

# The Genus *Salmostoma* Swainson, 1839: A Comparative and Systematic Study on Species Found in Undivided Paschim Medinipur District, West Bengal, India

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## ABSTRACT

Present study reveals the existence of three species under genus *Salmostoma* of family Cyprinidae from the study area. These three species are very closely related and sometime confusing to the fishers as well as fishery researchers. Main objective of the present study is the identification of these three species systematically to separate them through morphometric analysis of characters in comparison to each other. During study it has been observed that the distinguishing features of body colour, shape of lateral line and shape of face as well as the long silvery stripe on lateral side of the *S. phulo* is the feature to separate these three closely related species.

**Key words :** Comparison, *Salmostoma*, Species, Midnapore.

## Introduction

Razor belly minnows are a group of freshwater fin fishes of genus *Salmostoma* under family Cyprinidae of order Cypriniformes found in Southern Asia. The group is very rapidly declining in its native habitat due to anthropogenic activities like habitat destruction, indiscriminate application of agro-chemicals, overfishing and climatic stress in its natural habitats. These fishes are basically used as food fish in India and very recently some researchers are trying to designate some of the fishes of this group as aquarium fish (Paul and Chanda, 2014) for its shining silvery colour and moderate body size. But the vitality of the fish species group is very poor and

become easily dead when transferred from its natural habitat to aquarium. Although, almost all fishes of this group are either least concern or not evaluated category as per IUCN (2020, v 3.1) status except *S. belachi* and *S. horai* are vulnerable. Locally the population size is very alarming in the present study area.

Regarding taxonomic status, the group was very confusing and still the generic name *Salmophasia* is used by some authors. Originally the group was under *Cyprinus* Linnaeus, 1758 and later the group moved to *Chela* Hamilton, 1822 to *Salmophasia* Swainson, 1839 and finally *Salmostoma* Swainson, 1839. Swainson mentioned generic name *Salmostoma* (Swainson, 1839) and *Salmophasia* (Swanson, 1839) for the same type species and created confusion for

the next generation fish taxonomists and was discussed in details by Kottelat (1998) to conclude that the generic name *Salmophasia* is valid. Jordan (1919) is the first reviser to select *Salmophasia* as the genus name for the razorbelly minnows. Banarescu (1968) synonymised *Salmophasia* as a junior synonym under *Salmostoma* as per IUCN (2020, v 3.1) law of priority. Therefore, the name *Salmostoma* is the valid generic name for the group and in the present study latest nomenclature is followed. During the present study three species of the group has been reported and identified according to the existing literature like Talwer and Jhingran, 1991; Day, 1889; Nelson, 2006 and Jayaram, 2010. A comparison on characters of three species namely *S. bacaila*, *S. sardinella* and *S. phulo* has been tabulated (Table 1) for easy separation of three species found in the present study area. Therefore, present study will certainly be helpful for researchers and students of fishery science to identify these three species.

## Materials and Methods

During the study period (from April 2013- March 2022) the specimens were collected by using different gears with the help of fishermen and also collected from local fish market located in the study area. After taking photograph the specimens were preserved in a wide mouth jar having 4% formalin solution and (Bagra and Das, 2010) brought to the laboratory of Department of Zoology, Raja N.L. Khan Women's College (Autonomous) for proper identification and permanent preservation. The updated checklist (Pahari *et al.*, 2017; Kisku *et al.*, 2017; Chanda, 2020) of freshwater fishes from different localities of the study area has been studied. The related literature was collected by both online and offline searching. During online searching different databases like Google, Web of Science etc. were considered using different key words. Classification of fish taxa follows Talwar and Jhingran (1991), Jayaram (2010) and the valid nomenclature of species was adopted as per the Catalogue of Fishes of the California Academy of Sciences (Eschmeyer *et al.*, 2022). Orders of fish species in present works were treated in an alphabetical sequence of species.

## Materials examined

Thirty nine female specimens (Total length 8.1-17.5 cm) and Twenty four male specimens (Total length 8.2-17.3 cm) of *S. bacaila*; Nineteen female specimens

(Total length 8.7-14.7 cm) and sixteen male specimens (Total length 9.7-14.7 cm) of *S. phulo*; Thirteen female specimens (Total length 6.2- 9.9 cm) and six male specimens (Total length 7.1-9.6 cm) of *S. sardinella* were collected from the study area and after identification deposited in the museum of PG Department of Zoology, Raja N.L.Khan Women's College (Autonomous).

## Results

### Genus *Salmostoma* Swainson, 1839

Swainson (1839) created the genus based on the *Cyprinus bacaila* as type species for the genus. Thirteen species of Genus *Salmostoma* have been found in the world and 12 species have been found in Indian freshwater. A brief history of the genus with special reference to Indian contribution has been given below.

