

ON COLISA SP. FROM EASTERN DOON - TAXONOMIC NOTES AND DISTRIBUTIONAL NEW RECORD[†]

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ABSTRACT

The present investigation discusses *Colisa lalia*, *Colisa fasciatus* and *Colisa labiosus* from Eastern Doon. Taxonomical variations with reference to serrations on opercles and subopercle, teeth on jaws, scaly denseness over vertical fins, dorsal and anal fin spines and colour pattern have been discussed. Interestingly, the taxonomical analysis of these species has made it abundantly clear that it is very difficult to segregate all the three species on the basis of overlapping meristic and morphometric characters yet they are segregated to some extent on the basis of body shapes. Their colouration, too, is variable. The overlapping of characterizations makes it more difficult when one wishes to segregate *C. fasciatus* and *C. labiosus*. Their thus far distributional record in the valley is also discussed. *Colisa lalia* and *Colisa labiosus* are new records for the valley.

Key words : *Colisa* sp., Taxonomic variations, Distribution, New record, Doon Valley.

Introduction

The drainage pattern of Doon Valley (29° 30' N latitude and 77° 35' to 78° 20' E longitudes) owes to the big and serene Ganga and Yamuna system (Uttarakhand, Western Himalayas). It was about 73 years ago when Hora and Mukerji (1936) discussed about 20 species from Eastern Doon. Since then, fish fauna of Doon Valley has been worked out by a number of workers *viz.*, Das (1960), Lal and Chatterjee (1963), Singh (1964), Grover (1970), Husain (1975, 1987, 1995, 2003), Husain and Tilak (1994), Grover *et al*

(1994), Uniyal (2002), Uniyal and Kumar (2006), Uniyal and Mehta (2007), *etc.* Some did updating of checklists while others included taxonomic and bionomic notes.

While accomplishing the task of a Major Research Project supported by Uttarakhand State Council for Science and Technology, the streams of Eastern and Western Doon were explored for their biotic diversity and ichthyo-faunal status and it was quite fascinating to catch a number of specimens belonging to *Colisa* sp. from the marshy and swampy niches of Suswa river in E. Doon and Asan in W. Doon.

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The present communication, thus, deals with the taxonomical analysis, sexual dimorphism, notes on bionomics and distributional pattern of *Colisa lalia*, *Colisa fasciatus* and *Colisa labiosus*.

Material and Methods

Fish collections were made from Khandgaon pump house near Satyanarayan Post office and at BEG Camp, near Basanti Mata Mandir at Suswa (Raiwala) in Eastern Doon (300-340 m amsl). Collections were also made at Asan (Dhalipur) in W. Doon (430-470 m amsl).

The material was customarily examined for morphological, meristic and morphometric characters and compared with the descriptions given by Day (1878, 1889), Sterba (1967), Jayaram (1981), Talwar and Jhingran (1991), Menon (1999), Uniyal and Kumar (2006), Vishawanath *et al.* (2007) and also with the information available on the internet websites.

Results

I. Systematic Position (Nelson, 1994) :

Phylum : Chordata; **Sub-phylum** : Vertebrata; **Superclass** : Gnathostomata; **Grade** : Teleostomi; **Division** : Teleostei; **Sub-division** : Euteleostei; **Series** : Percomorpha; **Order** : Perciformes; **Sub-order** : Anabantoidi; **Family**: Belontiidae (Polyacanthidae); **Sub-family**: Trichogasterinae; **Genus** : *Colisa* (= *Polyacanthus*).

II. Genus *Colisa* (= *Polyacanthus*) Cuvier

Polyacanthus Cuvier *Hist. nat. Poiss.*, 3: 227, 1829
(Type, *Trichopodus colisa* Hamilton, 1822 : subsequent designation by Jordan, 1919, p. 173).

Colisa Cuvier, *Hist. nat. Poiss.*, 7 : 359, 1831 (Type, *Trichopodus colisa* Hamilton = *Trichogaster fasciatus* Schneider)

Trichogaster (nec Schneider) Regan, *Proc. Zool. Soc. Lond.* : 785-787, 1909 (Review).

