

**ON THE IDENTITY OF *NEMACHEILUS PANGURI* (CYPRINIFORMES: NEMACHEILIDAE)
FROM KASHMIR, INDIA.**

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Nemacheilus panguri (Hora, 1936) was originally described from Indus River basin and this was synonymised with *Triplophysa stewarti* (Kottelat, 2012). We describe herein *Triplophysa panguri* as a distinct species from the specimens collected from its type locality. This species can be distinguished from its congeners in the genus *Triplophysa* in having straight head, flattened and depressed snout; longer and narrow whip like caudal peduncle and slightly emarginated caudal fin. Also posterior jaw is sharp, truncate and horizontal. The upper margin of the orbit is slightly raised above the dorsal profile of the head. Dorsal fin having 9-10 branched rays positioned at nearer to tip of snout than to the base of caudal. Pelvic-fin origin just behind the dorsal fin origin vertically, and extends beyond anal fin origin. Anal fin is separated from the caudal base by a distance of $2^{1/2}$ scales. Anus is distant from anal fin origin by a distance more than that of orbit width.

KEYWORDS: Indus River, Kashmir, Nemacheilinae, *Nemacheilus panguri*.

INTRODUCTION

Valid species of *Triplophysa* in India are: *Triplophysa gracilis* (Day, 1877), *Triplophysa marmorata* (Heckel, 1838), *Triplophysa microps* (Steindachner, 1866), *Triplophysa shehensis* (Menon, 1987), *Triplophysa stoliczkae* (Steindachner, 1866), *Triplophysa tenuicauda* (Steindachner, 1866), *Triplophysa yasinensis* (Alcock, 1898), *Triplophysa drassensis* (Tilak, 1990) (Jayaram, 1999; Kottelat, 2012). And Jayaram (1999) included *Triplophysa panguri* (Hora, 1936) from Ladakh, India. Recently the corresponding author collected specimens of *Triplophysa* from Kashmir Valley and from the tributaries of Indus River in Ladakh and based on the examination of five specimens, it is found that all belong to the genus *Triplophysa*. As Kottelat (2012) placed this under *T. stewarti* we describe herein as a distinct species.

MATERIALS AND METHODS

Counts and measurements were made from the left side of the specimens following Menon (1987), Kottelat (1990) and Hubbs and Lagler (1964). Morphometric characters from landmarks 8, 15-22, 25-28, 33-34, 52 and 55 were the additional truss measurements (Strauss and Bookstein, 1982). Measurements were taken to the nearest 0.01 mm using digital calipers. Body measurements are expressed as percent of standard length (%SL), percent of peduncle length (%PL); head measurements are expressed as percent of head length (%HL); percent of snout length, percent of inter orbital width (IOW) are also given. All specimens were preserved in 10% formalin and deposited in the collections as CMA.

Abbreviations used: CMA- Collections of M. Arunachalam.

RESULTS

Triplophysa panguri Hora, 1936. (Figure 1).

Table 1. Morphometric characters of *Triplophysa panguri* (Hora, 1936).

