



# A report of freshwater sponge *Trochospongilla latouchiana* from Maharashtra, India.

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## ABSTRACT

Studies on freshwater sponge occurrence in India are few. The present study reports the occurrence of sponge *T. latouchiana* in Davdi lake of Dombivli, Thane district, North western region of Maharashtra. Light Microscopy and Scanning Electron Microscopy was used to confirm the species. In India, this species was last observed in its natural habitat in the year 1907 by Annandale. SEM analysis revealed an unusual occurrence of spines on megasclere spicules. The occurrence of this rarely seen species in our study area, emphasizes the need for further molecular studies of this species, and a thorough survey to study its occurrence elsewhere.

## KEYWORDS

Freshwater sponges, *Trochospongilla latouchiana*, birotule.

## INTRODUCTION

Sponges are pore bearing animals that belong to phylum Porifera. They are mainly aquatic and sessile, and obtain food by filtering small size food particles from water. Freshwater sponges occur in both lotic and lentic habitats. A variety of external morphologies like encrusting, rounded and finger-like forms are exhibited by them (Frost, 1991). Coexistence is a common phenomenon observed in sponges. Keen observation is essential to identify different species occurring on the same substrata especially in the encrusting forms, eg. genus *Corvospongilla*.

There are 31 species of freshwater sponges in India (Soota, 1991). In the past decade, around twelve sponge species were reported by various workers from Western Ghats of Maharashtra (Jamdade and Deshpande, 2014; Jhakalekar and Ghate, 2016). The species mainly belonged to genera like *Eunapius*, *Corvospongilla*, *Radiospongila*, *Ephydatia*, *Dosilia* and *Stratospongilla*. However, report of species of genus *Trochospongilla* is rare. According to the World Porifera Database, genus *Trochospongilla* includes 18 species. Indian region is represented by three species of this genus, namely, *T. latouchiana* (Annandale, 1907), *T. pennsylvanica* (Potts, 1882) and *T. philottiana* (Annandale, 1907). The present study, the occurrence of sponge *Trochospongilla latouchiana* is reported from Davdi lake of Dombivli, Thane district which is located in the North western region of Maharashtra state, India. This species is rarely observed in India.

## Classification of Freshwater Sponge in our study

- Phylum: Porifera (Grant, 1836)  
Class: Demospongiae (Sollas, 1885)  
Subclass: Heteroscleromorpha (Cárdenas, Perez and Boury–Esnault, 2012)  
Order: Spongillida (Manconi and Pronzato, 2002)  
Suborder: Spongillina (Manconi and Pronzato, 2002)  
Family: Spongillidae (Gray, 1867)  
Genus: *Trochospongilla* (Vejdovsky, 1888)  
Species: *Trochospongilla latouchiana* (Annandale, 1907)

## Distribution

India, Burma, China, Southeast Asia, Japan and Australia (Annandale, 1907; 1911; Penney and Racek, 1968; Racek, 1969; Masuda and Satoh, 1989; Manconi and Pronzato, 2002; Masuda, 2004; Manconi *et. al.*, 2013). In India, this species was reported from Bengal and Calcutta (Annandale, 1907; 1911).

## MATERIAL AND METHODS

### Study area

The lake under study is Davdi lake, located in Thane district, North western region of Maharashtra, India. The area of this lake is 4,060 sq.m., and its coordinates are 19°11'40" N and 73°06'58" E. The lake is located at the edge of Davdi village, Dombivli, and is away from residential area. A Hindu temple and a well are located in the vicinity of the lake. The lake is surrounded by stony steps on one side, and boulders on the other side. A well is located at the periphery of the lake. The uses of this lake include cattle washing, bathing, religious idol immersion and fishing.

