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Puntius sanctus, a new fish (cypriniformes: cyprinidae) species from Tamil Nadu, India

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Puntius sanctus, a new teleost fish, is described from a small water body at Velamkanni of Tamil Nadu, India. Taxonomically it can be differentiated from its congeners by the following combination of features: a distinct black spot and 1-2 rows of tiny black dots present surrounding it on the front of base of dorsal fin, a thin, convex bluish black line present above lateral line; 1 pair of maxillary barbels which reach to lower border of orbit; 24- 25 lateral line scales and 10 pre dorsal scales. The new fish is described and compared with its congeners.

Keywords: New description, Scientific naming, *Puntius chola, Puntius dorsalis*

INTRODUCTION

Asian cyprinid genus *Puntius* (Hamilton, 1822) contains small to medium sized aquarium and food fishes widely distributed in the aquatic bodies of countries west to Pakistan and south to Sri Lanka. In 1990, the genus comprised 48 distinct species in the South Asian region (Talwar & Jhingran, 1991); some 40 additional species have been added after that. In India *Puntius* species are the most common freshwater fishes found in lentic and mostly in midlevel and low-level regions of all lotic water bodies. The genus shows greatest species richness in Kerala.

Many *Puntius* species were described from the water bodies of India by Cuvier (1816), Hamilton (1822), McClelland (1839), Valenciennes (1842), Jerdon {1849} and Day {1865, 1878, 1889}; the different names used by them are *Barbus, Cyprinus, Systomus, Capoeta, Cirrhinus* and *Puntius.* By hybridization experiments, Kortmulder (1972) suggested the possibility of different sub-groups within *Puntius*. Taki *et al*. (1978) conducted osteological studies on 23 southeasts Asian *Puntius* species and proposed six groups in it. Jayaram (1991) classified *Puntius* into 10 groups with 14 complexes.

Pethiyagoda *et al.* (2012) and Pethiyagoda (2013) could trace out five lineages present within the genus *Puntius.* Specimens of *Puntius* species procured by this researcher from Velamkanni of Tamil Nadu, India was found to be unmatching in taxonomical characters with the existing *Puntius* species. On careful examination it was proved that it bears distinct differences from its relative species. So it is described here as a new species, *Puntius sanctus*

Figure 1: A fresh specimen of *Puntius sanctus,* Holotype, ZSI/WRC/P/5535.

MATERIALS AND METHODS

Fresh specimens of the new fish were collected from the water body using cast net and fixed in 10 % formalin; they were taxonomically analyzed; measurements were taken using dial calipers and data recorded to tenths of a millimeter; congeners of the new fish deposited in various ZSI museums of India were examined for confirming the identity of the new fish; for taxonomic analysis and comparisons, Jayaram (2002) was followed; measurements and counts were made on the left side of specimens. Head length and other parts of body are given as percentage of standard length (SL); parts of the head are given as percentage of head length (HL); distance between two fins or between fins and vent is taken from the origin of the fin; caudal peduncle length is taken from the posterior base of anal fin. The new fishes are now deposited in Zoological Survey of India museum at Pune, Maharashtra {ZSI/WRC}.This published work has been registered in ZooBank (www.zoobank.org) of ICZN.

Figure 2: A fresh specimen of Paratype of *Puntius sanctus,* ZSI/WRC/P/5536

RESULTS AND DISCUSSION

***Puntius sanctus*, sp. nov**

(Figures 1- 3 and Table 1& 2)

Type materials examined:

Holotype: ZSI/WRC/ P/5535, 70.0 mm SL, a small water stream at Velamkanni of Tamil Nadu, India, coll. Mathews Plamoottil, 10.07. 2019. Paratypes: ZSI/WRC/P/5536, 4 examples, 56.0-65.0 mm SL, other details same as HT.

