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First Record of endemic fish *Dawkinsia filamentosus* (Family Cyprinidae) from Daman Ganga river at Dadra & Nagar Haveli, Union Territory of India.

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Abstract
The present paper reports the first record of the fish species *Dawkinsia filamentosus* from Damanganga River of the state of Dadra & Nagar Haveli, Union territory of India. A total of 47 specimens were caught monthly from backwater of river Damanganga, including 20 males and 27 females. Morphometric measurements and the meristematic count were conducted for its identification. The given paper provides the description, distribution, and diagnostic character characteristics of the species *Dawkinsia filamentosus*.

Keywords: First record**,** description, distribution, diagnostic character, *Dawkinsia filamentosus*

1. Introduction
The Dadra and Nagar Haveli is a Union Territory of India, landlocked between Gujarat to the north and Maharashtra to the south. It is close to the western coast of India (between 20°0′ and 20°25′ N latitude and between 72°50′ and 73°15′ E longitude). The state has hilly terrain, especially towards the North-East and East, surrounded by the Sahyadri Mountains (Western Ghats) ranges. The terrain is intersected by the River Daman Ganga and its three tributaries [1].

The Damanganga River originates from Sahyadri Hills near Valveri village in Nashik district of Maharashtra. The river flows a distance of ~131.30 km from East to West along with its tributaries and passes through the hilly areas of Maharashtra, Gujarat, and Union Territories (UT) of Dadra & Nagar Haveli (DNH) and Daman & Diu (DD) before draining into the Arabian Sea [2]. The total catchment area of river is 415 square kilometres

The river Daman Ganga forms main source of fresh water for industries, irrigation and domestic purposes of state Dadra and Nagar Haveli. The industrial towns of Vapi, Dadra and Silvassa lie on the north bank of the river. According to the study report, these industries discharge untreated effluent into the river and common effluent treatment was also reported to be dysfunctional. This lead to decrease in dissolved oxygen and increased in mercury content [4].

Hence survey was conducted to study the aquatic fauna of the river and the effect of pollution on population dynamics of the fish fauna. Literature review found lack of study on fish fauna of the state. Survey of the fishing station revealed variety of common freshwater fish such as Rohu, Catla, Mrigal, Shinghala, Tilapia etc. But among these fishes, *Dawkinsia filamentosa* was not previously recorded from Dadra and Nagar. So the current work study was focused on taxonomy, morphology, diagnostic characters, and distribution of the species *Dawkinsia filamentosa.*

2. Materials and methods
2.1 Study area
During the recent survey, the first author collected the specimens from Madhuban dam, the backwater of the river Damanganga, 7.5 km from Silvassa, located between 20.016’ N latitude and 73.009’ E longitude and from Silvassa river front 20.27’ N latitude and 72.98’ E longitude, Dadra and Nagar Haveli, India. The sample was collected with the help of local fishermen, who used a gill net (Fig. 1).

2.2 Treatment of specimens

The collected fish was thoroughly washed and photographed. Methods of measurements and counts follow Katwate, Marcus Knight, et al., 2020 [5]. Measurement was taken with the help of meter tape and vernier caliper. Weight was carried out with the help of digital balance.

Length provided as standard length (SL). Body depth was measured at dorsal-fin origin. Head length includes the skin flap on the opercula. The number of lateral-line scales was counted up to the last perforated scale and includes one perforated scale on the caudal-fin base. The number of scales in a transverse row were counted from lateral-line scale row to dorsal fin origin, and from lateral-line scale row to pelvic fin origin. Dorsal fin rays were counted under transmitted light.

Sex of all mature individuals was determined from secondary sexual characters: coloration, presence or absence of nuptial tubercles, and of the filamentous extensions of the first five branched dorsal-fin rays.

The representative fish specimen was transferred to 70% ethanol and deposited at the Bombay Natural History Society (BNHS), Mumbai, India for identification. This fish was identified as *Dawkinsia filamentosus* and registered with catalogue number-BNHS FWF 704.