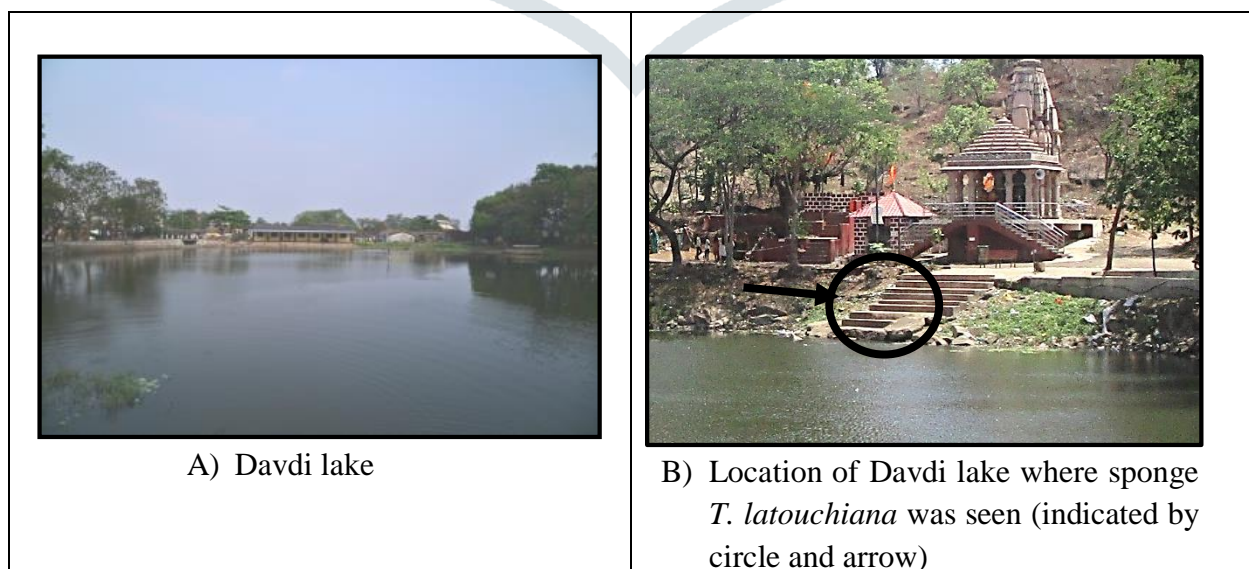


Figure 1- Image of study area and location of sponge occurrence.

## Sponge collection and identification

Sponge *T. latouchiana* was observed at the shallow peripheral area of Davdi lake during October 2021 to September 2022. Both live and dry specimens of this species were photographed, and small amount of dry sponge material along with its gemmules, were collected by carefully scraping the sponge material from the substratum with a scalpel. For identification of the sponge variety, the material was processed by boiling in concentrated Nitric acid, washing the dissociated spicules with distilled water and rinsing in ethanol. These processed spicules were observed under Light Microscope (Manconi and Pronzato, 2000).

For SEM analysis, sponge spicules were further thoroughly washed with 70% ethanol and completely dried. The gemmules were soaked in ethanol and sectioned. The spicules, entire gemmules and their sections were scanned using analytical Environmental Scanning Electron Microscopy (ESEM) (FEI Quanta 200, Germany). The sponge species was identified using the descriptions and illustrations given by Annadale (1907; 1911).

## RESULTS

Both live and dry sponge *T. latouchiana* were observed in Davdi lake during monsoon and summer season. The colour of live sponge is yellowish, while dry sponge is whitish in color. It occurs in the form of shallow cushions to circular encrustations 7 to 12 cm in diameter. Surface of the sponge is minutely hispid. Skeleton consist of distinct vertical radiating fibres and few transverse fibres at intervals. The sponge was observed co-existing with another encrusting sponge *Corvospongilla ultima*. The live and dry sponge is illustrated in figure 2.

