is naked. The nostrils are located close to each other (Salikhov et al., 2001; Yuldashov, Kamilov, 2018). This small fish, which has no commercial value, has adapted well to the riverbed and adjacent canals of the Chirchik River, canals of the irrigation network. At the same time, it also lives in the brackish water of the Damachi pond fish farm.

According to literary data, it is clear that the biology of the spotted sloth has been little studied in the water bodies of Uzbekistan. The literature notes that it reaches sexual maturity at the age of 2-3 years.

In our samples, all fish larger than 5.5 cm of standard length were sexually mature. There were 2 times more sexually mature females than males in the herd of producers. By May, the maturity rate of females was quite large and amounted to 11.1 - 25.6%. The absolute fertility of females of this small species is 246-5712 eggs, the relative fertility is 69-260 eggs/g of the total body weight of the fish. The size of mature eggs is 0.3-1.0 mm. It can be considered that the spotted sloth bear has adapted to the conditions of the flat part of the Chirchik River with its developed adventitious irrigation system, the population of the spotted sloth bear is self-reproducing. The sloth bear has no commercial value.

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