



## Fishes of the Genus *Puntius* species (Teleostomi: Cyprinidae) including two new additions from Kamrup District of Assam, India

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Available online at: [www.isca.in](http://www.isca.in), [www.isca.me](http://www.isca.me)

Received 11<sup>th</sup> June 2015, revised 29<sup>th</sup> June 2015, accepted 7<sup>th</sup> July 2015

### Abstract

*Puntius* species are marked by its variable size and colour pattern. The present study is aimed to study the *Puntius* species of Kamrup district of Assam, India. Fresh *Puntius* species were collected and kept in Arya Vidyapeeth College museum. Seven species of *Puntius* were found in the present study. *Puntius sarana orphoides* and *P. javanicus* were new state records. Based on the colour pattern and body marking a new identification key has been provided which can be of great taxonomic significance.

**Keywords:** *Puntius*, Kamrup, Assam, *Puntius sarana orphoides*, *P. javanicus*.

### Introduction

The genus *Puntius* exhibits high degree of variability in colour pattern, size and habitat<sup>1</sup>. This genus is characterized by short to moderately elongated and compressed body; more or less rounded abdomen; arched mouth; thin lips without horny covering; barbules either single, paired or completely absent; dorsal fin short, inserted opposite to pelvic fin; first fin-ray of dorsal fin bony may be strongly or smoothly serrated; caudal fin forked; lateral line either complete or incomplete with 17-36 scales. Kottelat<sup>2</sup> described *Puntius* as a catchall genus in which a large number of unrelated small barbids have been placed. 12 species of genus *Puntius* from Northeast India and 7 species from Brahmaputra valley zone were reported by Sinha<sup>3</sup> and Sarma et.al<sup>4</sup>. However due to complexity, the taxonomic status of different species occurring in Assam is yet to be ascertained. The present investigation is aimed to review the species of the genus *Puntius* present in Kamrup district, Assam.

### Material and Methods

**Study Site:** Kamrup (90°58' – 92°12' E & 25°43' – 26°48' N; area 4345 sq km) is endowed with diverse topography, the two fifth of the district is under hilly range. The hills gradually merge with the valley which has an average elevation of 0 – 50 m above mean sea level and constitutes a part of the Brahmaputra river basin. The river Brahmaputra intersects the district and flows in an east-west direction. All along its course temporary sandbars and riverine islands namely Bhangamari, Sialmari, Manuhkatichar, Shelmara, Bhoka mari char are present. The tributaries of Brahmaputra on the south bank are Kolong, Digaru, Bharalu, Kushi, Kharkhati, Boko and Singra, and on the north bank are Bornadi and Puthimari rivers flows. Beside around 1054.5 sq km area are under perennial lentic bodies. All these water bodies provide niches for diversified

piscian fauna. *Puntius* specimens were collected during April 2010 to October 2012 and are fixed and preserved in 8% formalin. As soon as the species are collected, data like place of collection, body colour, body markings etc are noted before preserving. The collected species were assigned museum number and were kept in Arya Vidyapeeth College museum (AVCM). Selected morphometric parameters (in mm) were recorded with a Mitutoyo dial vernier caliper w (accuracy  $\pm$  0.1mm). Mensural and morphometry used were:

TL-total length (from tip of the snout to the end of caudal fin), SL-standard length (from the tip of the snout to the base of caudal fin), HL-head length (from the tip of the snout to the posterior margin of operculum), ED-eye diameter (distance between anterior and posterior edges of eye in horizontal axis), DH -dorsal fin height (distance from the base of first dorsal fin to its apex), SnL-Snout length (from the anterior corner of eye to the tip of the snout), CPL-caudal peduncle length (from the posterior end of anal fin to base of caudal fin), PDL-predorsal length (from tip of the snout to the base of first dorsal fin), Ltr.-lateral line transverse (number of scales from the base of the first fin- ray of dorsal fin to the lateral line), L.I- lateral line longitudinal (number of scales through which lateral line passes).

The specimens were identified following the keys provided by Sen, Jayaram, Talwar and Jhingran, Menon, Barman and Vishwanath<sup>5-10</sup>.

### Results and Discussion

In the study seven species of *Puntius* were recorded. The ratios of different parameters of species of *Puntius*, morphometric comparison of *Puntius* species in % average of SL and morphometric comparison of *Puntius* species in % average of

HL are given in tables at the end of the manuscript. The picture plate of the fishes identified is also provided in the end of the paper.

