

NEW RECORD OF A SRI LANKAN ENDEMIC SPECIES, *SYSTEMUS SPILURUS* (GUNTHER, 1868; CYPRINIFORMES: CYPRINDAE) FROM KALAKKAD MUNDANTHURAI TIGER RESERVE, TAMIL NADU, INDIA.

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ABSTRACT

Systemus spilurus (Gunther, 1868) was so far reported from Sri Lanka since its description and currently this species showed its distribution in a stream inside Kalakkad Mundanthurai Tiger Reserve in Tamiraparani River, Tamil Nadu, South India. The new record of *Systemus spilurus* is based on the examination of 4 specimens.

KEYWORDS: Additional distributional record, Agasthyamalai Biosphere Reserve, Kalakkad Mundanthurai Tiger Reserve, *Systemus*,

INTRODUCTION

Systemus spilurus (Gunther, 1868) was reported from Sri Lanka and there were no records from India so far since its description (Menon, 1963; Jayaram, 1991; Talwar and Jhingran, 1991). In a recent collection from a stream inside Kalakkad Mundanthurai Tiger Reserve from south Tamil Nadu, India we found that 4 specimens of *Systemus* showed similarity in meristic counts and morphometric measurements with that of *S. spilurus* and hence we report this as a new distributional record to India. Menon (1963) included this as a subspecies of *Puntius sarana* (= *Systemus*) and Talwar and Jhingran (1991) also considered this as *Puntius sarana spilurus*. Kottelat (2013) synonymised *Puntius* (= *Systemus*) *spilurus* into *Systemus sarana* Hamilton (1822). Recently, Plamootti (2014) while diagnosing his new species of *Systemus chryseus* he compared *Systemus spilurus* but he relied on the original description of Gunther (1868). In order to ascertain the specific identity of *S. spilurus*, we compared specimens of *S. sarana* from its type locality. This work forms a major doctoral programme on the *Systemus* species complex of the junior author (R.Reguananth).

MATERIALS AND METHODS

Fish collections were made between 1996-2016 by earlier workers led by M. Arunachalam from river sites, from nearby fishermen and from fish markets in all over Peninsular India. Measurements were made point to point using digital calipers. Methods used for the meristic and morphometric data are based on Hubbs and Lagler (1964). Morphometric characters of 10, 19 - 27, 30 - 32, and 36 - 37 are the additional truss measurements (Strauss and Bookstein 1982). Body measurements are expressed as percentage of Standard Length (%SL); head measurements are expressed as percentage of Head Length (%HL).

Abbreviations: CMA (Collections of M. Arunachalam).

Materials Examined: *Systemus spilurus* CMA372, 4ex, 76.27-89.92 mm SL, from Agasthiyar falls, Tamiraparani River, Tamil Nadu, collected by M. Arunachalam and team, 07 June 1997. *Systemus sarana* CMA336 1ex, 74.58 mm SL, from Siliguri, West Bengal, collected by M. Arunachalam and team, 06 March 2013. *Systemus subnasutus* CMA352, 1ex, 188.87 mm SL, from Bhavanisagar Dam, Tamil Nadu, collected by M. Arunachalam and team, 08 October 2007. *Systemus subnasutus* CMA353, 4ex, 201.98-240.58 mm SL, from Bhavanisagar Dam, Tamil Nadu, collected by M. Arunachalam and team, 22 October 2002. *Systemus subnasutus* CMA354, 3ex, 205.85-234.26 mm SL, from Eranjipuzha, Kerala, collected by M. Arunachalam and team, 29-30 January 2004. *Systemus chryseus* CMA359, 3ex, 137.81-167.54 mm SL, from Pathanamthitta fish market, Kerala, collected by M. Arunachalam and team, 31 May 2011. *Systemus rufus* CMA360, 2ex, 126.84-147.84 mm SL, collected from Achankoil River, Kerala, collected by M. Arunachalam and team. *Systemus rufus* CMA361, 1ex, 144.39 mm SL, from Pathanamthitta fish market, Kerala, collected by M. Arunachalam and team, 22 June 2015. *Systemus laticeps*, data from Plamoottil, (2016).

RESULTS

Systemus spilurus (Gunther, 1868)
(Figs. 1-2 Tables 1-2)

Diagnosis: *Systemus spilurus* is distinguished from *S. sarana* in having more circumpeduncular scale rows (16 vs. 14), fewer circumferential scale rows (24 vs. 26), longer pre dorsal distance (52.85-54.19 vs. 51.50 %SL), longer pre occipital distance (20.79-22.73 vs. 19.05 %SL) and longer rostral barbel (24.53-29.52 vs. 16.34 %HL) and longer pre nasal distance (21.59-22.86 vs. 17.70 %HL).

