



# International Journal of Fauna and Biological Studies

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International  
Journal of  
Fauna And  
Biological  
Studies

ISSN 2347-2677  
IJFBS 2016; 3(5): 92-96  
Received: 17-03-2016  
Accepted: 23-08-2016

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## *Systemus laticeps*, a new species of cyprinid fish from Kerala, India

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### Abstract

*Systemus laticeps*, a new fish species of the family Cyprinidae, is described from Kerala, India. It is distinguished from its congeners by the following combination of characters: Body elongated, round and wide; head small and wide; a prominent hump present on the post occipital region, post dorsal region convex, a distinct thin median fontanel on the dorsal surface of head in between eyes and occiput. Lateral line indistinct in the anterior and posterior regions and it is convex above anal fin origin. Operculum and body scales exceptionally soft and flexible. Possess 27 lateral line scales and 9 pre dorsal scales. Inter-radial membrane of anal fin fleshy, thick and prominent.

**Keywords:** Freshwater fish, Central Travancore, New species, *Systemus chryseus*

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### 1. Introduction

Fishes of genus *Systemus* are small-sized cyprinids native to tropical Asia. Many authors including Jayaram<sup>[1]</sup>, Talwar & Jhingran<sup>[2]</sup> and Kottelat<sup>[3, 4]</sup>, considered *Systemus* as a synonym of *Puntius*. But Rainboth<sup>[5]</sup>, in a review of the fish fauna of Cambodia, could differentiate *Systemus* from *Puntius* and considered it to be a valid genus. Recently, through analysis of 16S ribosomal RNA and cytochrome b gene fragments from 31 South Asian species, Pethiyagoda *et al*<sup>[6]</sup> showed that *Systemus* is a distinct genus. Species of *Systemus* can be differentiated from other members of the genus by the possession of 27-34 lateral scales, maxillary and rostral barbels and serrated last unbranched dorsal-fin ray. *Systemus subnasutus*, *S. chryseus* and *S. rufus* are the valid *Systemus* species of Kerala. *Puntius pinnauratus*<sup>[12]</sup> and *Puntius chrysopoma*<sup>[9]</sup> are also can be included in *Systemus*.

During an ichthyological survey in the freshwater streams of central Travancore in Kerala, one wide bodied *Systemus* was obtained. Upon comparison with its congeners, it was proved to be a distinct species and so herein described as a new species *Systemus laticeps*.

### 2. Materials and methods

Fishes were collected using cast nets and preserved in 10% formalin. Methods used are those of Jayaram<sup>[7]</sup> and measurements follow standard practices; subunits of the head are presented as proportions of head length (HL); head length and measurements of body parts are given as proportions of standard length (SL). Body depth and body width were measured both at dorsal-fin origin and anus, vertically from dorsal-fin origin to belly and from anus to dorsum respectively.

**Abbreviations Used:** FBRC/ZSI - Freshwater Biology Regional Centre, Zoological Survey of India, Hyderabad, Andhra Pradesh; ZSI- Zoological Survey of India, Kolkata, West Bengal; ZSI/WGRC- Zoological Survey of India Western Ghats Regional Centre, Calicut, Kerala; HW- Head Width; STL- Snout Length; LCP- Length of caudal peduncle; DCP- Depth of caudal peduncle; BDD- Body depth at dorsal fin origin;

### 3. Results

*Systemus laticeps* sp. nov.,  
(Figures 1-4; Table 1)

**Holotype:** FBRC/ZSI/F/ 2316, 130 mm SL, India: Kerala, a freshwater stream at Thiruvalla, coll. Mathews Plamoottil, 3 January 2012.

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#### 4. Diagnosis

*Systomus laticeps* can be differentiated from all its congeners in having elongated, round and wide body; small and wide head; hyaline fins; a prominent hump present on the post occipital region, convex post dorsal region, exceptionally soft and flexible operculum and body scales, a distinct thin median fontanel on the dorsal surface of head in between eyes and occiput.; lateral line indistinct in the anterior and posterior regions; it is convex above anal fin origin. Inter-radial membrane of anal fin fleshy, thick and prominent. Lateral line scales 27 and pre dorsal scales 9.