***Puntius chola* (Hamilton Buchanan, 1822):** Characters: Body is silvery coloured, dorsal part is having light greenish tinge. Tip of dorsal fin, anal fin, pectoral fins and caudal fins are orange tinged. An orange band is found to be extended from tip of operculum to the base of caudal fin. One pair of maxillary barbules is present. A dark spot is found to be at the base of dorsal fin is present between 2<sup>nd</sup> - 5<sup>th</sup> fin rays. Another light spot is present near the caudal fin base, situated in between 23<sup>rd</sup> - 25<sup>th</sup> scales. Lateral line scales are 27 to 30. Scale counts present on the base of dorsal fin and anal fin are 5- 6 and 4 - 5 respectively. Dorsal fin base length is 12.82 ± 1.45. Scale counts from origin of dorsal fin to caudal fin base 18 to 21. Head is moderately large about 27% of the SL. Head of male (about 28% of the SL) is comparatively larger than female (about 26% of SL). Snout of female (about 25% of HL) is more elongated than the male (about 24 % of HL). Eye diameter is 33% of HL. Eye of female (about 33% of HL) is larger than the male (about 32% of HL) Predorsal length is near about 46% of the SL. Predorsal length of female (about 46% of SL) is larger than the male (about 45 % of SL). Dorsal fin length is near about 20% of SL. Dorsal fin height of male (about 20 % of SL) is longer than the female (about 19 % of SL). Caudal peduncle

length of the male (about 19 % of SL) is found to be longer than the female (about 18 % of SL).

***Puntius sophore* (Hamilton Buchanan, 1822):** Characters: Body is silvery coloured with reddish tinge. Tip of dorsal, anal, pectoral and caudal fins reddish orange. Barbules are absent. Dark spot is present in dorsal fin and placed in between 4<sup>th</sup> -8<sup>th</sup> fin ray. Another black spot is present near caudal fin, stretched in between 21<sup>st</sup> - 23<sup>rd</sup> scales. Lateral line is incomplete. Lateral line scales are 26 - 28. Scales at the base of dorsal fin and anal fin were 5 and 4 - 5 respectively. Dorsal fin base length is 9.93 ± 1.67. Scales count from the base of dorsal fin to caudal fin base ranges from 17 to 19. Head is about 26 % of the SL. Head of male (about 25.8 % of SL) is marginally longer than female (about 25.3 % of SL). Snout length is near about 19 % of HL. Snout length of female (about 21% of HL) is much longer than male (about 17% of HL). Eye diameter is 32% of HL. Eye diameter of male is (about 34 % of HL) much bigger than the female (about 30% of HL). Predorsal length near is about 47% of SL. Predorsal length of female (about 47.8 % of SL) longer than male (about 45 % of SL). Dorsal fin height of male (about 23% of SL) longer than female (about 21% of SL). Caudal peduncle length near about 19 % of SL. Caudal peduncle length of male (about 20 % of SL) is much longer than female (about 19 % of SL).