Branchiosteals five; body short or oblong, compressed; mouth small, upturned, highly protractile (protusible), lips thin or thick; teeth procumbent, villiform or conical; preorbital denticulated (comb-like); **opercle entire or serrated at the lower edge**; preopercle always serrated at the lower edge; subopercle entire or serrated; dorsal and anal fins long-based, dorsal fin commencing from above pectoral base with 15-18 spines and 9-12 soft rays, anal with 16-19 spines and 12-16 soft rays; spinous portion longer than the soft; pelvic fin in the form of a long filamentous ray; lateral line interrupted; scales ctenoid, forming not only sheath at anal, dorsal and caudal bases but also extending beyond (from 1/4th height of dorsal and anal to tips of soft anal rays and 3/4th length of caudal).

III. Key to species :

(Partial key applicable to the present material)

- 1 (a). Body short, craniodorsal profile over eyes concave2
(b). Body oblong (ellipsoidal), craniodorsal profile over eyes convex3
2. (a). Ventral profile upto base of anal angular (giving almost rhomboidal shape to the body), snout conically pointed, black band at posterior 3/4th of anal base (formed by coalescing vertical spots at the base of rays) *C. lalia*.

- (b) Ventral profile upto base of anal rounded (giving almost oval shape to the body), snout bluntly rounded, black band

at posterior $3/4^{\text{th}}$ of anal base absent
.....*C. fasciatus*

3. Profile at nape somewhat humpy (more in males). Lips very thick and papillated, especially in males; but moderately thick in females. Soft part of dorsal and anal fin rays moderate (females) to very much produced (reaching beyond $3/4$ length of caudal fin in males). Dorsal and anal fins sparsely to densely scaly (dorsal at the base only in females but upto $3/4^{\text{th}}$ of soft rays in males; anal scaly up to $3/4^{\text{th}}$ in females but upto tips of soft rays in males)
.....*C. labiosus*

IV. *Species Description* :

1. *Colisa lalia* (Hamilton-Buchanan, 1822)**

[Dwarf Gourami] (Fig. 1)

Trichogaster lalius, Hamilton, Fish Ganges. pp 120, 372, 1822 (Type locality : Gangetic Provinces); Day, *Fish. India*, p. 375, Pl. 79, Fig. 1878 (Ganges and Jamuna, common in Calcutta, also in Sind)
Colisa lalius, Cuvier (in C & V) *Hist. Nat. Poiss.*, 7 : 366, 1831
Colisa lalia, Sterba, *Freshwater Fishes of the World*, 790, Figs. 1043, 1967
Colisa lalia, Talwar and Jhingran, *Inland Fishes of India and Adjacent Countries*, pp. 1007, 1991.
Polyacanthus lalius, Menon, *Rec. zool. Surv. India*, *Occ. Paper* 175, pp 29, 1999

Material : From river Suswa at Khandgaon pump house, near Satyanarayan Temple and at BEG camp near Basanti Mata Mandir at Raiwala, in Eastern Doon.

Specimens : 28 (26- 71 mm in TL).

B. v, D. 15-17/9-12, P.10-11, V.1, A. 16-18/
14-16, C. 16, L. 1. 26-32, L.tr. $4^{1/2}$ - $5^{1/2}$ / $10^{1/2}$ -
 $12^{1/2}$.

Body short (rhomboidal), height 2.41-3.45 in Total Length [TL] (1.82-2.85 in Standard Length) [SL]. *Head* 3.18-4.06 in TL (2.37-3.35 in SL). *Snout* conically pointed-2.57-3.67 in Head Length [HL]. *Lips* thin. *Diameter of eye* 2.57-3.78 in HL, 1.0-1.25 in snout length and 1.14 -1.89 in the interorbital width. *Dorsal* base 2.11-2.80 in TL (1.65 -2.10 in SL). *Anal* base longer than dorsal, 2.0-2.38 in TL (1.53-2.23 in SL). *Filamentous pelvic ray* reaching beyond the end of anal (upto almost $1/2$ the length of caudal in young specimens), 1.40-1.89 in TL (1.04-1.53 in SL). *Caudal* rounded or cut-square or even slightly notched, 3.71- 4.86 in TL (2.71-4.14 in SL).