#### 5. Description

General body shape and appearance is shown in Figures 1-4. Morphometric data as in Table 1. Body elongated and round. Dorsal and ventral profiles not fairly convex; pre dorsal region not straight. Profile from dorsal fin front to occiput nearly straight, then abruptly sinks down and bends to tip of snout. Mid dorsal region just behind the occiput broader than its front and back, so as to form a prominent hump. Post dorsal region nearly convex at the middle region. Ventral

profile from thorax to vent nearly straight, then to caudal base concave. Upper and lower jaws equal; upper jaw broader than lower one; operculum soft and flexible; mandibular sensory pores arranged in rows. Mouth terminal, straight and not much protrusible. Gape of mouth greater than inter narial width and equals to inter orbital distance. Eyes situated a little behind and above the angle of jaws, bulging above the surface of head and can be clearly seen from both ventral and dorsal sides. A distinct, thin median fontanel present on the dorsal surface of head in between eyes and occiput and reach roughly to occiput. Nostrils are in short membranous tubes. Nostrils located a little nearer to eyes than snout tip. A shallow transverse groove present in between front base of nostrils. Barbels are two pairs, rostrals and maxillaries. The latter is slightly longer than the former. Maxillaries roughly reach middle of eyes and base of nostrils. Rostrals are lodged in the groove and it smoothly reaches the lower base of eyes and upper part of nostrils.

Dorsal fin originates just above the ventral fin origin and fairly behind the pectoral tip. It is placed on a distinct ridge on dorsal side bearing 9 scales on either side of it.



**Fig 1:** A fresh Specimen of *Systomus laticeps*, Holotype, FBRC/ZSI/F/ 2316.



**Fig 2:** *Systomus laticeps*, Holotype, Preserved.



Fig. 3. Head Region of *S. laticeps*



Fig. 4. Anal fin of *S. laticeps*

Table 1: Morphometric characters of *Systomus laticeps*

SL. NO.	Characters	Holotype
1	Total length (mm)	166.0
2	Standard Length (mm)	130.0
% SL		
3	Head length	23.8
4	Head depth	23.1
5	Head width	20.4
6	Post occipital distance	11.1
7	Body depth at dorsal fin	32.3
8	Body depth at anal fin	23.1
9	Body width at dorsal fin	26.1
10	Body width at anal fin	18.5
11	Pre-dorsal length	50.8
12	Post-dorsal length	51.5
13	Pre-pectoral length	23.8
14	Pre-pelvic length	50.0
15	Pre-anal length	73.1
16	Length of dorsal fin	19.2
17	Length of pectoral fin	18.1
18	Length of pelvic fin	15.4
19	Distance from pectoral to pelvic fin	27.0
20	Length of anal fin	13.8
21	Length of caudal fin	
22	Distance from pelvic to anal fin	24.6
23	Distance from anal to caudal fin	26.5
24	Length of base of dorsal fin	16.1
25	Length of base of anal fin	10
26	Length of caudal peduncle	16.5
27	Depth of caudal peduncle	15.3
28	Width of caudal peduncle	8.8
29	LCP/DCP	93.0
30	Distance from anal to vent	0.7
31	Distance from ventral to vent	24.2
32	Distance from occipital to dorsal fin	34.6
33	Head depth	96.8
34	Head width	85.5
35	Eye diameter	27.4
36	Inter orbital width	42.0
37	Inter narial width	22.6
38	Snout length	32.2
39	Width of gape of mouth	42.0
40	Length of maxillary barbels	27.4
41	Length of rostral barbels	17.7
42	Head length excluding snout	74.8
43	Pre occipital distance	77.4
44	Post occipital distance	46.8

Outer margin of dorsal fin fairly concave in the middle. Dorsal fin with 3 unbranched and 8 branched rays. First ray of dorsal fin very small, non osseous, soft and seemingly absent. Second ray is also soft and form 1/3 length of the third; third one is longest, moderately osseous and its proximal and distal ends serrated internally; its tip filamentous. Remaining rays are branched; articulations of all branched rays can be distinctly seen. Last dorsal ray branched to root and each of these again has two branches. Pectorals inserted below operculum on ventro lateral side, fairly in front of dorsal fin origin. Its tip never reach ventral fin origin. Pectoral fin with 1 unbranched and 14 branched rays. It originates slightly in front of dorsal fin origin and its tip never reach anal fin origin or vent. Its upper margin is roughly convex. Ventral fin with 1 undivided and 8 branched rays. Two moderately elongate and smooth auxiliary scales present on either side of ventral fin. The upper scale is soft and delicate and the lower one thick and fleshy. Anal fin triangular and it originates far behind ventral tip and slightly in front of the tip of last dorsal ray. Upper margin of it slightly concave and its tip never reach caudal base. No considerable distance between anal front and vent. A mid ventral ridge bearing 6- 7 scales present on the base of anal fin. Anal fin with 3 unbranched and 5 branched rays; first ray very small and soft; second ray soft and fused with third one; the latter is soft and fused with the fourth one. Each anal ray is branched and each of this again divides into two. Articulations of branched anal rays can be distinctly seen. Inter- radial membrane of anal fin fleshy, thick and prominent. Caudal fin with 19 principal rays. Caudal lobes deeply forked and its rays are soft.

