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First report of freshwater sponge *Radiospongilla cerebellata* (Bowerbank, 1863) from Kokrajhar district, Assam, India

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Abstract
In this paper, we present the first report on occurrence of freshwater sponge species *Radiospongilla cerebellata* (Bowerbank, 1863) from Kokrajhar District of Assam, India. We presented our field observation with taxonomic description of the species, their micro-habitats along with photographs and micrographs.

Keywords: freshwater, sponge, porifera, Kokrajhar, Assam

Introduction

Sponges are a group of organisms under Animal kingdom (Porifera, Spongillidae), which inhabit in marine, estuarine and freshwater habitats. These groups of organisms constitute an important component of these ecosystems. Due to their sedentary nature and very poorly organized body structure they are very little known. The colour of these species also inconspicuously variable from green brown, gray or yellow, and they solely depends on absorbing the sestonic material available in water.

The freshwater sponges of Assam are poorly known in comparison to other states of the country. Freshwater sponges were originally studied by Carter (1849; 1881; 1882) [4, 5, 6] and Bowerbank (1863) [3]. Later Annandale (1911) made the first inclusive account of taxonomy and biology of the freshwater sponges. After Annandale, there were sporadic reports on freshwater sponges of India (Jakhalekar & Ghate 2013). In an occasional paper of ZSI by T.D. Soota (1991), mentioned about 30 species of freshwater sponges in 10 genera of the family Spongillidae Gray from the Indian region. In this paper he mentioned about two species from Assam region. But paucity of subsequent records of these species from this biodiversity rich region might be due to lack of proper study and survey on freshwater sponges.

During our field survey on the freshwater ecosystem in kokrajhar District, Assam, India, we noticed this interesting freshwater sponge from a seasonal wetland. We documented our field observations with notes on the microhabitats and ecology. This appears as the first report of this species from Kokrajhar District of Assam.

Material and Methods

We have start survey on Wetland micro fauna and flora in Kokrajhar District from 2018. This is the western most district of the state of Assam bordering West Bengal in west and International border with Bhutan in North. The district of Kokrajhar settled on the riverbank of Brahmaputra is bounded by Dhubri district on the south and the Chirang district lies on the eastern side. Kokrajhar district lies in between 26’18 N to 26’54 N latitudes and 89’46 E to 90’58 E longitudes. The climate in Kokrajhar district as in the entire state is hot and humid during summer. It also experiences strong spell of cold winter. The maximum humidity lies from June to October. The major portion of the district is a flat plain and characterized by its configuration, drainage pattern and geological structure. The district is crossed by several rivers. There are also several small and large streams across the area. These all are the places of interest for the field collections.

Out of 12 different field sites, only one locality (26.411031N, 90.307998E) was found with freshwater sponges. This wetland is seasonal in nature and having different hydrophytic species. The area is about 2 hac and found with very low human disturbances. The physical and chemical properties of the water were studied and abundance of micro-invertebrate fauna was also observed according to standard literature. The majority of the sponge collections were made during August- December, when the water level starts to ceases. We observed the shallow marginal areas of the water bodies. Sponges were photographed in the field with a Nikon D750 camera and then removed carefully along with gemmules from the substrata. The collected samples were fixed in 4% formaldehyde and later stored in 70% ethanol for further studies. The dried up specimen were also collected for study. Samples were examined with a Labomed Research Microscope equipped with tracing and measuring devices and devised with Amscope Microscope Camera to capture micrographs.

From the collected samples Spicules and gemmules were studied and measured. For identification of the species descriptions made by Annandale (1911), Penney & Racek (1968) and Soota (1991) were compared.