**Table-1**  
**Morphometry of *Puntius* species ( mean and S.D of male and female of each species)**

Species	Sex	HL:SL	SnL:HL	ED:HL	PDL:SL	DL:SL	CPL:SL
<i>P.chola</i>	Male	0.28 ± 0.01	0.24 ± 0.02	0.32 ± 0.02	0.45 ± 0.03	0.20 ± 0.03	0.19 ± 0.02
	female	0.26 ± 0.02	0.25 ± 0.03	0.33 ± 0.04	0.46 ± 0.02	0.19 ± 0.03	0.18 ± 0.03
<i>P.sophore</i>	Male	0.26 ± 0.01	0.17 ± 0.03	0.34 ± 0.02	0.45 ± 0.03	0.23 ± 0.02	0.20 ± 0.02
	female	0.25 ± 0.03	0.21 ± 0.04	0.30 ± 0.06	0.48 ± 0.02	0.21 ± 0.05	0.19 ± 0.02
<i>P.ticto</i>	Male	0.28 ± 0.02	0.21 ± 0.02	0.36 ± 0.03	0.49 ± 0.03	0.24 ± 0.02	0.20 ± 0.02
	female	0.28 ± 0.007	0.23 ± 0.01	0.38 ± 0.02	0.48 ± 0.02	0.26 ± 0.01	0.21 ± 0.02
<i>P.conchoniis</i>	Male	0.28 ± 0.01	0.21 ± 0.03	0.36 ± 0.03	0.47 ± 0.06	0.24 ± 0.03	0.18 ± 0.02
	female	0.27 ± 0.006	0.20 ± 0.006	0.34 ± 0.006	0.49 ± 0.02	0.18 ± 0.02	0.19 ± 0.01
<i>P.sarana sarana</i>	Male	0.292 ± 0.005	0.24 ± 0.009	0.27 ± 0.01	0.52 ± 0.01	0.25 ± 0.007	0.16 ± 0.01
	female	0.296 ± 0.01	0.23 ± 0.01	0.26 ± 0.01	0.51 ± 0.02	0.24 ± 0.007	0.17 ± 0.01
<i>P.sarana orphiodes</i>	Male*	0.246	0.287	0.274	0.504	0.253	0.16
	female	0.25 ± 0.02	0.27 ± 0.02	0.28 ± 0.01	0.51 ± 0.03	0.25 ± 0.01	0.16 ± 0.005
<i>P.javanicus</i>	Male	0.30 ± 0.02	0.24 ± 0.03	0.28 ± 0.02	0.49 ± 0.02	0.27 ± 0.009	0.17 ± 0.004
	female	0.27 ± 0.007	0.26 ± 0.007	0.29 ± 0.01	0.51 ± 0.02	0.25 ± 0.01	0.18 ± 0.01

\*one male species of *P.sarana orphiodesis* is found.

**Table-2**  
**Morphometric comparison of *Puntius* species in % average of SL**

Character	<i>Puntius</i> species						
	<i>P. chola</i>	<i>P. sophore</i>	<i>P. ticto</i>	<i>P. conchoniis</i>	<i>P. s. sarana</i>	<i>P.s. orphiodes</i>	<i>P. javanicus</i>
HL	27	26	28	28	29	25	27
PDL	46	47	48-49	47-49	52	50	51
DFL	20	21-23	24-26	24	25	25	26
CPL	18-19	19	21	18	16	16	17

**Table-3**

**Morphometric comparison of *Puntius* species in % average of HL**

Species	Eye diameter	Snout Length
<i>P.chola</i>	33	24-25
<i>P.sophore</i>	32	19
<i>P.ticto</i>	36-38	21-23
<i>P.conchonius</i>	36	20-21
<i>P.sarana sarana</i>	27	24
<i>P.sarana orphoides</i>	28	27
<i>P.javanicus</i>	27-29	24-26

***Puntius conchonius* (Hamilton Buchanan, 1822):** Characters: Body is silvery coloured with black shades. Tips of dorsal, anal caudal and pelvic fins are black tinged. A distinct round spot is present in the middle of caudal peduncle lying in between 19<sup>th</sup> to 21<sup>st</sup> scales. An irregular black mark is present at the end of operculum. Barbules are absent. First dorsal fin finely serrated. Lateral line is incomplete. Number of scales present in lateral line is 24 - 26. Dorsal fin base length is  $8.43 \pm 0.66$ . Scales count from the origin of dorsal fin to caudal fin base varies from 18 to 19. Scales present at dorsal and anal fin bases 7 and 5-6 respectively. Head is about 28 % of SL. Head of male (about 28% of SL) is comparatively larger than female (about 27 % of SL). Snout length of male (about 21 % of HL) is longer than female (about 20 % of HL). Eye diameter is 36 % of HL. Eye diameter of male (about 37 % of HL) is longer than the female (about 34 % of HL). Predorsal length is 48 % of SL. Predorsal length of female (about 49 % of SL) is longer than male (about 47 % of SL). Dorsal length is 24 % of SL. Dorsal fin height of male (about 24 % of SL) is much longer than female (about 18 % of SL). Length of Caudal peduncle is 18 % of SL. Length of Caudal peduncle of female (about 18.5 % of SL) is slightly longer than male (about 18.2 % of SL).