S.no	Morphometric measurements	<i>Triplophysa panguri</i> CMA 284 Topotypes (n=5)	
		Range	Mean±SD
1	Standard length (mm)	43.04-69.55	61
	% of Standard Length		
2	Snout to urocentrum	95.79-98.77	96.87±1.18
3	Pre -anal length	66.29-68.19	67.46±0.84
4	Pre -dorsal length	46.83-50.96	49.32±1.53
5	Pre- pelvic length	46.34-50.69	49.30±1.72
6	Pre- pectoral length	21.04-23.11	22.43±0.84
7	Caudal peduncle length	23.17-25.33	24.27±0.98
8	Dorsal-fin origin to pelvic-fin insertion	10.08-11.64	11.05±0.65
9	Anal fin height	19.42-20.86	20.00±0.69
10	Depth of caudal peduncle	4.13-4.66	4.35±0.27
11	Caudal fin length	21.40-22.86	21.94±0.57
12	Dorsal fin height	21.01-23.37	21.75±0.96
13	Pectoral fin length	22.07-24.95	23.18±1.24
14	Pelvic fin length	17.65-19.77	18.94±0.80
15	Occiput to dorsal-fin origin	27.36-32.25	30.38±1.84
16	Occiput to pectoral-fin insertion	10.97-13.66	12.15±1.23
17	Dorsal-fin insertion to pelvic-fin insertion	15.11-16.87	15.92±0.67
18	Dorsal-fin origin to pectoral -fin insertion	22.99-26.82	25.50±1.52
19	Dorsal-fin origin to anal-fin origin	19.96-22.80	21.56±1.02
20	Dorsal-fin insertion to caudal -fin base	32.24-35.02	34.04±1.15
21	Dorsal-fin insertion to anal-fin origin	8.01-9.37	8.50±0.57
22	Dorsal-fin insertion to anal-fin insertion	10.71-13.50	12.28±1.10
23	Dorsal fin base length	17.45-18.91	18.07±0.53
24	Anal fin base length	8.14-9.41	8.65±0.49
25	Pectoral-fin insertion to pelvic-fin insertion	27.02-28.65	27.88±0.67
26	Pectoral-fin insertion to anal-fin origin	41.94-43.74	42.95±0.69
27	Pelvic- fin insertion to anal-fin origin	14.31-16.39	15.43±0.85
28	Pelvic- fin origin to anal-fin origin	16.71-19.28	18.44±1.02
29	Pectoral-fin origin to pelvic-fin origin	25.00-28.73	27.32±1.44
30	Head length	21.22-22.85	21.96±0.68
31	Post -dorsal length	47.75-50.77	49.53±1.48
32	Body depth	9.64-12.32	11.33±1.00
33	Distance between pectoral- fin and vent	40.66-44.47	42.33±1.55
34	Distance between pelvic- fin and vent	13.94-15.76	15.27±0.76
35	Head length (mm)	10.26-14.76	13.51
	% of Head Length		
36	Pre-occipital length	83.26-90.64	87.04±3.38
37	Snout to opercle	95.23-97.66	96.26±0.91
38	Upper jaw length	27.01-31.71	28.80±1.82
39	Snout length	53.19-56.71	55.14±1.51
40	Pre nasal length	30.12-33.36	31.77±1.27
41	Orbit width	20.94-22.17	21.31±0.52
42	Interorbital width	22.22-23.51	22.78±0.51
43	Internasal width	16.50-17.68	17.10±0.52
44	Head width	56.30-60.82	59.19±1.81
45	Gape width	19.50-22.84	20.65±1.36
46	Lower jaw to isthmus	47.36-50.89	48.62±1.48
47	Head depth at nostril	41.03-44.64	43.22±1.40
48	Head depth at pupil	46.01-48.74	47.70±1.29
49	Head depth at occiput	51.33-56.85	53.87±2.47
50	Maxillary barbel length	41.82-45.46	42.61±1.60
51	Inner rostral barbel length	20.91-24.06	22.76±1.25
52	Vent to anal-fin origin	13.45-18.02	15.95±1.64
53	Orbit width (% of snout length)	37.04-39.37	38.20±0.89
54	Orbit width (% of interorbital width)	92.77-96.49	94.34±1.82
55	Vent to anal- fin origin % of pelvic fin insertion to anal fin origin	18.69-19.84	19.22±0.41

Topotypes: *Triplophysa panguri*, CMA 284, 5 ex, 43.04-69.55 mm SL, Main Indus River 60 km from Leh; Ladakh, Kashmir, collected by M. Arunachalam and team, 20 September 2011.

Diagnosis:

Triplophysa panguri can be distinguished from its congeners in having straight head and flattened with depressed snout; longer and narrow whip like caudal peduncle; slightly emarginated caudal fin. Posterior jaw is sharp, truncate and horizontal and the upper margin of the orbit is slightly raised above the dorsal profile of the head. Dorsal fin having 9-10 branched rays; and positioned at nearer to tip of snout than to the base of caudal.

Pelvic fin origin is just behind vertically that of dorsal fin origin and extends beyond anal fin origin. Anal fin edges separated from caudal base by a distance of $2^{1/2}$ scales. Anus separated from anal- fin origin to a distance more than orbit width.

This species can be distinguished from *T. stewarti* in having head shape flattened and strait (vs. rounded and narrow), larger eyes (4.33-4.93 vs. 3.4-3.7) times of HL, deep snout and broadly pointed (vs. narrow and pointed) and dorsal fin position nearer to tip of snout (vs. equidistant between tip of snout and caudal).

This species can be distinguished from *T. stenura* in having a longer snout (53.19-56.71 vs. 47.19-52.71) %HL, caudal fin slightly emarginated (vs. moderately forked); from *T. stolicikai* in having branched dorsal fin rays (9-10 vs. 7), dorsal fin closer to tip of snout (vs. closer to caudal), least height of caudal peduncle (16.51-20.10 vs. 30.27-33.96) % of its length. This species differs from *T. tenuicauda* in having head depth at occiput (51.33-56.85 vs. 46.18-50.90) %HL, branched dorsal fin rays 9-10 (vs. 8-9); from *T. yasinensis* in having narrow body (9.64-12.32 vs. 13.28-15.82) %SL, longer snout (53.19-56.71 vs. 48.07-49.06) %HL, branched dorsal fin rays 9-10 (vs. 8). This species further differs from *T. gracilis* in having branched dorsal fin rays 9-10 (vs. 7), pelvic fin positioned behind (vs. before) dorsal fin origin vertically; least height of caudal peduncle (16.51-20.10 vs. 31.62-35.68 % of its length); from *T. microps* in having complete lateral line (vs. incomplete), branched dorsal fin rays 9-10 (vs. 7), caudal fin shape (slightly emarginated vs. truncate) and from *T. shehensis* in having complete lateral line (vs. incomplete) and branched dorsal fin rays 9-10 (vs. 7).