1839 *Salmophasia* Swainson, Longman, Orme, Brown, Green, & Longmans, and Taylor, London, 1 (1838): vi + 368 pp., 2 (1839): vi + 448 pp.

1839 *Cyprinus* (*Salmostoma*) Swanson, Longman, Orme, Brown, Green, & Longmans, and Taylor, London, 1 (1838): vi + 368 pp., 2 (1839): vi + 448 pp.

1968 *Salmostoma* Banarescu, Revue Roumaine de Biologie, Sériede Zoologie, 13(1) : 3-14, Pls. 1-3; Howes, 1979, Bull. Br. Mus. Nat. Hist. (Zool.), 36(3): 190-191.

**Type species:** *Cyprinus bacaila* Hamilton, 1822, *Fish Ganges*, pp. 265, 384, pl. 8, fig. 76.

**Type locality:** Gangetic provinces.

**Diagnosis of the Genus:** Body elongated and compressed. Abdomen keeled from below pectoral fin to anus. Mouth oblique to the body axis, cleft reaching anterior margin of the eye or slightly ahead. Eyes moderate or large. Symphyial knob present. Dorsal fin short with 9-10 rays, inserted commonly in opposite to anal fin. Pectoral fin long with an elongated axillary scale. Anal fin short with 14-20 rays. Caudal fin deeply forked. Lateral line curved and go through the downward of the body with 39-112 scales.

**Remark:** Three species *Salmostoma bacaila*, *Salmostoma phulo* and *Salmostoma sardinella* has been recorded from the study area.

Key to the species:

1. Lateral line scale more than 70 .... 2  
Lateral line scale less than 70 *S. sardinella*
2. Gill rakers 17 to 21 ... *S. bacaila*

Gill rankers 13to 16... *S. phulo*

***Salmostoma bacaila* (Hamilton, 1822)**

*Salmostoma bacaila* was originally described as *Cyprinus bacaila* from freshwater rivers of Gangetic provinces. A brief history of the species with special reference to Indian contributions has been given below.

1878 *Chela bacaila* Day, *Fishes of India*: 603, pl.152, fig. 5; Day, 1889, *Fauna Br. India*, *Fishes*, 1:367; Shaw and Shebbeare, 1937, *J. Asiat. Soc. Beng.*, 3:19, Fig.11.

1968 *Salmostoma bacaila* Banareescu, *Revue. Roum. Biol. (Zool.)*, 13(1): 4, fig.1.

**Type species:** *Cyprinus bacaila* Fish Ganges, pp. 265, 384, pl. 8, Fig. 76.

**Type locality:** Gangetic provinces.

**Materials Examined:** 3 female (10.9cm – 16.6 cm), 4 male (10.1cm- 16.4cm), Gopiballavpur I (Gopiballavpur), Paschim Medinipur, West Bengal, 07.03.2014, A. Chanda; 4 female (13.3cm – 17.5 cm), 1 male (15.2cm), Gopiballavpur II (Tapsia, Andharia), Paschim Medinipur, West Bengal, 29.10.2013, A. Chanda; 3 female (10.4 cm-14.2 cm), 6 male (11.5cm- 17.3cm), Jhargram (Lodhasuli, Sardhia), Paschim Medinipur, West Bengal, 09.09.2013, A. Chanda; 4 female (9.6cm-16.9 cm), 1 male (10.7cm), Debra (Kethar, Panchgeria), Paschim Medinipur, West Bengal, 23.05.2013, A. Chanda; 5 female (9.9cm-15.7 cm), 2 male (11.4cm- 15.1cm), Narayangarh (Rampura, Belda), Paschim Medinipur, West Bengal, 20.05.2013, A. Chanda; 1 female (13.3cm), 4 male (10.3 cm- 15.9cm), Binpur II (Belpahari), Paschim Medinipur, West Bengal, 13.09.2013, A. Chanda; 4 female (8.1cm-14.3 cm), 6 male (8.2 cm- 14.9 cm), Salboni (Karnagarh, Gaighata), Paschim Medinipur, West Bengal, 27.09.2014, A. Chanda. 10 female (10.0 cm - 13.0 cm) and 5 male (9.5 cm- 12.0 cm), Garbeta II (Gowaltore), Garbeta I (Chandrakona road), 2 female (10.1 cm-12.0 cm) and 1 male (12.0 cm) Chandrakona I, II, and 3 female (10.0 cm - 12.5 cm) and 1 male (12.0 cm) Keshpur, Paschim Medinipur, West Bengal, 05.03.2022, A. Chanda and Party.

**Diagnosis of the species (Fig. 1):** Body elongate and strongly compressed. Mouth oblique, lower jaw with a symphysial knob. Dorsal fin present in the opposite of anal fin. Lateral line present in downward with 86-110 scales. Body colour silvery. Fin formula- D 9- 10; P 12-13; V i 8; A 13-15.