***Puntius ticto* (Hamilton Buchanan, 1822):** Characters: Small fish, body slightly round with blackish yellow shade. Tip of dorsal fin lightly tinge with black colour. A prominent irregular black spot is present in between 15<sup>th</sup> - 19<sup>th</sup> scales in horizontal rows. Dorsal profile of body is more convex than ventral. Barbules are absent. Lateral line is incomplete. Number of scales present in lateral line is 23 - 24. Dorsal fin base length is  $8.74 \pm 0.75$ . Scale counts from the origin of dorsal fin to caudal fin base ranges between 18 to 19. Numbers of scales present in dorsal fin and anal fin bases are 6 and 5 respectively. A faint black mark behind the operculum is present. Head is about 28 % of SL. Head of male (about 28.4 % of SL) slightly longer than female (about 28.2 % of SL). Snout length of female (about 23% of SL) much longer than male (about 21% of SL). Eye diameter is 37% of HL. Eye diameter of female (about 38% of HL) is longer than the male (about 37% of HL). Predorsal length of male (about 49% of SL) longer than female (about 48.8% of HL). Dorsal fin height of female (about 26% of SL) is longer than male (about 24.8% of SL). Caudal peduncle lengths

of female (about 21% of SL) are longer than male (about 20% of SL).

***Puntius sarana sarana* (Hamilton Buchanan, 1822):** Characters: Body bright silver. Abdomen rounded. Tip of dorsal fin, anal fin, pelvic fin and pectoral fins are reddish tinged. First dorsal fin ray is smoothly serrated. Two pairs of barbules are present. 30-33 scales present in lateral line. Dorsal fin base length is  $15.25 \pm 1.26$ . Number of scales from the beginning of dorsal fin to caudal fin base ranges between 20-23. Number of scales presents in dorsal and anal fin bases are 5. Lateral line transverse is 6/1/4. Predorsal scales are 11. Head is about 29% of SL. Head of female (about 29.6% of SL) larger than male (about 29.2% of SL). Snout length of male (about 25% of HL) is larger than female (about 24% of HL). Eye diameter is 27% of HL. Eye diameter is of male (about 27 % of HL) bigger than the female (about 26% of HL). Predorsal length of male (about 52% of SL) is slightly longer than female (about 51.8% of SL). Dorsal fin height of male (about 26% of SL) is longer than female (about 25% of SL). Caudal peduncle length of female (about 17% of SL) is slightly longer than male (about 16% of SL).

***Puntius sarana orphoides* (Valenciennes, 1842):** Characters: Body white colour. Abdomen rounded and compressed. Two pairs of barbules are present. Lateral line is complete. Number of scales present in lateral line are 31. Dorsal fin base length is  $21.38 \pm 0.52$ . Number of scales from the beginning of dorsal fin to caudal fin base ranges between 24. Number of scales presents in dorsal and anal fin bases are 5. Lateral line transverse is 5/1/5. Predorsal scales are 11. Head is about 25% of SL. Head of female (about 25% of SL) longer than male (about 25% of SL). Snout length of male (about 29% of HL) is longer than female (27% of HL). Eye diameter of female (about 28 % of HL) is larger than male (about 27% of HL). Predorsal length, dorsal fin height and caudal peduncle length of female longer than the males.

***Puntius javanicus* (Bleeker, 1855):** Characters: Body bright silvery colour. Abdomen compressed. Tip of dorsal, anal, pelvic and pectoral fins tinge with red colour. First dorsal fin ray strongly serrated. Two pairs of barbules present. Lateral line is complete, 30-31 scales present in lateral line. Dorsal fin base length is  $13.30 \pm 1.08$ . Scales counts from the origin of dorsal fin to caudal fin base ranges between 22-23. Number of scales present in dorsal and anal fin bases are 5-6 and 5-6 respectively. Lateral line transverse is 6/1/4. Predorsal scales 11. Head is about 27% of SL. Head of female (27% of SL) is comparatively smaller than male (30% of SL). Snout length of female (about 27% of HL) is longer than male (about 25% of HL). Eye diameter is 29% of HL. Eye diameter of female (29% of HL) longer than the male (about 28% of HL). Predorsal length of female (about 51% of SL) is larger than male (49% of SL). Dorsal fin height of male (about 27% of SL) is longer than female (25% of SL). Caudal peduncle length of female (about 18% of SL) is slightly longer than male (about 17% of SL).