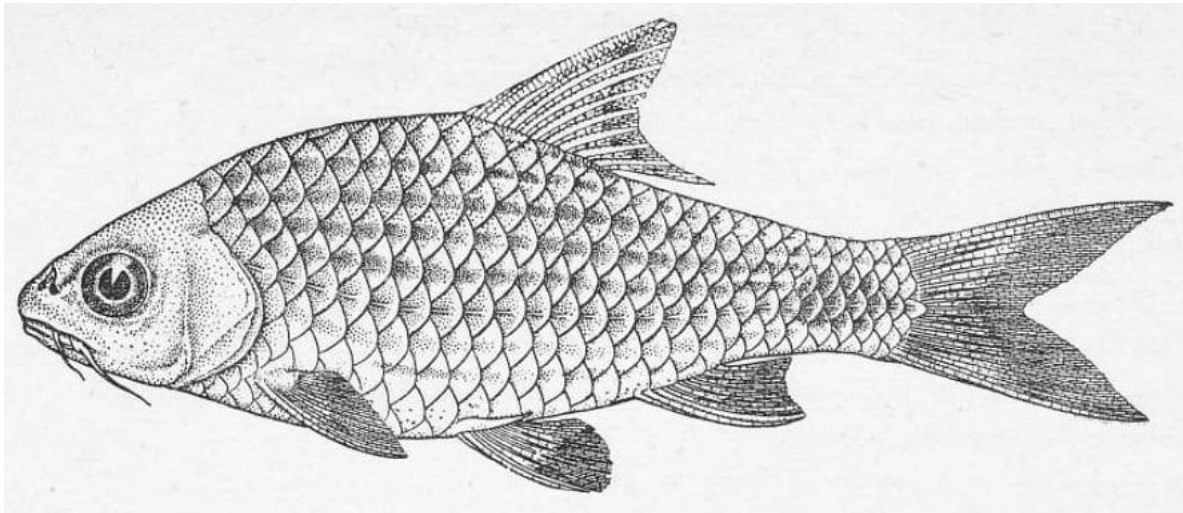


Figure 1 Original drawing of *Systemus* (= *Barbus spilurus* Gunther, 1868).



Figure 2 *Systemus spilurus* CMA372, 1ex, 89.13 mm SL, from Agashthiyar falls, Kalakkad Mundanthurai Tiger Reserve Tamil Nadu, collected by M. Arunachalam and team, 7 June 1997.

This species is distinguished from *S. subnasutus* in having fewer lateral line scales (28 vs. 29), longer pre occipital distance (20.79-22.73 vs. 15.35-18.19 %SL), longer head (27.11-28.79 vs. 23.45-25.19 %SL) and wider orbit (23.58-29.13 vs. 18.27-22.39 %HL), and narrow head (53.12-58.14 vs. 58.46-68.52 %HL). This species is further distinguished from *S. chryseus* in having fewer lateral line scales (28 vs. 30), deeper body (33.96-37.53 vs. 29.11-30.01 %SL), longer pre dorsal distance (52.85-54.19 vs. 49.11-50.59 %SL), narrow head (53.12-58.14 vs. 59.24-61.71 %HL) and shorter gape width (17.86-20.80 vs. 22.20-23.61). It is distinguished from *S. rufus* in having fewer lateral line scales (28 vs. 30), deeper body (33.96-37.53 vs. 39.51-40.84 %SL), shorter pre dorsal distance (52.85-54.19 vs. 55.44-57.81 %SL), lesser dorsal fin base length (13.16-14.21 vs. 14.84-15.24 %SL) and lesser gape width (17.86-20.80 vs. 28.78-31.98 %HL) and longer rostral barbel (24.53-29.52 vs. 22.38-23.57 %HL). Is distinguished from *S. laticeps* in having more lateral line scales (28 vs. 27), more pre-dorsal scale rows (10-11 vs. 9), more circumpeduncular scale rows (16 vs. 14), deeper body (33.96-37.53 vs. 32.03 %SL), deeper pre dorsal distance (52.85-54.19 vs. 50.08 %SL), shorter dorsal fin base length (13.16-14.21 vs. 16.01 %SL) and short gape width (17.86-20.80 vs. 40.00 %HL).