**Distribution: India:** It has been found in India (Maharashtra, Orissa, West Bengal and Tripura).

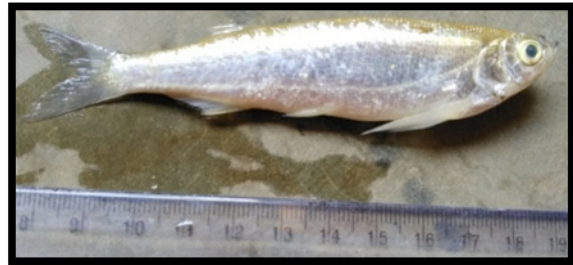


Fig. 1. *Salmostoma bacaila* (Hamilton, 1822)

**Paschim Medinipur:** During the present study the species has been found in Gopiballavpur I, Gopiballavpur II, Narayangarh, Debra, Binpur II, Jhargram, Salboni, Garbeta I &II, Chandrakona I, II and Keshpur blocks of Paschim Medinipur.

**Elsewhere:** Pakistan, Bangladesh and Nepal, Afghanistan.

***Salmostoma phulo* (Hamilton, 1822)**

*Salmostoma phulo* was originally described as *Cyprinus phulo* Hamilton-Buchanan, 1822 from north-east Bengal. A brief history of the species with special reference to Indian contributions has been given below.

1878 *Chela phulo* Day (partim), *Fishes of India*: 602, pl.153, Fig. 1; Day (partim), 1889,

*Fauna Br. India*, *Fishes*, 1:365.

1968 *Salmostoma phulo phulo* Banareescu, *Revue. Roum. Biol. (Zool.)*, 13(1): 5, Fig. 2.

**Type species:** *Cyprinus phulo* Hamilton-Buchanan, 1822, *Fish. Ganges*: 262, 384.

**Type locality:** Rivers and ponds of north-eastern parts of Bengal, India.

**Materials Examined:** 3 female (9.1cm – 13.6 cm), 3 male (9.7cm-13.1cm), Gopiballavpur I (Gopiballavpur), Paschim Medinipur, West Bengal, 28.10.2013, A. Chanda; 1 female (13.7cm), 4 male (11.3cm – 14.3 cm), Gopiballavpur II (Tapsia, Andharia), Paschim Medinipur, West Bengal, 29.10.2013, A. Chanda; 3 female (9.4cm- 13.8cm), 2 male (9.7cm- 12.4cm), Sankrail (Rohini, Ragra), Paschim Medinipur, West Bengal, 25.10.2013, A. Chanda; 5 female (7.8cm-14.7cm), 1 male (10.5cm), Mohanpur, Paschim Medinipur, West Bengal, 21.09.2014, A. Chanda. 2female (8.9cm-10.2cm), 1 male (9.1 cm), Medinipur, Paschim Medinipur, West Bengal, 04.03.2022. A. Chanda and Party. 1female (9.1cm), 1 male (8.7cm), 2 female (8.9cm-10.2cm), 2male (9.1-9.5 cm), Keshpur, 04.03.2022. A. Chanda and Party. 1 female (10.1 cm), 1 male (9.0 cm) Gabetta I, 1 female (8.9cm), 1 male (9.1 cm) Keshiary,

Paschim Medinipur, West Bengal, 06.03.2022. A. Chanda and Party.

**Diagnosis of the species (Fig. 2):** Body elongates and compressed. Lower jaw with a distinct symphy-sial process. Dorsal fin inserted in the opposite to anal fin. Pectoral does not reach the pelvic. Caudal deeply forked. Lateral line curved in downward and complete with 99-112 scales. Body color silvery with a bright silvery lateral band. Fin formula- D 8-9; P 11- 13; V 8; A 18-21.



Fig. 2. *Salmostoma phulo* (Hamilton, 1822)

**Distribution: India:** It has been found in India (Maharashtra, West Bengal and Assam).

**Paschim Medinipur:** During the present study the species has been found in Sankrail, Gopiballavpur I, Gopiballavpur II, Garbeta I & II, Chandrakona I, II, and Keshiary, Mohanpur blocks of Paschim

Medinipur, West Bengal.

**Elsewhere:** Bangladesh, Nepal.

***Salmostoma sardinella* (Valenciennes, 1844)**

*Salmostoma sardinella* was originally described as *Leuciscus sardinella* from river Rangoon Myanmar. A brief history of the species with special reference to Indian contributions has been given below.

1844 *Leuciscus sardinella* Valenciennes, *Histoire naturelle des poissons*, v. 17: i-xxiii + 1-497 + 2 pp., Pls. 487-519.