Predorsal scales 13-16. *Lateral line* interrupted after 12-14 scales, descending after 1-2 scales.

Colouration (Fig. 1) : Variable according to the habitat. Males darker while females lighter. Oblique 8-12 brilliant pale-blue to emerald-green bands (extending onto the vertical fins) descend down on the olive-green to brownish to grey-silvery flanks. The whole head and usually the part of the body lying immediately behind the gill cover is brilliant blue green. *Operculum* with a prominent greenish-blue dark spot at lower edge (another fainter one anterior to it and a larger one can be noticed above it). *Dorsal* and *caudal fins* barred with brownish to scarlet dots. *Anal* with a dark band along its post. $3/4$ base (formed by coalescing vertical spots at the base of rays), edged blood-red on the spinous portion and few anterior soft rays. *Caudal* paler to orangish, often bright orange on the tips. *Ventrals* orange-red.

** Popular generic name *Colisa* is retained here instead of recent nomenclatural changes in favour of *Polyacanthus* as done by Menon (1999).

Sexual Dimorphism : Males are usually larger than females. Colour patterns variable. Females duller never achieving the brilliant colours of the male. Soft rays of dorsal pointed in males whereas rounded in females .

2. *Colisa fasciatus* (Blotch and Schneider, 1801)

(Giant Gourami, Striped or Banded Gourami) (Figs. 3 & 4)

Trichogaster fasciatus, Bloch and Schneider, *Syst. Ichth.*, p.164, pl: 36, 1801 (type-locality: Tranquebar); Day, *Fish. India*, p. 374, Pl. 78, fig. 6 1878 (Coromandel coast as far South as river Krishna, Estuaries of Ganges, Cachar and Assam, Punjab, N.W Provinces, Sind and Burma.

Colisa fasciata, Sterba, *Freshwater Fishes of the World*, 787, Figs. 1008, 1967,

Colisa fasciatus, Talwar and Jhingaran, *Inland Fishes of India and Adjacent Countries*, pp. 1006, 1991,

Polyacanthus fasciatus, Cuvier (in C & V), *Hist. Nat. Poiss.*, 7 : 369, 1831.

Polyacanthus fasciatus, Menon, *Rec. zool. Surv. India, Occ. Paper* 175, pp 297, 1999.

Material : From river Suswa at Khandgaon pump house, near Satyanarayan Temple and at BEG camp near Basanti Mata Mandir at Raiwala, in Eastern Doon, Asan in Western Doon.

Specimens : 53 (57-79 mm in TL).

B. v, D.15-16/11-12,P.10 ,V.1, A.16-18/15-16, C. 15-16, L.l. 27-31, L. tr. 4^{1/2} - 5^{1/2}/10^{1/2} - 12^{1/2}.

Body short (oval), height 2.71-2.95 in Total Length [TL] (2.04-2.25 in Standard Length) [SL]. *Head* 3.75- 4.18 in TL (2.81-3.23 in SL). *Snout* bluntly rounded, 3.2-4.0 in Head Length [HL]. *Lips* thin. *Diameter of eye* 3.0 - 4.0 in HL, 0.8-1.2 in

snout length and 1.40-1.80 in the interorbital width. *Dorsal* base 2.03 - 2.23 in TL (1.5-1.70 in SL). *Anal* base longer than dorsal, 1.92 - 2.15 in TL (1.49-1.61 in SL). *Filamentous pelvic ray* reaching upto end of anal, 1.40 -1.68 in TL (1.07-1.63 in SL). *Caudal* truncate or fan-shaped, 3.8-4.2 in TL (2.82-4.2 in SL).

Predorsal scales 14-18. *Lateral line* interrupted after 14-16 scales, descending after 1-2 scales.

Colouration : Variable according to the habitat. Back olive-green while the belly is dull turquoise-orange. Oblique 9-12 slender, turquoise stripes on the orange-silvery to turquoise-silvery flanks. *Operculum* with a prominent greenish-blue dark spot at lower edge (another fainter one anterior to it and a larger one can be noticed above it as described for *C. lalia*) The dorsal and anal fin orangish (in female) to bluish (in male). Anal edged red. The ventral fins orange-red. The caudal fin barred and orange to bluish-orange. The iris of the eye orange.