Figure 3: Preserved specimen of *Puntius sanctus*, Paratype, ZSI/WRC/P/5536

Table 1. Morphometric characters of *Puntius sanctus*

Sl. No	Characters	HT	Range (HT+ PT)
1	Total Length (mm)	94.0	73.0- 94.0
2	Standard length (mm)	70.0	56.0-70.0
	% SL		
3	Head length	28.8	28.5- 29.0
4	Head depth	22.1	20.6- 23.4
5	Head width	16.4	12.9- 16.4
6	Body depth at dorsal fin	37.8	35.4- 37.
7	Body depth at anal fin	25.7	25.0- 25.7
8	Preoccipital distance	18.6	18.5- 18.6
9	Distance from occiput to dorsal	54.3	31.5- 54.3
10	Pre dorsal distance	52.8	50.8- 53.2
11	Post dorsal distance	48.8	48.0- 53.8
12	Prepectoral distance	27.8	26.5- 27.8
13	Prepelvic distance	51.4	49.2- 51.4
14	Preanal distance	75.7	71.5- 75.7
15	Length of dorsal fin	25.7	24.2- 25.7
16	Length of pectoral fin	20.0	20.0- 20.3
17	Length of pelvic fin	20.3	20.3- 20.8
18	Length of anal fin	18.6	17.7- 18.6
19	Length of caudal fin	34.3	30.0- 34.3
20	Length of base of dorsal fin	18.4	17.2- 18.4
21	Length of base of anal fin	11.4	10.5- 11.5
22	Length of caudal peduncle	16.4	16.4- 19.4
23	Depth of caudal peduncle	14.3	13.7- 14.3
24	Distance from pectoral to pelvic	24.8	24.6- 24.8
25	Distance from pelvic to anal	27.3	23.8- 27.3
26	Distance from anal to caudal	26.4	26.4- 30.0
27	Distance from anal to vent	0.86	-0.86- 1.8
28	Distance from ventral to vent	25.0	20.8- 25.0
29	Head Length (mm)	20.2	18.5- 20.2
	% HL		
30	Head depth	76.7	72.4- 76.7
31	Head width	56.9	51.3- 56.9
32	Snout length	25.7	19.4- 25.7
33	Eye diameter	33.7	30.5- 35.1
34	Inter orbital width	24.7	24.7
35	Internarial width	24.7	20,0- 24.7
36	Width of gape of mouth	24.7	22.2- 24.7
37	Length of maxillary barbels	17.3	10.8- 17.3
38	Distance from occiput to dorsal fin	188.1	110.8- 188.1
39	Distance from snout to occiput	64.4	64.4- 64.8
40	Post orbital distance	47.0	45.9- 47.0

Table 2. Meristic counts of *Puntius sanctus*

Sl.No	Characters	Range
1	Dorsal fin rays	iii, 8
2	Pectoral fin rays	i, 14
3	Ventral fin rays	i, 8
4	Anal fin rays	ii, 5
5	Caudal fin rays	i, 17, i
6	Lateral line scales	24- 25
7	Pre dorsal scales	10
8	Circumpeduncular scales	14
9	Scales between lateral line and ventral fin	3 ½- 4½
10	Scales between lateral line and dorsal fin	4½ – 5½
11	Scales between lateral line and anal fin	4½
12	Prepelvic scales	7
13	Pre anal scales	13- 14

Figure 4: *Puntius chola* collected from west Bengal, ZSI/WRC/ P/5537

Figure:5 *Puntius dorsalis* collected from its type locality, ZSI/ANRC/M/23595

Diagnosis:

Puntius sanctus can be distinguished from its congeners in having 1 pair of maxillary barbels which reach to lower border of orbit; 24- 25 lateral line scales, 10 pre dorsal scales, a distinct black spot and 1-2 rows of tiny black dots present surrounding it on the front of base of dorsal fin; dorsal part of head, above and in front of orbit, has a distinct depression and another small, thin and elongated finger shaped mark present just behind the level of posterior border of orbit and reaching to occiput.

Description:

Body laterally compressed; both dorsal and ventral profiles equally convex; pre dorsal region sloping nearly in straight line. Post dorsal region straight or slightly concave; orbits on dorsolateral side of head, close to dorsal profile; eyes partly seen from below the ventral side; lower border of orbit just reach above gape of angle of mouth; 1 pair of small, feeble maxillary barbels; it reach to lower border of orbit; mouth subterminal, upturned and protrusible; I pair of small nares located close to orbit than snout tip; these open out by prominent tubes; dorsal part of head above and in front of orbit has a distinct depression; there is a thin and small finger shaped mark just behind orbit on dorsal side and reaching to occiput. Opercle extends out as a thin flap which reach to pectoral fin base; dorsal fin located above ventral fin origin; its tip reach to middle or posterior base of anal fin; first dorsal ray very small and indistinct; second also small which reach less than 1/3 of the length of third ray; the latter is osseous, strong and its inner edge smooth; spinous part more and filamentous portion small, less than an eye diameter; last dorsal ray not divided to root; pectoral fin originate from the level of opercle; its tip reach to ½ to 1 scale in front of ventral fin origin; its outer margin convex; tip of ventral fin never reach to anal fin; but just reach to vent. vent located close to anal fin; no considerable interspace between the two. Outer margin of ventral fin convex; anal tip never reaches to caudal fin base, reach to 2 scales in front of caudal fin base; caudal fin lobes equal.