Table 1 Morphometric characters of *Systemus spilurus*

Morphometric characters of <i>Systemus spilurus</i> . Body character measurements are represented as % standard length and head character measurements are represented as % head length.	
Measurements from point to point (identified by numbers and names)	<i>Systemus spilurus</i> CMA 372 (n=4)
1 Total length (mm)	125.29-131.36
2 Standard length (mm)	76.27-89.92
% of Standard length	
3 Snout to urocentrum	95.07-96.46
4 Pre-anal length	73.67-74.93
5 Pre-dorsal length	52.85-54.19
6 Pre-pelvic length	50.77-54.08
7 Pre-pectoral length	25.54-27.76
8 Pre occipital length	20.79-22.73
9 Caudal peduncle length	18.99-21.63
10 Dorsal-fin origin to pelvic-fin insertion	33.53-35.57
11 Dorsal spinous height	17.03-26.95
12 Anal fin height	15.80-17.30
13 Depth of caudal peduncle	12.72-21.06
14 Caudal fin length	30.43-34.37
15 Dorsal fin height	24.32-26.85
16 Pectoral fin length	17.33-20.74
17 Pelvic fin length	16.15-18.04
18 Pelvic axillary scale length	6.88-7.57
19 Occiput to dorsal-fin origin	32.28-34.06
20 Occiput to pectoral-fin insertion	24.18-25.37
21 Occiput to pelvic-fin insertion	40.83-42.49
22 Dorsal-fin insertion to pelvic-fin insertion	28.89-31.77
23 Dorsal-fin origin to pectoral-fin insertion	33.33-39.84
24 Dorsal-fin origin to anal-fin origin	39.11-41.33
25 Dorsal-fin insertion to caudal-fin	36.44-39.72
26 Dorsal-fin insertion to anal-fin origin	27.66-28.37
27 Dorsal-fin insertion to anal-fin insertion	25.84-27.24
28 Dorsal-fin base length	13.16-14.21
29 Anal-fin base length	7.22-9.00
30 Pectoral-fin insertion to pelvic-fin insertion	24.19-25.63
31 Pectoral-fin insertion to anal-fin origin	43.02-47.06
32 Pelvic-fin insertion to anal-fin origin	19.36-23.97
33 Head length	27.11-28.79
34 Post- dorsal length	51.13-56.31
35 Body depth	33.96-37.53
36 Distance between pectoral-fin and vent	43.94-47.29
37 Distance between pelvic-fin and vent	20.43-23.09
% of Head length	
38 Snout to opercle	67.54-82.89
39 Upper jaw length	22.98-26.20
40 Snout length	28.08-32.49
41 Pre nasal length	21.59-22.86
42 Orbit width	23.58-29.13
43 Interorbital width	38.54-45.21
44 Internasal width	19.21-22.45
45 Head width	53.12-58.14
46 Gape width	17.86-20.80
47 Lower jaw to isthmus	60.72-65.64
48 Head depth at nostril	28.22-30.00
49 Head depth at pupil	56.68-61.73
50 Head depth at occiput	78.80-86.32
51 Maxillary barbel length	27.84-39.49
52 Rostral barbel length	24.53-29.52

Table 2 Meristic counts of *Systemus spilurus*

Meristic characters	<i>Systemus spilurus</i> CMA 372 (n=4)
1. Dorsal fin rays	iv.8
2. Anal fin rays	iii.5
3. Pelvic fin rays	i.8
4. Pectoral fin rays	i.15
5. Caudal fin rays	10+9
6. Lateral-line scales	28
7. Pre-dorsal scales	10-11
8. Upper transverse scale rows	5.5-6
9. Lower transverse scale rows	4-5
10. Lateral line to pelvic scale rows	4
11. Circumpeduncular scale rows	16
12. Circumferential scale rows	24
13. Transverse breast scale rows	8-9
14. Pre-anal scale rows	23-24

Description:

Body oblong and fairly deep and moderately compressed; its depth at dorsal origin 33.96-37.53 %SL. Head moderately elongate, conical, head length 27.11-28.79 %SL. Head depth at nostril 28.22-30.00 at pupil 56.68-61.73 and at occiput 78.80-86.32 %HL, respectively. Orbit width 23.58-29.13 %HL; interorbital width 38.54-45.21 %HL and nostril width 19.21-22.45 %HL. Snout length 28.08-32.49 %HL. Gape width 17.86-20.80 %HL. Barbels two pairs, maxillary barbel is longer than rostral one. Length of maxillary barbel 27.84-39.49 %HL and length of rostral barbel 24.53-29.52 %HL.