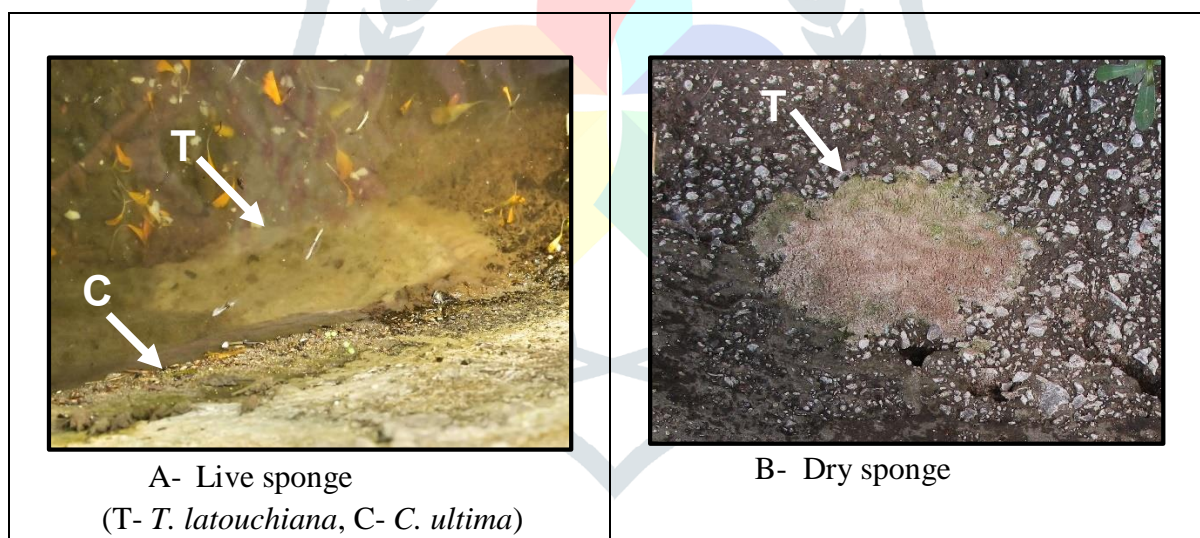


Figure 2- Sponge *T. latouchiana* on a side of concrete steps at Davdi lake.

The megascleres are feebly curved amphioxea, sparsely spiny and rarely smooth. Their length range is 220–280  $\mu\text{m}$  and width range is 12–20  $\mu\text{m}$ . Microscleres are absent. Gemmuloscleres are small birotules having slender smooth shaft of length 12–16  $\mu\text{m}$ . The circular rotules of unequal diameter. The smaller rotule is slightly recurved to form a bowl-like structure while the larger rotule is marked with distinct double circular outline as seen from above. The shaft does not project beyond the rotules.

Gemmules are small with diameter ranging from 160 to 190  $\mu\text{m}$ . They are abundantly present in the sponge body. Gemmuloscleres are radially embedded in the pneumatic coat in monolayer. The smaller rotules face the outer end while the large rotules face the inner side of the gemmule. The foramen appears to be surrounded by a crater-like depression, and the foraminal tube is short and distinct. The LM images of *Trochospongilla latouchiana* spicules are given in figure 3, and SEM image of spicules and gemmule is given in figure 4.