Lateral line passes through mid-lateral part; at the tip of pectoral fin it is slightly concave and then goes straight to caudal fin base; scales moderate in size; easily deciduous; breast scales nearly of equal size to other scales; no scales at the base of dorsal fin and anal fin; auxiliary scales present on the base of ventral fin; which is less than an eye diameter of pelvic fin length.

Colour:

Body silvery; pectoral fin and dorsal fin hyaline; ventral and anal fin light orange; caudal fin hyaline, but its middle rays are scarlet; a distinct black spot and 1-2 rows of tiny black dots present surrounding it on the front of base of dorsal fin; In life, a pale reddish tint present on caudal base; after preservation in formalin it turned to a dusky shade. A thin convex bluish black line developed above lateral line in preservation.

Etymology:

The specific epithet *sanctus* in Latin means sacred; referring to the type locality of the new fish, Velamkanni, a Pilgrimage and holy place for some religious people.

Comparisons:

The new species differs from *Puntius chola* Hamilton (1822) in having shorter body (BDD 35.4- 37.8 % SL vs.41.4 in *P. chola*), shorter head (HD 72.4- 76.7 % HL vs.84.0), more predorsal scales (10 vs. 9), lesser (24- 25 .vs. 26) lateral line scales, longer maxillary barbels which reach (vs. never reach) to lower border of orbit. Differences between the new species and *P. chola* are listed in Table 3.

The new species differs from *P. dorsalis* Jerdon (1849) in having shorter (19.4- 25.7 % HL vs. 27.6- 34.0) snout, more (3 ½- 4 ½ vs. 2 ½) scales between lateral line and ventral fin, more (10 vs. 8) predorsal scales and in possessing a distinct black spot under the anterior (vs. posterior) dorsal fin rays. The new species differs from *Puntius cauveriensis* (Hora, 1937) in having shorter snout (19.4- 25.7 % HL vs. 30.8- 38.9), larger eyes (30.5- 35.1 % HL vs.18.5- 24.0), more (10 vs. 8-9) predorsal scales and in having (vs. lacking) a color spot under dorsal fin.

The new species differs from *P. mahecola* (Valenciennes1842; Pethiyagoda and Kottelat, 2005), *P. amphibious* (Valenciennes, 1842; Plamoottil, 2018a), *P. euspilurus* Plamoottil (2016) and *P. kyphus* Plamoottil (2019) in having osseous and strong (vs. non osseous, weak and flexible) last undivided dorsal fin ray, 10 (vs.7- 8) predorsal scales and long maxillary barbels which reach (vs. does not reach) to orbit and in having (vs. lacking) a distinct black spot on the base of anterior dorsal fin rays.

Table 3. Differences between *Puntius sanctus* and *P. chola*

Sl.No.	Characters	*P. sanctus*	*P. chola*
Morphometric characters			
1	Eye diameter/HL	30.5- 35.1	28.3
2	Head height/ HL	72.4- 76.7	84.0
3	Head width/ HL	51.3- 56.9	49.5
4	Snout length /HL	19.4- 25.7	28.3
5	Pre occipital distance/HL	64.4- 64.8	68.4
6	Width of gape of mouth/HL	22.2- 24.7	26.0
7	Body depth at dorsal fin origin/SL	35.4- 37.8	41.4
8	Length of pelvic fin/SL	20.3- 20.8	18.6
9	Length of anal fin/SL	17.7- 18.6	15.8
10	Height of dorsal fin/ SL	24.2- 25.7	21.8
11	Length of caudal fin /SL	30.0- 34.3	28.2
12	Length of base of anal fin/SL	10.5- 11.5	9.1
Meristic counts			
13	Lateral line scales	24- 25	26
14	Scales- LL/V	31/2- 41/2	31/2
15	Pre dorsal scales	10	9
16	Caudal fin principal rays	16	17
Other Morphological features			
17	Post dorsal region	concave	Straight
18	Dorsal fin location	Above ventral fin origin	Behind ventral fin origin
19	Opercle	Reach to pectoral fin	Never reach to pectoral fin
20	Maxillary barbels	Reach to orbit	Never reach to orbit
21	A convex bluish black line above lateral line	Present	Absent
			81- 84