Description:

Morphometric measurements are given in Table 1. Body elongate, sub-cylindrical with long and narrow whip like caudal peduncle. Dorsal profile gently arched up to dorsal fin origin, and then it slightly tapers towards the caudal base, ventral profile flat and horizontal.

Body depth is greater than its width, body depth 9.64-12.32 %SL. Caudal peduncle long and is longer than head length, caudal peduncle length 23.17-25.33 %SL; and its least height of caudal peduncle is greater than its width, almost equal to orbit width, 16.51-20.10 %PL. Head is moderately long and broadly pointed anteriorly and its length 21.22-22.85 %SL. Head depth is greater than its width, head depth at occiput 51.33-56.85 % HL.

From nape to nostril, head straight, then it suddenly bent towards the tip of snout, and is greatly depressed, and its length is longer than post orbital portion of head length, snout length 53.19-56.71 % HL. Two pairs of nostrils placed nearer to the orbit and posterior nostrils larger than anterior and separated by the nasal flap. The position of the eye in the length of head is variable; the upper margin of the orbit is slightly raised above the dorsal profile of head and the eyes are not visible from the ventral surface, orbit width 20.94-22.17 % HL, 37.04-39.37 % snout length, 92.77-96.49 % IOW. Mouth is lunate, transverse and horizontal and is situated on the ventral surface slightly behind the tip of snout and bordered by fleshy and papillated lips. Lower lip is interrupted in the middle; exposed lower jaw, which is sharp, truncate and horizontal. Three pairs of barbels, well developed, and barbels are longer than the orbit width, maxillary barbels extend to near

mid of orbit, outer rostral barbels extend to anterior margin of orbit, inner rostral barbels reach near to the base of maxillary barbels almost its length is equal to orbit width.

Scales:

Devoid of scales. Lateral line complete and well-marked up to caudal base.

Fins:

Dorsal fin rays iv + 9(3), 10(2); anal fin rays iv + 5; pectoral fin rays i + 10 (3), 11(2); pelvic fin rays i + 7; caudal fin rays i + 8+7 + i (17).

**Figure 1** *Triplophysa panguri*.

Lateral and ventral views of *T. panguri*, CMA 284, 64.77 mm SL, Main Indus River, 60 km from Leh, Kashmir, India.

Dorsal fin situated in advance of the pelvic and its commencement is nearer to the tip of snout than base of caudal; and its length is slightly lesser than head length, higher than the depth of body, its distal margin is slightly emarginate, dorsal fin length 21.01-23.37 %SL; Paired fins are broad and horizontal; pectoral fin is

considerably longer than the head length, its tip extends to $3/4^{\text{th}}$ distance to pelvic, pectoral fin length 22.07-24.95 %SL. Pelvic fin positioned just behind the dorsal fin origin and it extends to anal fin origin, pelvic fin length 17.65-19.77 %SL. Anal fin is similar in shape to the dorsal, its tip formed by second branched rays, its edges not reaching the caudal base, anal fin length 19.42-20.86 %SL. Caudal fin almost as long as or slightly shorter than head; it is slightly emarginate with the upper lobe considerably longer than the lower lobe and caudal fin length, 21.40-22.86 %SL.

Coloration in preservative:

In 10% formalin, the ground colour of the specimens is pale brown in posterior, but anterior side dark olive to purple red and more concentrated. Head has pale brown tinged with dark olive colour. Ventral side has creamy white to dark olive colour. There are patches of approximately nine to ten brown bands along the lateral line and saddle shaped; four numbers of each present before origin to insertion of dorsal fin. Posterior side of the dorsum having saddle shaped brown bands merged with lateral bands. All fins are hyaline, dorsal fin undivided rays have 4 spots, and one row of spots in transverse along the branched rays. Pectoral, pelvic and anal fins have no spots. Caudal fin has thin basal blotches and three rows of vague spots transversely along the rays.

Sexual dimorphism:

Female specimens have slightly thick skin pads present from upper jaw to anterior margin of orbit, but without brushes of tubercules. And pectoral fin rays of anterior thickened but no brushes of tubercules seen.

Air-bladder and intestine: The anterior part is dumb-bell shaped and is enclosed in two bony capsules while the posterior part deeply constricted to form two chambers, lies free in the abdominal cavity. The two anterior chambers are connected by a short tube and the anterior and posterior parts of the bladder are connected by a short tube. Intestine with two loops, reaching ventral surface of “U” shaped stomach.