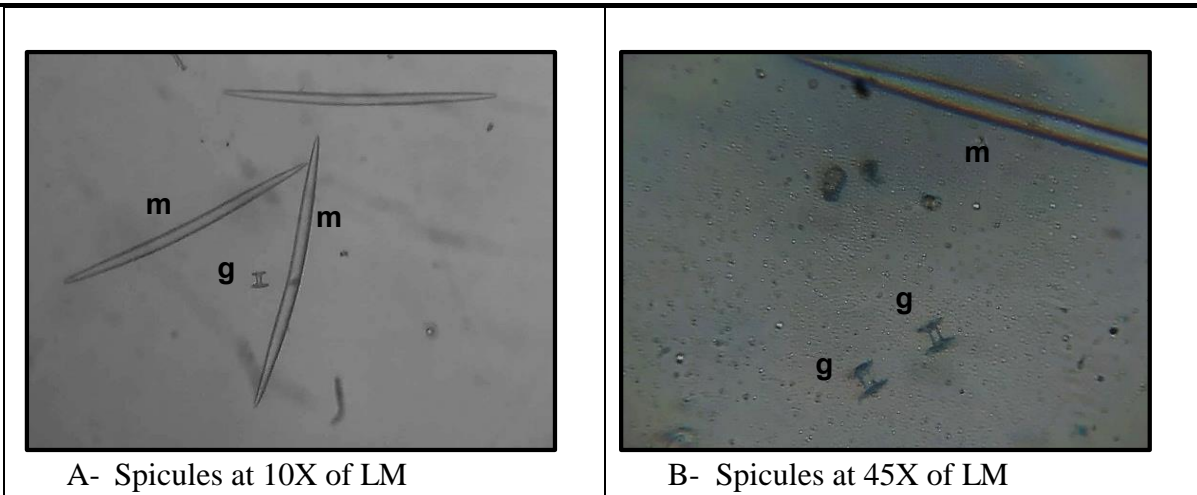
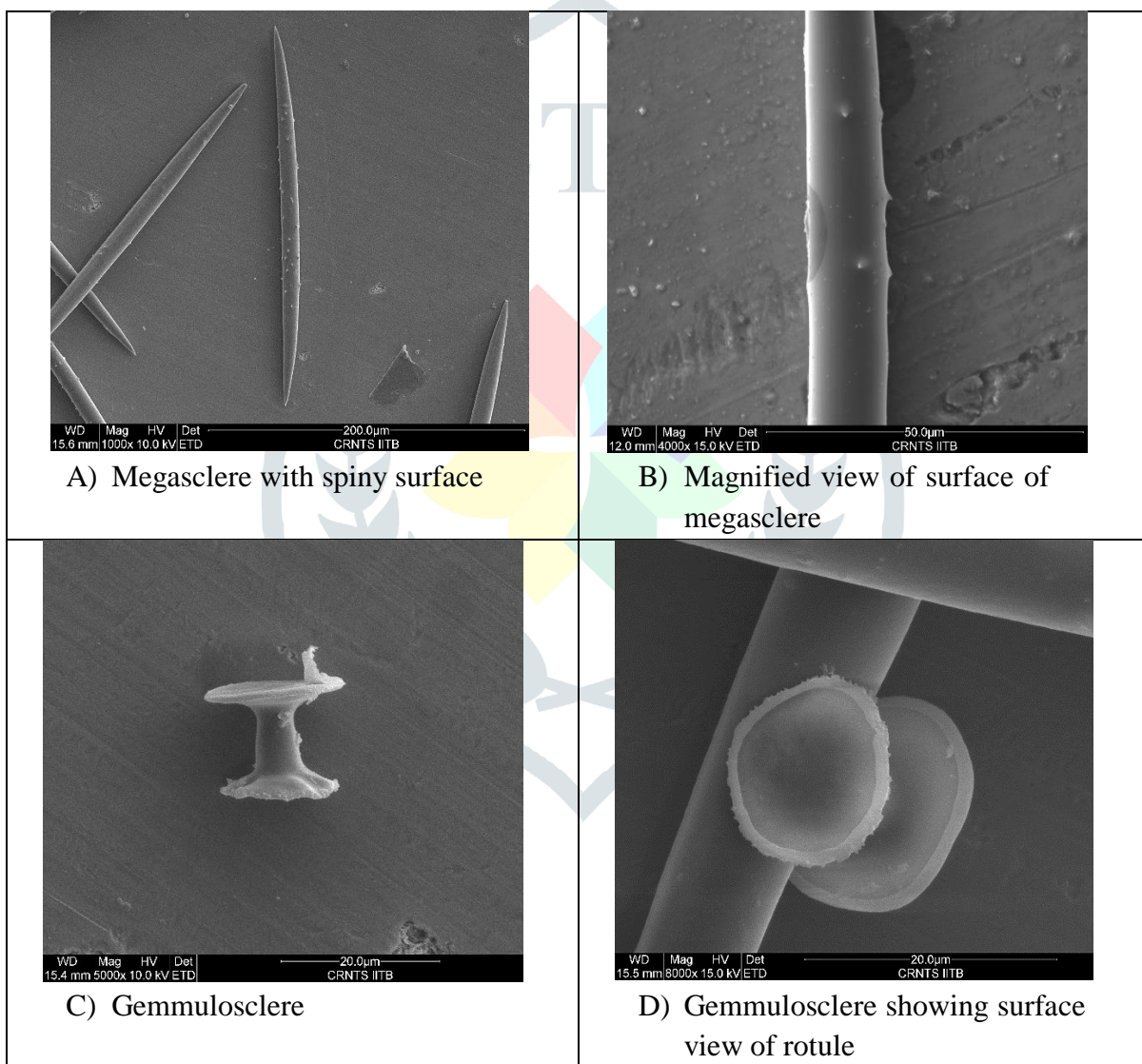
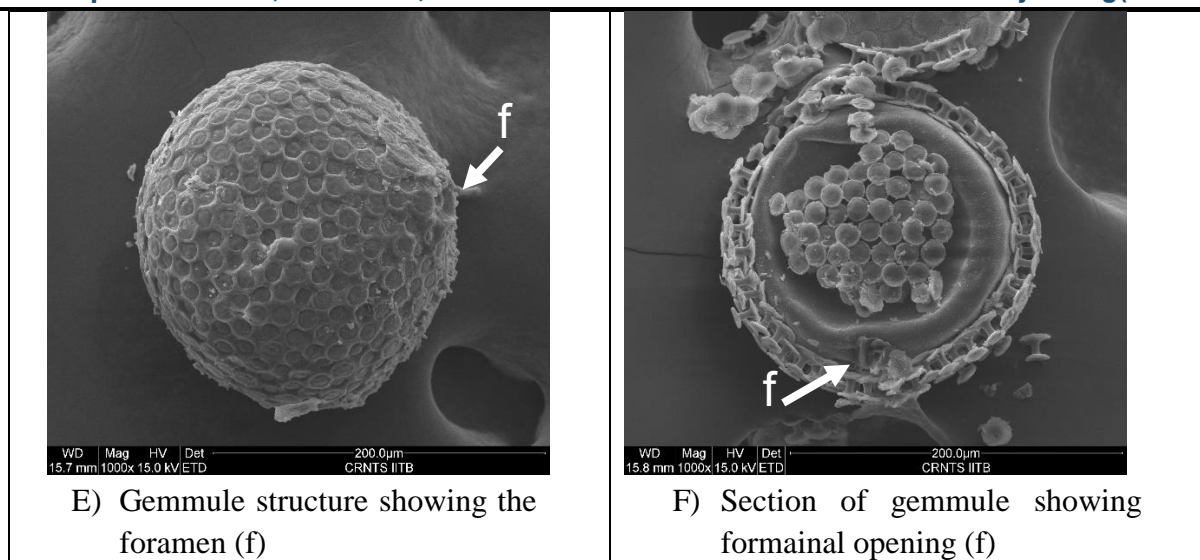