Sexual Dimorphism : Males are usually larger than females. Colour patterns variable. Females duller never achieving the brilliant colours of the male. Soft rays of dorsal pointed in males whereas rounded in females.

3. *Colisa labiosus* (Day, 1878)

(Thick-lipped Gourami) (Figs. 5 -8)

Trichogaster labiosus, Day, *Fish. India*, p. 374, Pl. 79, fig. 4 1878.

C. labiosa, Sterba, *Freshwater Fishes of the World*, 787-788, Figs. 1008, 1967.

C. labiosus, Talwar and Jhingaran, *Inland Fishes of India and Adjacent Countries*, pp. 1006, 1991.

Material : From river Suswa at Khand-



1.



2.



3.



4.



5.



6.



7.



8.

1. *Colisa lalia* (female), 2. Bubble nest in Aquarium (built by *C. labiosus* male), 3. *Colisa fasciatus* (female), 4. *Colisa fasciatus* (male), 5. *Colisa labiosus* (female), 6. *Colisa labiosus* (male), 7. Thin lips of *Colisa labiosus* (female), 8. Thick and papillated lips of *Colisa labiosus* (male)

gaon pump house, near Satyanarayan Temple and at BEG camp near Basanti Mata Mandir at Raiwala, in Eastern Doon.

Specimens : 53 (58-95 mm in TL).

B. v, D.16-18/10-11, P.10-11, V.1, A.16-19/12-16, C. 16, L.l. 28-33, L. tr. $4^{1/2}$ - $5^{1/2}$ / $10^{1/2}$ - $12^{1/2}$.

Body oblong (ellipsoidal), height 2.77-3.37 in Total Length [TL] (2.11-2.59 in Standard Length) [SL]; *Head* 3.69-4.15 in TL (2.87-3.23 in SL); *Snout* bluntly rounded, 2.91-3.75 in Head Length [HL]. *Lips* thin to thick and highly papillated (a character of sex-distinction) (Fig. 7, 8). *Diameter of eye* 3.0 - 4.22 in HL, 0.9 - 1.37 in snout length and 1.40-2.0 in the interorbital width. *Dorsal* base 2.03 - 2.29 in TL (1.59 - 1.78 in SL). *Anal* base longer than dorsal, 1.97-2.17 in TL (1.54 - 1.65 in SL). *Filamentous pelvic ray* reaching beyond anal up to caudal base 1.28 - 1.72 in TL (0.98 - 1.33 in SL). *Caudal* truncate or wedge-shaped, 3.81- 4.92 in TL (2.87- 3.92 in SL).

Predorsal scales 15-19. *Lateral line* interrupted after 14-16 scales, descending after 1-2 scales.

Colouration : Variable according to the habitat. Males brighter and females duller. Back olive green, yellowish-silvery to copper-red on the flanks with a sky-blue sheen by reflected light (on the flanks as well as vertical fins). Oblique 9-10 backwardly-directed turquoise-blue to blue-black bands. *Operculum* with a prominent blue-black or royal bluish dark spot at lower edge (another fainter one anterior to it and a larger one can be noticed above it as described for *C. lalia* and *fasciatus*). Vertical fins paler to deep

blue. *Dorsal* darker, particularly in males with red spots. *Anal* sea-green to deep blue with blood-red border; the tips being supported by narrow lines of intense deep blue. *Ventrals* yellow or red, with yellow-white to dark-blue base, and brilliant red tips. *Caudal* light pale-orange to brownish, also with red spots. *Eyes* rust red to carmine red.

Sexual dimorphism : Lips are thin in females (Fig. 7) whereas thick and papillated (Fig. 8) in males. Dorsal fin produced in males (reaching beyond $3/4^{\text{th}}$ length of caudal), scaly upto $3/4^{\text{th}}$ of soft rays but rounded and scaly at the base only in females. Anal fins also produced (reaching upto $3/4^{\text{th}}$ length of caudal), scaly upto tips of soft rays in males but rounded and scaly up to $3/4^{\text{th}}$ of soft rays in females. Pelvic fin ray always red in ripe males but with yellow to dark blue bases and brilliant red tips in ripe females.