1878 *Chela sardinella* Day, *Fishes of India*: 600, pl.152, fig. 1; Day, 1889, *Fauna Br. India*, Fishes, 1:363.

1967 *Salmostoma sardinella poonpuni* Tilak, *Cheetal* v. 20 (no. 4): 25-28.

**Type species:** *Leuciscus sardinella* Valenciennes, 1844, *Histoire naturelle des poissons*, v. 17: i-xxiii + 1-497 + 2 pp., Pls.487-519.

**Type locality:** Rangoon, Myanmar.

**Materials Examined:** 1 female (7.3cm), 2 males (7.1cm – 9.6 cm), Narayangarh (Rampura, Belda), Paschim Medinipur, West Bengal, 20.05.2013, A. Chanda; 4 females (6.2 cm-9.9cm), 1 male (7.3 cm), Sabong (Mohar), Paschim Medinipur, West Bengal, 22.05.2013, A. Chanda. 1 females (7.2 cm-9.9 cm), 1 male (8.3 cm), Garbeta I , II, 4 females (6.2cm-9.9

**Table.** Identifying characters of three species of Razorbelly minnows found in the study area

Characteristics	<i>Salmostoma bacaila</i>	<i>Salmostoma sardinella</i>	<i>Salmostoma phulo</i>
Body shape	Body elongated and strongly compressed.	Body elongated and compressed. Dorsal and ventral side equally convex.	Body elongated and compressed.
Symphysial knob/ process	Lower jaw with well-developed symphy-sial process.	Lower jaw with rudimentary symphy-sial process.	Lower jaw length about 2 times in head length, with a distinct symphy-sial process.
Dorsal fin position	Dorsal fin inserted well in advance of anal fin.	Dorsal fin inserted above or slightly behind the origin of anal fin.	Dorsal fin inserted opposite to origin of anal fin.
Pectoral fin			Pectoral fin length about 3.5 times in standard length.
Scale	Scales very small (no. >70)	Scales medium (no. <70)	Scales small (no. >70)
Lateral line	Lateral line slightly decurved. Lateral line with 86-110 scales.	Lateral line with 47-53 scales.	Lateral line curves gently downwards. Lateral line with 99-112 scales.
Transverse scale row	17-19/4-6	7-8/1-2	12-15/6
Colour	Grey-green upside, often silvery. Broad gleaming white green band along flank.	Silvery	Silver with a bright silver lateral band.

cm), 1 male (7.3 cm), Keshpur, Chandrakona I, Paschim Medinipur, West Bengal, 04.03.2022, A. Chanda and Party. 4 females (7.2 cm-9.0cm), 1 male (7.3 cm), Keshiary, Paschim Medinipur, West Bengal, 06.03.2022, A. Chanda and Party.

**Diagnosis of the species (Fig. 3):** Body elongates and compressed. Dorsal and ventral profile equally convex. Mouth oblique, lower jaw with a rudimentary symphyseal knob. Dorsal fin present above or slightly behind origin of anal fin. Lateral line present with 47-53 scales. Body colour silvery. Fin formula D 9-10; P 12-13; V i 7; A iii 16-19.



Fig. 3. *Salmostoma sardinella* (Valenciennes, 1844)

**Distribution: India:** This species occurs in India (the Ganga-Brahmaputra drainage and in Orissa).

**Paschim Medinipur:** During the present study the species has been found in Narayangarh, Sabong, Garbeta-I, Chandrakona-I, Keshpur and Keshiary blocks of Paschim Medinipur District.

**Elsewhere:** Bangladesh and Myanmar.

## Discussion

Fish fauna of the present study has previously been studied by several authors like Paul and Chanda (2014, 2017); Kisku *et al.*, (2017); Pahari *et al.*, (2017); Chanda (2020); Jana *et al.*, (2021a, 2021b); Chanda and Jana (2021) but all of these works are check list or diversity assessment type of works. None of the workers had gone through details taxonomic studies of the fish fauna of the study area and basically followed either classification scheme of Talwer and Jhingran (1991) or Nelson (2006) or even Jayaram's (2010) scheme of fish classification. Local level fish fauna identification make confusion because there is no key for identification of limited number of fish species for a short area under study. Therefore, key to identification of local fish community become difficult for fish faunal researchers and needed a separate key for identification in regional for local level. Fish species under genus *Salmostoma* has 13 species (Eschmeyer, 2022; Kottelat, 2013) out of which 12 are

reported from India (Froese *et al.*, 2017), only *Salmostoma sladoni* (Day, 1870) is in outside Indian territory and is found in Myanmar water (Fishbase). Present study reveals the existence of three species namely *S. bacaila*, *S. phulo* and *S. sardinella* from the study area. These closely related species has been easily identified by in-depth study of the characters comparatively analyzed in the Table 1.

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