Figure 3- Spicules of *T. latouchiana* under Light Microscope (LM)  
Megasclere- m, Gemmulosclere- g





**Figure 4- SEM photographs of spicules and gemmule of *T. latouchiana*.**

## DISCUSSION

The specimens of *T. latouchiana* in our study show slight variation from the original descriptions. The species *T. latouchiana* was originally described by Annandale (1907), the specimens of which were found in a museum tank in Kolkata, India. In its original description, the megasclere oxaeas are entirely smooth. Later, the same is mentioned by Penney and Racek (1968) and Manconi and Pronzato (2019). Recently, Jhakalekar and Ghate (2014) conducted SEM study on the museum material of *T. latouchiana* from type locality, and they reported entirely smooth surface of megascleres of this species which match well with the original description. However, there is a striking difference in the surface of megasclere of our specimen which show sparse spines on the megasclere shaft except at their tips. Other characters of our sponge specimen like external morphology, gemmuloscleres and the gemmules match well with the original descriptions, except for the surface of megasclere. Such spinous megascleres were also reported in specimens of *T. latouchiana* from Australia, Japan and Cambodia (Racek, 1969; Masuda and Satoh, 1989; Masuda, 2004). Racek (1969) considers this character of spiny megascleres in *T. latouchiana* to be negligible as only few megascleres showed sparse microspines. However, we observed many spiny megascleres in all the specimens of this species. This trait therefore cannot be ignored and needs to be examined further, as there is a possibility of existence of its subspecies. This trait can also be a result of environmental influence.

## CONCLUSION

The present study helped rediscover *Trochospongilla latouchiana* in central India after almost a century. The study also adds one more species to the checklist of freshwater sponges of Maharashtra state. *Trochospongilla latouchiana* was easily identifiable on field and under Light Microscope. The appearance of spines on megascleres may be due to environmental influence or it is a subspecies, which can be confirmed by DNA analysis.

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