Bionomics

All the three species were found to inhabit swampy and marshy niches of Eastern Doon in the vicinity of Suswa river, part of which falls under protected Rajaji National Park. Repeated observations have confirmed that the swampy areas, fully loaded with submerged *Hydrilla*, shaded and blanketed on the surface by *Limnophila*, *Nasturtium*, *Lemna*, *Marselia* etc. and protected marginally by the emergent *Polygonum*, *Cyperus*, *Scirpus*, *Eupatorium*, *Ipomea*, etc, are their ideal dwelling grounds. The physico-chemical parameters in such habitats varied as under :

Water quality : Temperature ($^{\circ}\text{C}$) 18.0-23.0;

pH - 6.8-7.5; Hardness (ppm) 80.0-

150.0; Phosphorous (ppm) 0.8-0.12 and Nitrates (ppm) 6.10-7.39.

Soil quality : Nitrogen (%) 0.190-0.210 ; Phosphorous (ppm) 14.0-18.0 and Organic Carbon (%) 1.50-2.20.

As for food and feeding, they prefer aquatic vegetation on which they most of the time nibble. Upwardly directed mouth is not only suited for consuming plant material, but also insects, larvae and crustaceans drifting in the surface layers (Gupta and Gupta, 2006).

Most of the specimens procured during March to May exhibited gradual ripening of the gonads indicating their prospective breeding in the later months. Females out-number males in an aggregation. Not to be emphasized that wide range of colour variations are apparent while the individuals venture from the weedy thickets to less shaded areas. Males have been found to build foam-nests from air bubbles among the floating plants as confirmed when a good number of specimens were placed in aquarium (Fig. 2). As per the inherent tendency of all the fellow members (like *Anabas*, *Betta*, *Belontia etc.*), males are quite quarrelsome during the ripening period and often nibble off the vertical and caudal fins and scales of females. When kept in aquarium injured females had to be removed from time to time.

Discussion

The meristic and morphometric characters observed in the present material and compared with Day (1878, 1889), Jayaram (1981), Talwar and Jhingran (1991) and Uniyal and Kumar (2006) are well in agreement with them but with

certain enlargement of ranges. Interestingly, most of the meristic characters and body ratios are overlapping and it is very difficult to segregate *C. lalia*, *C. fasciatus* and *C. labiosus*, except on the basis of body shape and craniodorsal profile over the eye (*cf.* partial key given in the foregoing). Other points of interest are discussed as under :

1. *Variability in serrations on opercle and subopercle* : The diagnostic generic character pertaining to opercles given by Day (1878, 1889), Jayaram (1981), Talwar and Jhingran (1990) and Vishawanath *et al.* (2007) is found to be quite variable. The present findings do not agree with these workers who described 'opercle entire' as the generic character. The screening of the present material has revealed that the lower edge of the opercle is finely serrated to denticulated (saw-like) in all the specimens of *Colisa fasciatus* and *C. labiosus*.

In *Colisa lalia* opercle appeared entire upto 35 mm (TL) but gradually fine serrations to prominent denticulations appear along its lower edge as the size increases.

As for subopercle, the present findings corroborate the contention of Day (1878, 1889) that, "the subopercle may be serrated or entire in the same species".

Therefore, while studying the generic character pertaining to opercle, it should be observed as follows : '**opercle entire or finely serrated to denticulated**'.

2. *Variability in dorsal and anal fin spines* : The present findings support the view of Day (1878) when he enumerated the variations in the number of dorsal and

anal fin spines in the specimens collected from Assam and Calcutta.

3. *Colour variations* : As described in the foregoing, apart from oblique bands on the body these species are quite peculiar to colour changes. In general, they are darker in weedy thickets and lighter in more lighted waters.

Sterba (1967) for *Colisa labiosus* male has said that the pelvic fin ray is red but colourless in females. The later is also found to be variable i.e., the pelvic fin ray of female ranges from colourless to light pinkish but that too when females are approaching peak ripening period.