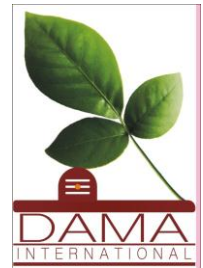
Dorsal fin with 4 simple and 8 (4) branched rays, anal-fin with 3 simple and 5 (4) branched rays, pelvic fin with 1 simple and 8 (4) branched rays, pectoral fin with 1 simple and 15 (4) branched rays, caudal fin rays 10+9 (4). Pre dorsal distance 52.85-54.19 %SL and pre pelvic distance 50.77-54.08 %SL. Dorsal fin origin midway between the snout and the base of the caudal, dorsal fin origin anterior to pelvic fin insertion vertically and dorsal fin length 24.32-26.85 %SL. Last undivided ray of dorsal fin osseous, strong and finely serrated posteriorly. Length of the dorsal spine 17.03-26.95 %SL. Pectoral fin not reaching the pelvic fin. Length of pectoral fin 17.33-20.74 %SL and length of the pelvic fin 16.15-18.04 %SL. Length and depth of caudal peduncle 18.99-21.63 and 12.72-21.06 %SL respectively. Dorsal fin base is much wider than the anal fin base length. Length of dorsal fin base 13.16-14.21 %SL and length of anal fin base 7.22-9.00 %SL. Anal fin length 15.80-17.30 %SL. Caudal fin is forked, its length 30.43-34.37 %SL. Post dorsal length 51.13-56.31 %SL. Distance between pectoral fin and pelvic fin insertion 24.19-25.63 %SL; pectoral fin insertion to anal fin origin 43.02-47.06 %SL and pelvic fin insertion to anal fin origin 19.36-23.97 %SL. Distance between pectoral fin and vent 43.94-47.29 %SL and distance between pelvic fin and vent 20.43-23.09 %SL.

Lateral line 28 (4); pre dorsal scale rows 10 (2), 11 (2); upper transverse scale rows 6 (4); scale rows from lateral-line to pelvic-fin insertion 4 (4); lower transverse scale rows 5 (4); circumpeduncular scale rows 16 (4); circumferential scale rows 24 (4); transverse breast scale rows 8 (4); pre anal scales 23 (2), 24 (2); anal scales (anus to anal fin) 1 (4).

Coloration: In live condition back olive, flanks silvery with gold reflections, cheeks golden, barbels red-brown. Fins dusky-brown to orange, dark caudal blotch behind anal fin. Body and fins of formalin-fixed and EtOH preserved specimens brownish.

Geographical Distribution

Currently known only from the Kalakkad Mundanthurai Tiger Reserve, Agashthiyar falls, Tamiraparani River, Tamil Nadu.



DISCUSSION

Description of *Systemus spilurus* earlier by Gunther (1868), showed the following characters comparable to the specimens collected from a stream in Tamiraparani River in south Tamil Nadu, India; lateral line scale rows (28 vs. 26-27), upper transverse scale rows (5.5-6 vs. 5.5), body depth (2.66-2.94 vs. 1.00-3.00 %SL), head length (3.47-3.69 vs. 1.00-4.00 %SL) and orbit width (3.43-4.24 vs. 1.00-4.00 %HL). Based on Menon's description (1963) on the specimens from Sri Lanka, the present specimens are comparable in the following characters; lateral line scales (28 vs. 26-28), pre dorsal scale rows (10-11 vs. 9-10), upper transverse scale rows (5.5-6 vs. 5.5), lower transverse scale rows (4 vs. 3.5), body depth (2.66-2.94 vs. 2.55-2.80 %SL), head length (3.47-3.69 vs. 3.52-3.82 %SL), head width (1.72-1.88 vs. 1.59-1.70 %HL), head depth at occiput (1.16-1.27 vs. 1.23-1.31 %HL), orbit width (3.43-4.24 vs. 3.30-3.70 %HL) and inter orbital width (2.21-2.59 vs. 2.50 %HL). Many species endemic to Sri Lanka showed its distribution to southern India especially from south Tamil Nadu on the tip of peninsular India. Examples were *Puntius bimaculatus* and *Labeo fisheri* (Jayaram 1991; Anusha *et al* 2018). Likewise the distribution of *Systemus spilurus* inside the KMTR of Agasthyamalai Biosphere Reserve in southern peninsular can also be justified.

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