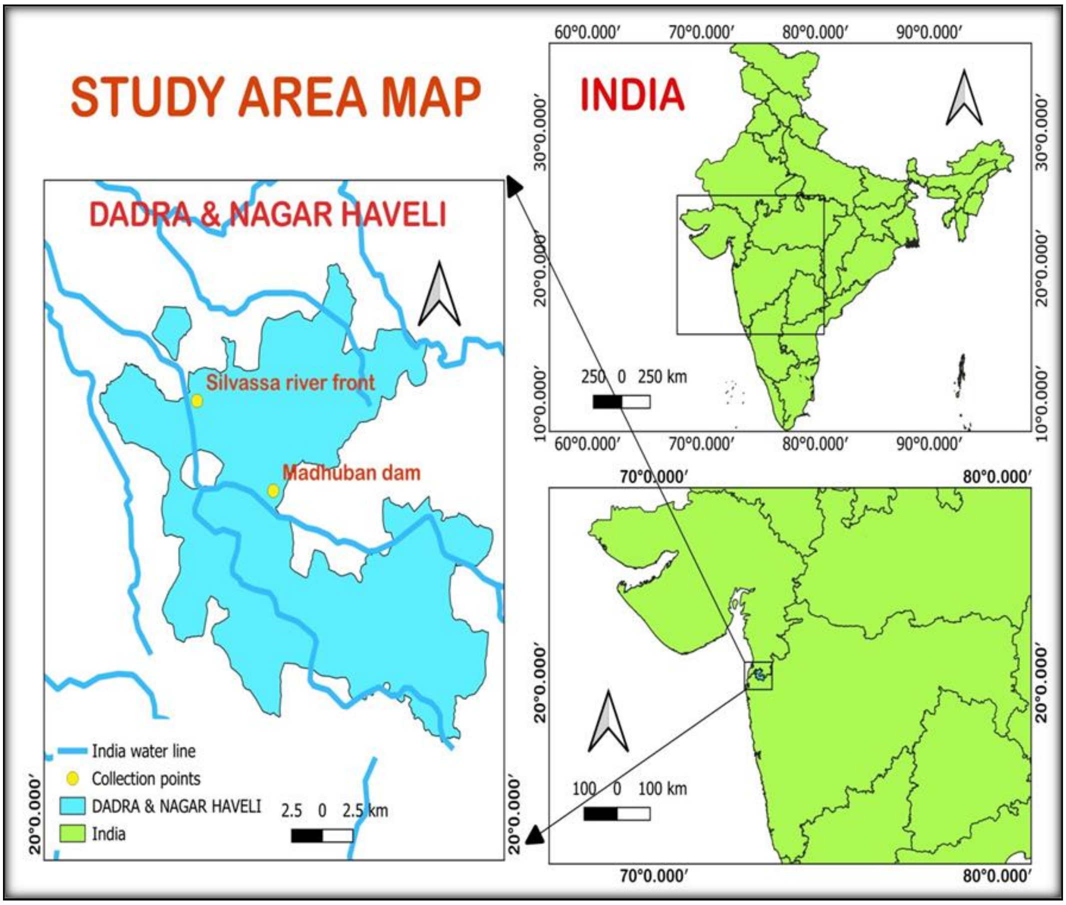

Fig 1: Map of the study area showing collection point of the sample specimen of *Dawkinsia filamentosus.*

3. Result

3.1 Taxonomic Hierarchy

Kingdom: Animalia
Phylum: Chordata
Class: Pisces
Order: Cypriniformes
Family: Cyprinidae (2 - 4 barbels or no barbels)
Genus: *Dawkinsia*
Species: *Dawkinsia filamentosa*

3.2 Meristic and morphometric characters are given in table

Table 1: Morphometric measurements carried out on the specimen of *Dawkinsia filamentosa* captured from Daman Ganga river.

Morphometrics	Mean (sd)	Range
Snout Length	7.0 (0)	6.0 - 9.0
Pre-orbital Length	13.1 (0)	12 - 15
Head length	20.5 (1.0)	18 - 25
Pre-Dorsal Length	38.1 (4.4)	30 -48
Pre-Pelvic Fin	41.0 (4.1)	32 - 51
Standard Length	84.9 (9.7)	66 - 109
Total Length	108.1 (11.8)	85 - 140
Width of Dorsal fin	16.2 (4.1)	12 - 40
Eye diameter	6.8 (0.5)	6 - 8
Depth of Caudal peduncle	11.8 (1.6)	9 - 19
Body depth	31.3 (3.5)	25 - 40

Table 2: Meristics count carried out on the specimen of *Dawkinsia filamentosa* captured from Daman Ganga river.

Meristics characters	Range
Lateral line scales	21-24
Transverse row scales	4 - 4.5
Dorsal fin rays	8
Pectoral fin rays	14
Pelvic fin rays	8
Anal fin rays	5
Caudal fin rays	8 to 9