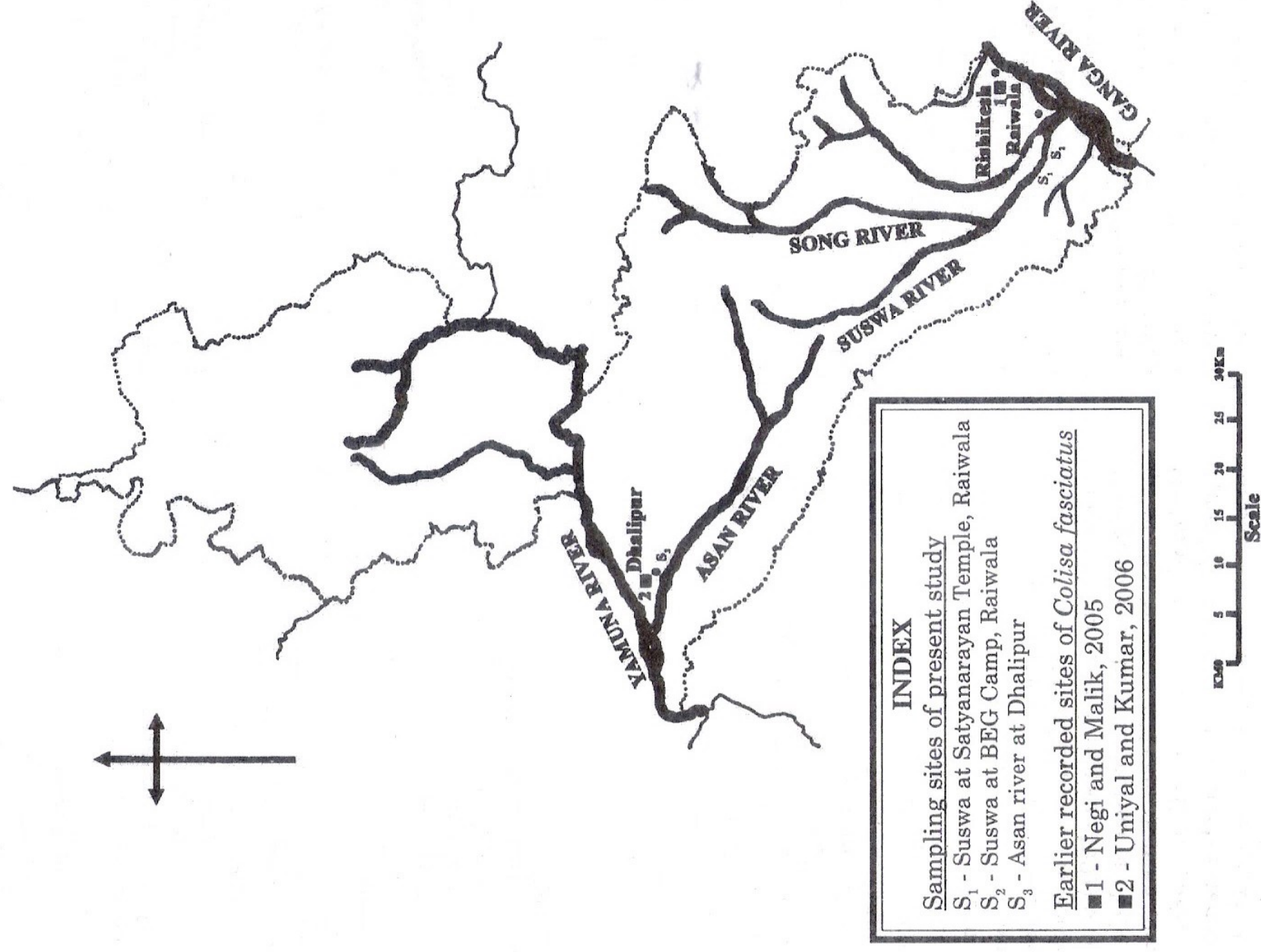
4. *Teeth on the Jaws* : The dentinal pattern on the jaws characteristically segregates adult females (Fig. 7) and males of *Colisa labiosus* (Fig. 8), as they are very fine, villiform and procumbent in females whereas tough, conical and hidden under thick and papillated lips in males. In *Colisa lalia* and *C. fasciatus* the teeth are always villiform.