Scales of the body generally thin, soft and flexible. Scales on the breast region very small, others proportionately large and not easily deciduous. Lateral line scales 27. 1 scale present at the caudal fin base; pre dorsal scales 9; 6½ scales between lateral line and dorsal fin; 3½ scales present between lateral line and ventral fin; circum peduncular scales 14. Lateral line starts a little below the upper part of operculum and it is indistinct in the anterior and posterior regions; it has a bent at the posterior half of the pectoral; it is convex above anal fin origin.

**Colour:** Back and upper lateral sides blackish green; lower lateral sides light green and ventral side yellow; a black bar formed of minutes dots present outer to opercle. Fins hyaline;



flesh in between anal fin yellowish. Barbels light green. Eyes blue. 6 or 7 greenish lines present on lateral sides. A black blotch present on 23- 26 scales. After preservation in formalin color fades and lateral sides develop a pale yellow color; caudal color spot becomes more prominent in formalin.

## 6. Etymology

The specific epithet '*laticeps*' was taken from two Latin words '*latus*' meaning 'wide' and '*ceps*' meaning 'headed' refers to the wide head of the new fish.

## 7. Distribution

Currently known to occur only at its type locality in Kerala, India.

## 8. Habitat

Type locality of *Systemus laticeps* is a small freshwater stream at Thiruvalla (Fig. 5). It is formed by the confluence of certain branches of rivers flowing through the low level regions of Pathanamthitta District. This water body has width of 30- 37 m and depth <1 to 2 m in summer season. It is blanketed by mud dominant sediments. This area is covered by more or less dense riparian vegetation. Flora includes *Ochreinauclea missionis*, *Dendrocalamus strictus*, *Hydnocarpus pentandra*, *Acacia caesia*, *Bambusa bambos*, *B. vulgaris*, etc. *Nymphaea* and *Colocasia esculenta* are the major instream vegetation. *Puntius mahecola*, *Dawkinsia filamentosa*, *Haludaria fasciata*, *Rasbora dandia*, *Heteropneustes fossilis*, *Clarias dussumieri*, *Wallago attu*, *Ompok malabaricus* etc are the co- occurring fish species.



Fig 5: Type locality of *Systemus laticeps*

## 9. Discussion

*Systemus laticeps* can be distinguished from *Systemus sarana* (Hamilton<sup>[8]</sup>), of Gangetic system of West Bengal, in having 27 lateral line scales (vs. 31- 32 lateral line scales in *S. sarana*), 9 (vs. 10- 11) pre dorsal scales, shorter (HL 23.8 % SL vs. 27.0- 40.0) and wider head (HW 85.5 % HL vs. 60.0- 75.0). The new species can be distinguished from *Systemus subnasutus* (Valenciennes<sup>[9]</sup>), described from Pondicherry, in having 27 (vs. 28- 31) lateral line scales, wider (HW 85.5 % HL vs. 40.0- 64.0) head and deeper (DCP 93.0 % LCP vs. 58.0- 77.0) caudal peduncle. *Systemus laticeps* differs from *S. chryseus* Plamoottil<sup>[10]</sup>, described from Manimala River, in having lesser lateral line scales (27 vs. 29- 30) and pre dorsal scales (9 vs. 11), wider body (26.1 % SL vs. 18.6- 20.0) and wider head (85.5 % HL vs. 64.9-72.0). The new species differs from *Systemus rufus* Plamoottil<sup>[10]</sup>, described from Manimala River, in having a slender body (BDD 32.3 % SL

vs. 39.2- 41.5), 9 (vs. 11- 12) pre dorsal scales and lesser (27 vs. 30) lateral line scales and more (8 vs. 6-7) branched rays in ventral fin.