3.3 Description

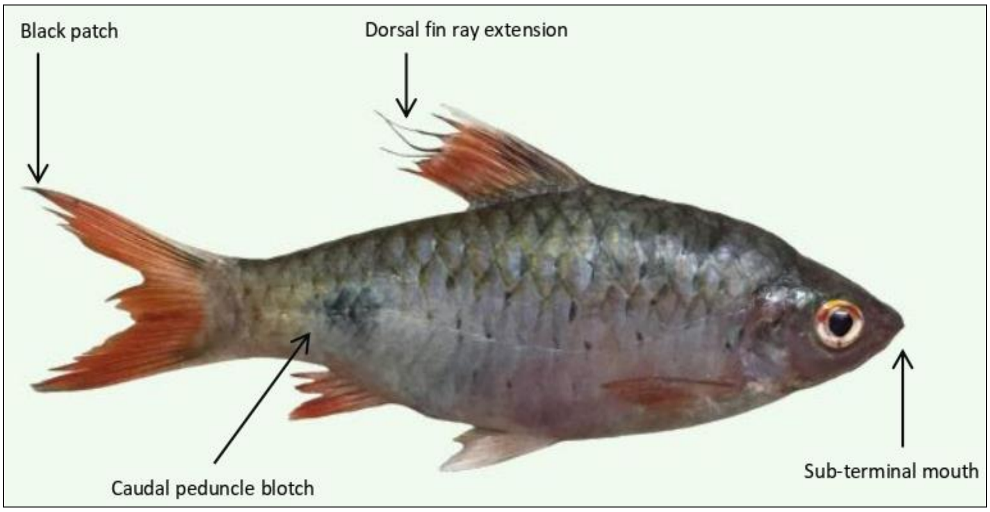

Fig 2: Specimen sample collected from the study area.

Meristic and morphometric characters are as given in the Fig 2.

Body of the fish is compressed with rounded abdomen. Head is short as compared to the whole body size. Snout found obtuse in shape with mouth sub-terminal in position. Eyes situated dorso-laterally. Lips thin covering the jaws. Two maxillary barbels are present in pairs. Barbels were short in size. Nuptial tubercles were found to be prominent in males. The dorsal fin is short and inserted exactly opposite to the pelvic fin with branched rays. Adult male shows prolonged filament-like extension of branched dorsal fin rays. The anal fin is of moderate size. The caudal fin is deeply forked and possesses a black band near the tip of each caudal fin lobe. Scales are of cycloid type. Body depth is 3 to 3.5 in total length. Lateral line scales are 21-24. Lateral line complete with 21-28 scales. Lateral line scales not more than 28. Scales between lateral line and pelvic fin base not more than three and half. Dorsal spine weak articulated.

3.4 Distribution

The species are distributed across peninsular India, in the east-flowing Cauvery, Krishna, and Tamitaparani rivers of Andhra Pradesh, Karnataka, and Tamil Nadu and throughout the west-flowing coastal floodplain rivers of Kerala, Karnataka, and Goa. It occurs in lowland, upper and middle reaches of rivers and also in estuaries, reservoirs, and marshes.

3.5 Diagnostic characters

The fish is characterized by the deep black oval mark called caudal peduncle blotch on lateral line above an anal fin present. *Dawkinsia filamentosa* differs from other species by caudal peduncle blotch not reaching (vs. reaching) caudal-fin base, having only caudal peduncle blotch (vs. anterior and posterior dorsal blotches in front of caudal-peduncle blotch in *D. arulius, D. rubrotincta, D. srilankensis and D. tambraparniei*) on body. The tip of the caudal lobe also possesses a black patch. *Dawkinsia filamentosa* differs from *D. crassa* by presence of sub-terminal (vs. terminal) mouth and from *D. assimillis* by mouth not inferior (v.s inferior) as given in Fig. 2. Presence of dorsal fin ray extension also distinguishes the species from its other cryptic species.

4. Discussion

The literature review revealed the restricted distribution of the fish of genus *Dawkinsia*. Species of the genus *Dawkinsia* are reported to be distributed along Western Ghat, Eastern Ghat, Southern India and Sir Lanka. *Dawkinsia filamentosa* previously have been described as *Barbus filamentosus*, *Puntius filamentosus;* Indian tiger barb, *filament barb,* longfin barb, feather fin barb by [6].

The fish belonging to the genus *Dawkinsia* is a ray-finned fish species in a non-phylogenetic group, with members in the family Cyprinidae. The species is most commonly found in coastal floodplains near the Southwest Indian states of Kerala, Tamil Nadu and Karnataka. This species is also known as blackspot barb [7]. The fish was found as *Pantius filamentosus* in the Indian subcontinent throughout the river South Western Ghat [8]. The species have an adult size of 108 mm and are characterized by having a deep black oval mark on the lateral line above anal fin present [9].

Pethiyagoda, R & Kottelat M, 2005 reported the different species belonging to the genus *Puntius* from Kerala, Karnataka state of southern India and Sri Lanka. [10]

Katwate, Apte, *et al*., 2020 studied the species of *D. filamentosa* from north most Kal River of Raigad, from the west-flowing Vaitarana of state Maharashtra.

[11] Jegatheesh *et al*. 2014 along with *Dawkinsia filamentosus* studied four species having close genetic similarity i.e *D. assimilis, D. rohani, D. tambraparniei and D.exclamatio* from 15 different locations covering east and west flowing stream/rivers of Kanyakumari district in Tamil Nadu.

Thus with all detailed investigation, no efforts was seen done to record different species of fish present in the state of Dadra and Nagar Haveli, India.

5. Conclusion

Present study recorded the species *Dawkinsia filamentosus* for the first time in state of Dadra and Nagar Haveli, India. Also availability and quantity of fish was found to be limited in the local market. Hence these findings will revise the distribution data of the species and provide insight to conduct thorough investigation on its availability.

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