5. *The status of Colisa sp.* : As said earlier most of the meristic characters and body ratios are overlapping and it is very difficult to segregate *C. lalia*, *C. fasciatus* and *C. labiosus* on these bases. The exploration of possible reasons behind this has revealed some interesting facts as to decide the relationships among all the three species. The study of present material (especially *C. fasciatus* and *C. labiosus*) is fully in agreement with the contention of Arnold (1950) (*vide* Sterba, 1967) who very impressively shown that “all the so-called *Colisa labiosa* kept in Germany are very similar to *Colisa fasciatus* and probably represent an inadequately investigated variety of the

latter”. Other reports (website ref. 3) also support this fact by saying “this species (*C. fasciata*) closely resembles *C. labiosus* and is somewhat similar to the stocky-bodied *C. lalia*”. The similarities among the species are also the outcome of the fact when it is known that ‘*C. fasciatus* can be crossed with *C. labiosus*’ (website ref. 3) and ‘thick-lipped gourami (*C. labiosus*) has been deliberately crossed with the Indian gourami (*C. fasciata*) and dwarf gourami (*C. lalia*) hybrids with new colour patterns’ (website ref. 4). This is the potential reason of mixing of characters and creating lots of difficulties in deciding the ideal taxonomic status to the material collected from the wild. The three species dwelling in the same locality definitely get ample chances of crossbreeding and producing populations of overlapping characterizations and varied colour patterns.

6. *Distribution* (Fig. 9) : The faunistic revaluations done from time-to-time (Jayaram, 1981; Talwar and Jhingran, 1991; Menon, 1999; Vishawanath *et al.*, 2007) give the distribution of *Colisa fasciatus* and *C. lalia* in the freshwaters of India, Pakistan, Nepal, Bangladesh, Burma (Myanmar) etc.. Jayaram (1981) still described the distribution of *Colisa labiosus* as to be in Burma (Myanmar) like Day (1878). It is for the same reason that Menon (1999) did not include *Colisa labiosus* in the ‘*Checklist of Freshwater Fishes of India*’. At this juncture, it is worth quoting Talwar and Jhingran (1991) who have described the distribution of *Colisa* sp. as “freshwaters of India, Burma and Thailand, four species; all in Indian region”. This statement is corroborated by various reports (like website ref. 1), where the origin of *Colisa labiosa* has been described to be Burma and India. Recently Vishawanath *et al.* (2007) reported

Fig. 9



Map of Doon Valley showing sampling sites

Trichogaster labiosus (= *C. labiosus*) from Manipur and Tripura in India. The present findings gain firm footing from the reports which say that *Colisa lalia* typically inhabit areas with thick vegetation, such as the wetlands of the Ganges and Jamuna (website ref. 2).

As far as the distribution of *Colisa* sp. in Western Himalayan region (including Garhwal and Kumaun Hills) is concerned *Colisa fasciatus* and *Colisa lalia* were reported from the Kumaun hills, when Husain (1995) discussed the fauna of Western Himalaya (Part I). Menon (1962) and Nautiyal (2005) also recorded their presence in Western Himalayas. The presence of *Colisa* sp. in the streams of Doon Valley was not reported in the publications during 1936 and 1994 (cf. ref. in introduction).

It was in 2005 when Negi and Malik

recorded the presence (but stated to be rare) of *Colisa fasciatus* in the fish fauna of Ganga river (20 km stretch) at Rishikesh (Eastern Doon) between Phoolchatti Ashram to Saptasarovar. Further, the presence of *Colisa fasciatus* in Western Doon, at the confluence of Asan and Yamuna river, was recorded by Uniyal and Kumar (2006).

The present findings confirm the distribution of *Colisa fasciatus* in Eastern Doon particularly in the marshy and swampy areas in the vicinity of Suswa river. Thus, it is a **new record for Suswa**.

Simultaneously, the recording of *Colisa lalia* and *Colisa labiosus* from the same locality is **exclusively a new record for Eastern Doon and hence for Doon valley**. Also, these new records foresee avenues of propagating such important aquarium fishes on commercial basis.

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