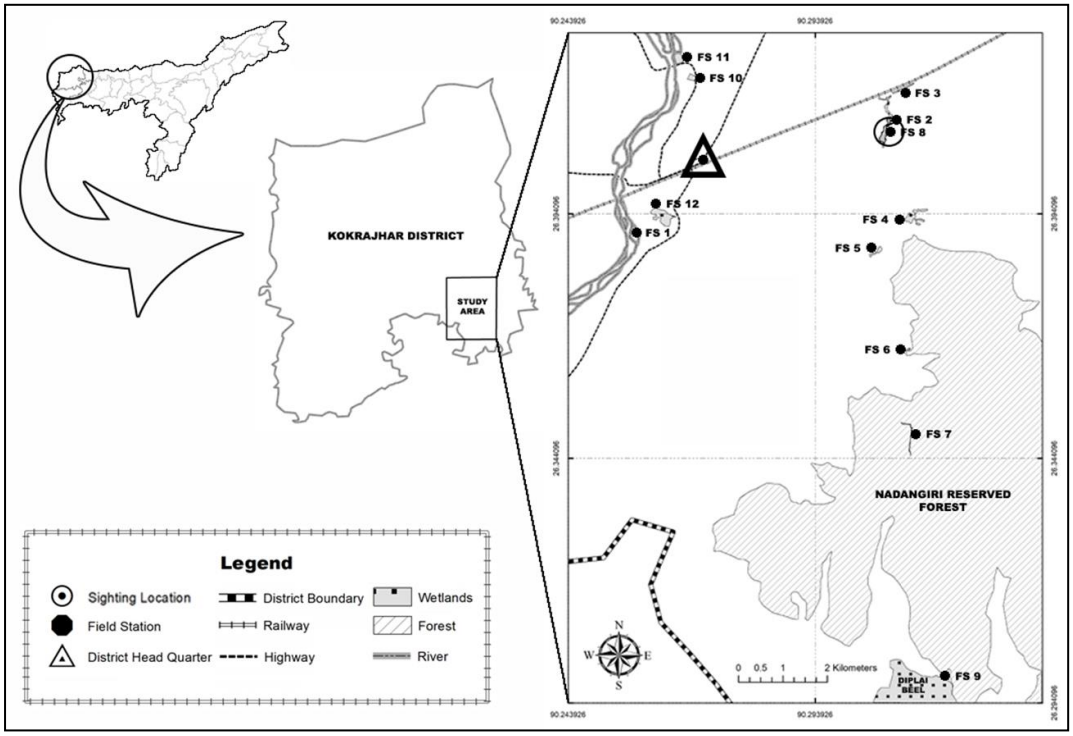

Fig 1: Geo referenced map of the study area.

Fig 2: A. Habitat. B. Surface of the sponge. C. Base of the sponge with substratum D. Dried up sample. E. Enlarged view. F. Megascleres and Gemmuloscleres

Results and discussion

Taxonomic Descriptions

The taxonomic remarks on the species *Radiospongilla cerebellata* (Bowerbank, 1863) [3] are presented below.

***Radiospongilla cerebellata* (Bowerbank, 1863) [3]**

Classification: Kingdom: Animalia; Phylum: Porifera; Class: Demospongiae; Subclass: Heteroscleromorpha; Order: Spongillida; Family: Spongillidae; Genus: Radiospongilla; Species: *Radiospongilla cerebellata* (Syn. Names: *Spongilla cerebellata* Bowerbank, 1863 [3]; *Spongilla cinerea* Weber, 1890; *Spongilla biseriata* Weltner, 1895; *Spongilla proliferens* Annandale, 1907; *Ephydatia semispongilla* Annandale, 1909; *Spongilla semispongilla* Annandale and Kawamura, 1916; *Spongilla micron* Annandale, 1916; *Spongilla sectospina* Rezvoj, 1926)

Description

This Sponge in shape and structure ranges from small to large, showing brain like corrugations, often growing noticeable, finger-like projections at the surface; smaller individuals, however, form shallow cushions, covered by minute pores, along with megascleres projecting individually from the surface. Small but discernible oscula; dermal membrane well developed. Colour in live sponge is bright green, discolours in dried up sponges. Dry Sponges off-white to pale brown. Skeleton having radiating spicule fibers of different thickness; Spongin insignificant. Live sponges are soft and loosely textured. Megascleres smooth, curved or less straight, 260–380 X 8–12 µm. Microscleres absent. Gemmuloscleres densely spined, rarely straight, 75-110 µm. Gemmules numerous, thick, spherical.

Distribution

Globally this species is known from Sri Lanka, Indonesia, Philippines, New Guinea, China, Japan, Russia, South East Europe, tropical and sub-tropical Africa, North America (Mendis & Fernando 1962; Penney & Racek 1968; Poirrier 1972; Manconi *et al*. 2013).

In India it was recorded earlier from Bhutan frontier of Mangaldai (Assam), Orissa, Bihar, West Bengal, Uttar Pradesh, Maharashtra, Karnataka, Kerala, Tamil Nadu and Andhra Pradesh (Soota, 1991)

Discussion

As per the literature on Indian freshwater sponge fauna, there are at least 28 species in 10 genera been recorded so far. But there is lack of any information on the freshwater sponges of Kokrajhar District, Assam. So, this field observation could be considered as the first report on the species. The majority of our sponge samples were collected from a seasonal wetland, with stable aquatic environment in association with some aquatic plant (grass) species. We have regularly monitored the sponges and it was found that *Radiospongilla cerebellata* have great ability to tolerate and colonise wide range of habitat. The present habitat was found rich in organic materials coming from the decomposition of different hydrophytic species. It is envisaged this study that substratum appears to be one of the crucial constituents of the microhabitat for the settlement and growth of *Radiospongilla cerebellata*. In this study we found the species attached to an unidentified aquatic grass species as its substratum. As growth continues, finger-like processes are seen to produce as stubby projections at the surface which next grow prominently in length and somewhat in breadth to form an extremely corrugated structure. In young sponges turret-like raised osculum was observed.

Conclusion

It is noticeable that out of 12 sites of regular study only one site was found with the species. We can conclude that, anthropogenic pressure is one of the major factors for declining the habitat. According to Bell *et al*. (2015), freshwater environments have been globally impacted by human activities, which have resulted in the change in abundance of sponges in different countries. In Kokrajhar also, decline of local freshwater habitats by anthropogenic reason have made change of the microhabitat to sustain such rare sponge populations. So, there is a great threat for local extinction of this rare freshwater sponge from the area. The particular habitats and localities of this species should therefore be made an urgent and special study for locality-mapping, and specifically targeted by State Governments for immediate and strict conservation.

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