*Systemus laticeps* differs from *Puntius pinnauratus*, *P. chrysopoma* and *P. gibbosus* in having a wider head, specialized anal fin with fleshy, thick and prominent inter radial membrane and a prominent post occipital hump. Many taxonomists<sup>[2, 1 & 11]</sup> consider *Puntius pinnauratus* Day<sup>[12]</sup>, described originally from Malabar, as a synonym of *Systemus subnasutus*. Plamoottil<sup>[10]</sup> considered *Puntius pinnauratus* Day as a valid species. The new species further differs from *P. pinnauratus* in having green (vs. silvery) lateral sides, hyaline (vs. reddish) fins, shorter (HL 23.8 % SL vs. 27.6- 29.1) head, longer (STL 32.2 % HL vs. 23.8- 24.0) snout and wider (HW 85.5 % HL vs. 58.0- 59.0) head. *Systemus laticeps* further differs from *Barbus chrysopoma*<sup>[9, 13 & 12]</sup> in having 27 (vs. 28) lateral line scales, 9 (vs. 10) pre dorsal scales and greenish (vs. silvery) body. The new species can be distinctly demarcated from *Systemus spilurus*<sup>[13]</sup>, found in the inland water bodies of Sri Lanka, in having more (6½ vs. 3½- 4½) scales between lateral line and dorsal fin and wider (HW 85.5% HL vs. 52.0- 62.0) head. *Systemus laticeps* differs from *S. orphoides*<sup>[9, 14]</sup> in having 6½ (vs. 5½) scales between dorsal fin and lateral line, 27 (vs. 28- 31) lateral line scales and wider (HW 85.5 % HL vs. 40.0- 65.0) head.

## 10. Conclusion

Species of the genus *Systemus* are edible fishes found throughout India. They are mainly residing in the low level and middle level regions of freshwater bodies. In Kerala, it is one of the common freshwater cyprinid fish consumed by the local people. Some of these are utilized for ornamental fish trade. It was interesting to learn that no species of this genus had been described from Kerala for the last one and half century. In 2014, Plamoottil<sup>[10]</sup> discovered and described 2 new species of *Systemus*. The presently described cyprinid fish is also a new addition to this genus from Kerala. It also re-emphasizes importance of the state as a biodiversity hotspot for freshwater fishes. It is expected that more species of this genus will be described from Kerala in coming years.

## 11. Comparative materials Examined

*Systemus chryseus*: Holotype: ZSI/FF 4625, 150 mm SL, Keezhvaipur, Manimala River, Kerala, India; collected by Mathews Plamoottil, 01 October 2011. Paratypes: 4 specimens, ZSI/WGRC/IR/V 2421, 118- 152 mm SL, Keezhvaipur, Manimala River, Kerala, India; collected by Mathews Plamoottil, 14 May 2012. *Systemus rufus*: Holotype: ZSI/WGRC/IR/2367, 106 mm standard length, Venpala, Manimala river, Kerala, India; collected by Mathews Plamoottil, 10 October 2011. Paratype: ZSI/WGRC/IR/ 2368, 102 mm standard length, Venpala, Manimala River, Kerala, India; collected by Mathews Plamoottil, 10 October 2011. *Systemus sarana*: ZSI/F 4317, 2 examples, Imphal River, Manipur, A. G. K. Menon, 1963; ZSI/F 13430, 1 example, 84mm SL, Kalimpong Duars, Siliguri Teesta River, coll. S. L. Hora; ZSI/F 12558- 12560, 3 examples, Darna River, coll. A. G. L. Fraser, 20 oct, 7 nov and 26 dec, 1935; ZSI/F 11399, 1 example, Stream below Darjling, Himalayas, coll. G.E. Shaw & E. O. Shebbeare. 3.3.9.2. *Systemus subnasutus*: ZSI/F 1551, 1 example, Kokamurihee, Pondicherry, coll. A. G. K. Menon, 06.03.1958; ZSI/F 1549, 2 examples, Gadilaru River, Guddalore, Arcot Dt, Madras State, coll. A. G. K. Menon,

PondicherryKarakkal Survey, 1958; ZSI/WGRC/IR 11320, 1 example, Chaliyar River, K. C. Gopi. 3.3.9.3. *Puntius pinnaurarus*: PCMP/10, 2 examples, 86.5- 90.5 mm SL, Nandikkara, Thrichur, coll. Mathews Plamoottil, 01.02. 2014. 3.3.9.4. *Barbus chrysopoma*; PCMP/ 11, 150 mm SL, Arattupuzha, Thrichur, Kerala, coll. Mathews Plamoottil 3.3.9.5. *Systemus spilurus*: ZSI/F 2181/2, 1 example, 28 mm SL, Sri Lanka, coll. A. G. K. Menon. *Systemus orphoides*: ZSI/F 5459/1, 1 example, 79 mm SL Prome, coll. Francis Day; ZSI/F 5466/1, 1 example, Burma, coll. Francis Day. ZSI/F 9370/1, 5 examples, Fort Steadman, Inle Lake, S. Shan States, coll. N. Annandale.

## 12. Acknowledgments

The author acknowledges Principal, Government College, Chavara, Kollam, Kerala for providing necessary facilities to undergo this research work. I am also grateful to the anonymous reviewers whose comments were greatly helpful for the improvement of this article.

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