Distribution:

Triplophysa panguri is known from the Main Indus River, 60 km away from Leh, near to the military camp, Kashmir. This species is already recorded from PangurTso, TsoNyak, and in the upper reaches of basin of Indus River.

Discussion:

Nemacheilus panguri was described by Hora (1936) from PangurTso, TsoNyak Lake, in upper reaches of Indus River. As we could not examine the types of Hora's specimens, we collected fresh specimens from its type locality in Main Indus River and examined the characters and based on that we confirmed that it belongs to *Triplophysa panguri*. The main diagnostic characters such as long whip like caudal peduncle, caudal fin shape, cylindrical body form, and certain features especially body characters are related to *T. stewarti*, but the distinctness occurs between these two species are in head shape (flattened and strait vs. rounded and narrow), large eyes 4.33-4.93 vs 3.4-3.7 times of HL, snout (deep and broadly pointed vs. narrow and pointed), position of dorsal fin (nearer to tip of snout vs. equidistant between tip of snout and caudal). But the line drawings of Hora (1922) clearly distinguishes the character like eyes positioned at raised above the dorsal profile of head in *T. panguri* (vs. middle) in *T. stewarti*.

Some characters are related to the other species, for example, the form of lips of *Triplophysa panguri* is similar to *T. stolicikai*. Another feature of the species is long, narrow caudal peduncle overlapped with *T. stenura*, but the characters distinct from *T. stenura* are; longer dorsal fin height (21.01-23.37 vs. 16.27-19.90 %SL), from *T. stolicikai* in having longer dorsal fin base length (17.45-18.91 vs. 11.22-15.31 %SL) and larger eyes (20.94-22.17 vs. 13.06-17.44 % HL).

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Comparison materials:

Triplophysa marmorata: CMA 267, 5 ex, 57.42-70.39 mm SL, Sukhna nallah near Narbal Solbugh, Kashmir, collected by M. Arunachalam and team, 11 May 2010.

Triplophysa kashmirensis: CMA 268, 1 ex, 59.85 mm SL, Sukhna nallah near Narbal Solbugh, Kashmir collected by M. Arunachalam and team, 11 May 2010. CMA 274, 4 ex, 81.5-94.16 mm SL, Nagbal Youshmarg tehsil Chariesharief (DK), Budgam, Kashmir collected by M. Arunachalam and team, 13 May 2010. CMA 275, 2 ex, 77.74-77.93 mm SL, Sindbal River, Ganderbal District, Kashmir, collected by M. Arunachalam and team, 12 May 2010.

Triplophysa gracilis: CMA 269, 5 ex, 41.62-52.91 mm SL, Sukhna nallah near Narbal Solbugh, Kashmir, collected by M. Arunachalam and team, 11 May 2010.

Triplophysa choprai: CMA 271, 4 ex, 70.64-110.09 mm SL, Nagbal Youshmarg tehsil Chariesharief (DK), Budgam, Kashmir, collected by M. Arunachalam and team, 13 May 2010. CMA 272, 3 ex, 54.98-59.01 mm SL, Iron nallah, Bandipura (DK), Kashmir, collected by M. Arunachalam and team, 9 May 2010. CMA 273, 1 ex, 85.27 mm SL, Sindbal River, Kashmir, collected by M. Arunachalam and team, 12 May 2010, Bonor nallah, Srinagar, Kashmir, collected by M. Arunachalam and Johnson, 14 September 2012.

Triplophysa yasinensis: CMA 278, 2 ex, 60.69-62.63 mm SL, Iron nallah, Kashmir, collected by M. Arunachalam and team, 9 May 2010. CMA 277, 4 ex, 58.76-67.32 mm SL, Nagbal Youshmarg tehsil Chariesharief (DK), Kashmir, collected by M. Arunachalam and team, 13 May 2010.

Triplophysa stolickai: CMA 279, 18 ex, 37.32-96.74 mm SL, Itchoo River, 60 km from Kargil, Kashmir, collected by M. Arunachalam and team, 22 September 2011.

Triplophysa stenura: CMA 280, 6 ex, 62.04-91.04 mm SL, Shey- (Ancient capital of Ladakh), Leh District, Kashmir, collected by M. Arunachalam and team, 16 September 2011. CMA 281, 6 ex, 57.49-70.65 mm SL, Indus River, Kashmir, collected by M. Arunachalam and team, 16 September 2011.

Triplophysa tenuicauda: CMA 283, 14 ex, 34.66-61.46 mm SL, Shey – (Ancient capital of Ladakh), Kashmir, collected by M. Arunachalam and team, 16 September 2011.

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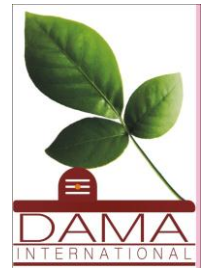
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