The present study revealed that species of *Puntius* exhibit variation in scale counts, colour pattern and body markings. Further, sexual dimorphism amongst the members of various species had also been observed from the *Puntius* species of Northeast India. In the present study, seven species of *Puntius* from Kamrup district in the Brahmaputra valley of Assam were recorded of which *Puntius sarana orphoides* and *P. javanicus* were new state records. *P. javanicus*, an exotic species, was introduced in culture ponds, however it easily got acclimatize to the environment and presently found in natural water bodies as well. In the present study variation in the lateral line scales and body markings amongst the species of *Puntius* were observed. These two parameters may be considered taxonomically most important in addition to body colour pattern and occurrence of barbels. Sen<sup>5</sup> reported the lateral line scales of *P. chola*, *P. sophore*, *P. ticto* and *P. conchoni* were to be 26 - 28, 23 - 26, 22 - 26 and 24 - 28 respectively. In our study, the lateral line scales of *P. chola*, *P. sophore*, *P. ticto* and *P. conchoni* were found to be 27 - 30, 26 - 28, 23 - 24 and 24 - 26 respectively. Further, it has been found that the lateral line scale of *P. sarana* to be between 30 - 33 in contrast to 28 - 34 and 32 -34 as reported by Sen<sup>5</sup> and Barman<sup>9</sup>. They also reported the presence of dark black spot on the dorsal fin of *P. chola* and *P. sophore* only, without mentioning any specific location. In our study, we found that in *P. chola*, the spot was located between 2<sup>nd</sup> - 5<sup>th</sup> dorsal fin rays and in *P. sophore* it is in between 4<sup>th</sup> - 8<sup>th</sup> dorsal fin rays. Marked differences were also seen in the location of round black spot at the caudal fin base in *Puntius* species. In *P.chola*, an irregular black spot was found to be present in between 23<sup>rd</sup> - 25<sup>th</sup> scales along the lateral line; in *P. sophore* the irregular black spot was located between 21<sup>st</sup> - 23<sup>rd</sup> scales. In *P.ticto* an irregular spot was noticed at the middle of caudal peduncle in between 15<sup>th</sup> - 19<sup>th</sup> scale and in *P. conchoni*, a round prominent black spot was recorded in between 19<sup>th</sup> - 21<sup>st</sup> scales. However, study by Sen<sup>5</sup> suggested that the location of black spots at the caudal fin base of *P. ticto* and *P. conchoni* to be in the 18<sup>th</sup>-19<sup>th</sup> and 19<sup>th</sup>-20<sup>th</sup> scales respectively.

Marked morphometric differences amongst the sexes of the species of *Puntius* were also noted. The male of *P. sophore* and *P. chola* possessed larger head, longer dorsal fin and caudal peduncle than the female. The eye diameter of male of *P. sophore* was found to be larger than the female counterpart. The head, dorsal fin, snout, and diameter of eye of male of *P.conchoni* were found to be longer than the female. In contrast the snout, eye, dorsal fin and caudal peduncle of female of *P.ticto* were found to be elongated than the male. The male of *P. javanicus* has larger head and dorsal fin length than the female; the male of *P.sarana* was observed to be marked by longer snout, eye and pre dorsal length, and smaller head length as compared to the female. In *P. sarana orphoides*, the head length, eye diameter, pre dorsal length, dorsal fin length and caudal peduncle length of female were found to be higher than male. From the present study a key to the species of *Puntius* of Kamrup district has been developed and provided here.