The new species differs from *Puntius sophore* (Hamilton, 1822) and *P. stigma* (Valenciennes, 1844; Plamoottil, 2018) in having 10 (vs. 8-9) pre dorsal scales, a black spot on the front base (vs. middle) of dorsal fin and in having (vs. lacking) one pair of maxillary barbels. The new fish species differs from *P. viridis* Plamoottil & Abraham (2014), *P. parrah* (Day, 1865), *P. nelsoni* Plamoottil (2014), *P. madusoodani* Kumar *et al.* (2011), *P. dolichopterus* (Plamoottil, 2015) and *P. nigronotus* Plamoottil (2014) in having 10 (vs. 8-9) predorsal scales and in having (vs. lacking) a black spot at the base of anterior dorsal fin rays.

Comparative Materials Examined:

Puntius Kyphus, Holotype: ZSI/ NERC/ V/F 4546, 80.0 mm SL, a water stream at Thiruvalla, Kerala, India, coll. Mathews Plamoottil, 20.08. 2017. Paratypes: ZSI/ NERC/ V/F 4547, 2, 52.0- 93.0 mm SL, other details same as HT; *Puntius nelsoni*: Holotype: ZSI/WGRC/IR/2353, 91 mm SL, Kallumkal, Manimala River, Kerala, India, 9°20'0''N, 76°30'0''E, coll. Mathews Plamoottil, 21.08.2011; paratypes: ZSI/ WGRC/ IR/ 2354, 3, mm SL, Kallumkal, Manimala River, Kerala, India, 9°20'0''N, 76°30'0''E, coll. Mathews Plamoottil, 21.08.2011. *Puntius dolichopterus:* ZSI/ANRC**-**12226, 68 mm SL, Kayamkulam, Kerala, India, coll. Mathews Plamoottil, 21.08. 2014. Paratypes: ZSI/ANRC**-**12227, 5 specimens, 57.0 - 63.5 mm SL, Kayamkulam,, Kerala, India, coll. Mathews Plamoottil, 21.08. 2014. *Puntius nigronotus:* Holotype: ZSI FF 5285, 82.3 mm SL, India: Kerala, Mananthavady River, Wayanad, coll. Mathews Plamoottil, 01. 01. 2012. *Puntius viridis*: Holotype, ZSI/ WGRC/IR/2382, 81 mm SL, Kallumkal, Manimala River, Kerala, India, 9°20'0''N, 76°30'0''E, coll. Mathews Plamoottil, 21.08.2011; paratypes, ZSI/ WGRC/ IR/2383, 5, 72- 76 mm SL, Kallumkal, Manimala River, Kerala, India, 9°20'0''N, 76°30'0''E, coll. Mathews Plamoottil, 21.08.2011; ZSI FF 4932, 2, 63- 74 mm SL, Manimala River at Kallumkal, Kerala, coll. Mathews Plamoottil, 10. 10. 2012. *Puntius madhusoodani*: Holotype, CRG-SAC 456, 91.4 mm SL, Manimala River, near Thirumoolapuram, Thiruvalla, Kerala, , coll. K. Krishnakumar; 17.11.2010; paratypes, CRG- SAC 457 – 459, 3, 67.6 - 80.9 mm SL, Manimala River, near

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CONCLUSION

Puntius sanctus is a rare cyprinid species found in the water bodies of south India. It is closely related with the west Bengal species *Puntius chola*. The latter was considered as a widely spread species found throughout India. It was thought that *Puntius chola* are common in south Indian states including Tamil Nadu and Kerala; but that view is no longer held now. *P. chola* is a species found in northern parts of west Bengal. *P. sanctus* is a species distributed in freshwater bodies of Tamil Nadu. It is expected that more aspects of the biology of the new species will be revealed in near future.

CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

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AUTHOR CONTRIBUTIONS

MP collected the new fish, conducted experiments, gave scientific name to new fish and wrote the manuscript.

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