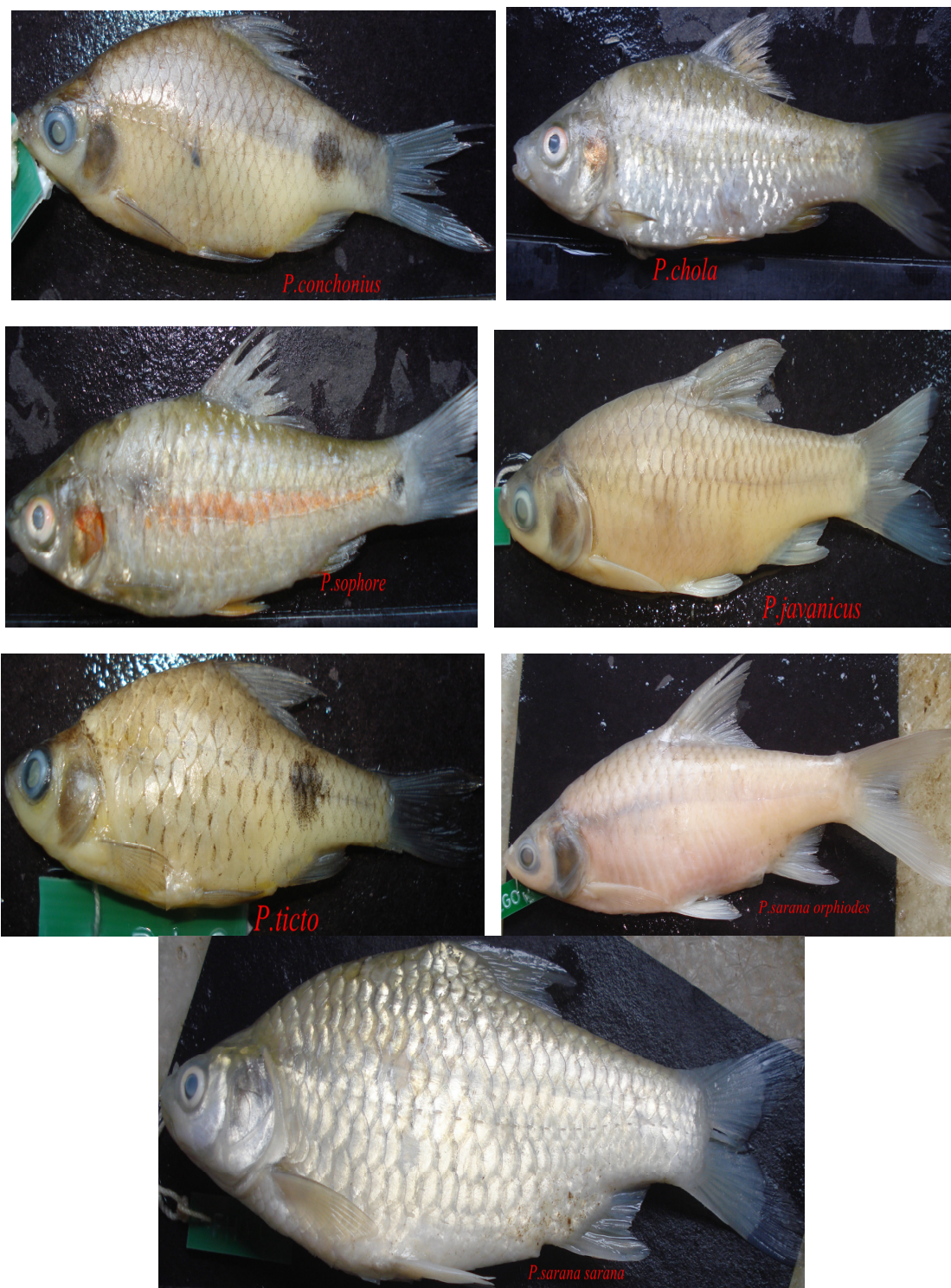
- i. Tip of dorsal, anal, caudal fin orange or red tinge.....2
- Tip of dorsal, anal, caudal fin black.....6
- ii. Barble present.....3
- Barble absent; a dark spot on dorsal fin, extending from 4<sup>th</sup> to 8<sup>th</sup> fin rays; a black spot at caudal fin base.....*P. sophore*
- iii. Barble one pair; an orange band extending from back operculum to the base of the caudal fin; a dark spot at the base of dorsal fin between 2<sup>nd</sup> to 5<sup>th</sup> fin rays and another at the base of caudal fin; lateral line scale 27 to 30..... *P. chola*
- Barble two pairs.....4
- iv. First dorsal fin ray smoothly serrated..... 5
- First dorsal fin ray strongly serrated..... *P. javanicus*
- v. Body bright silver colour; lateral line scale 32-33; lateral line transverse 6/1/4.....*P. sarana sarana*
- Body bright silver colour; lateral line scale 31; lateral line transverse 5/1/5.....*P. sarana orphoides*
- vi. A distinct round spot present in the middle of the caudal peduncle; tip of dorsal, caudal and pectoral fins black tinged; a partial black mark present at the end of operculum; lateral line scale 26.....*P. conchoni*
- No marking/ spot on the body except for a scattered spot near caudal peduncle in some; lateral line scale 23.... *P. ticto*.

## Conclusion

Northeastern India is one of the biodiversity hotspots areas of freshwater fishes and altogether 274 freshwater fishes have been reported so far. Fishes of genus *Puntius* is one of the important freshwater fishes; however its diversity in the Kamrup district of Assam, India, has not been assessed so far. Finding of seven species indicates the richness of freshwater fauna of Kamrup district, Assam and the taxonomic key developed on the basis of body markings and scale counts in an very important taxonomical work in the current environmental scenario .In this regard this paper assumes significance and it reports seven species of *Puntius* from the study site including two species being first described.

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**Figure-1**  
**Photo Plates of *Puntius* Species**

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