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Cover: Himalayan Gray Langur *Semnopithecus ajax* (adult female) © Rupali Thakur.

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COMMUNICATION

First report of marine sponge *Chelonaplysilla delicata* (Demospongiae: Darwinellidae) from the Andaman Sea/Indian Ocean with baseline information of epifauna on a mesophotic shipwreck

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Abstract: During a biodiversity assessment on a wreck located in the Andaman Sea (Andaman Islands), a single specimen of sponge *Chelonaplysilla delicata* was recorded. Our finding confirms the species taxonomy and highlights the current observation as a first report from the Andaman Sea/Indian Ocean. The baseline information on epifaunaof the wreck is further stated in this study.

Keywords: Biodiversity, epifauna, invasive, Porifera taxonomy, *Tubastraea*.

Hindi: अंडमान सागर (अंडमान द्वीप समूह) में स्थित मलबे पर जैव विविधता मूल्यांकन के दौरान, स्पंज का एक एकल नमूना चेलोनाप्लसिलिा डेलिकाटा दर्ज कयिा गया था। हमारी खोज प्रजातियों के वर्गीकरण की पुष्टि करती है और अंडमान सागर / हिंद महासागर से पहली रपिोर्ट के रूप में वर्तमान अवलोकन पर प्रकाश डालती है। एपफिौना की आधारभूत जानकारी इस अध्ययन में आगे बताई गई है।

Bengali: আন্দামান সাগরে (আন্দামান দ্বীপপুঞ্জ) অবস্থিত একটি ধ্বংসাবশেষের জীববৈচিত্র্য মূল্যায়নের সময়, স্পঞ্জের একটি একক নমুনা চেলোনাপ্লিসিলা ডেলিকাটা নথিভুক্ত করা হয়েছিল। আমাদের বর্তমান অনুসন্ধানটি প্রজাতিটির শ্রেণীবিন্যাস সুনিশ্চিত করে এবং আন্দামান সাগর/ভারত মহাসাগর থেকে প্রথম প্রতিবেদন হিসাবে দৃষ্টিগোচর করে। এই এপিফনার কিছু প্রাথমিক তথ্য এখানে আরও বলা হয়েছে।

Tamil: அந்தமான் கடலில் (அந்தமான் தீவுகள்) அமைந்துள்ள ஒரு கப்பல் சிதைவில் பல்லுயிர் மதிப்பீட்டிற்கான ஆராய்ச்சின்போது, கடற்பாசியின் ஒரு வகை-மாதிரியான *செலோனாப்ளிசில்லா டெலிகேட்டா* முதன் முறையாக பதிவு செய்யப்பட்டுள்ளது. எங்கள் ஆராய்ச்சியானது இந்த கடற்பாசியின் இனங்கள் வகைபிரிப்பை உறுதிப்படுத்துவதோடு மட்டுமல்லாமல் இந்த கடற்பாசி அந்தமான் கடலில் வாழ்வதை முதல் முறையாக உறுதிப்படுத்துகிறது. கடல் அடியில் ஊர்ந்து வாழும் விலங்குகளின் அடிப்படைத் தகவல்கள் இந்த ஆய்வில் மேலும் எடுத்துரைக்கப்பட்டுள்ளன.

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INTRODUCTION

The Andaman Sea, an eastern subdivision of the Indian Ocean, is bordered by countries like Thailand and Myanmar on the east and the Andaman archipelago (Andaman & Nicobar Islands/ANI) on the west (Figure 1) (Brown 2007). A large portion, however, falls within the boundary of the Coral Triangle Initiative (CTI) (Rudi et al. 2012). Studies related to its marine biodiversity or the coral reef ecosystem have been comparatively understudied or scattered (Aungtonya et al. 2000; Brown 2007). Additionally, the Andaman Sea possesses several shipwrecks (Kheawwongjan & Kim 2012) acting as artificial reef ecosystems, knowledge pertaining to which is mostly limited in the region. These sunken structures provide space for the growth and establishment of various sessile marine communities like poriferans (Walker et al. 2007; Lira et al. 2010) and other non-native species (Patro et al. 2015; Soares et al. 2020). Within the Indian Exclusive Economic Zone (EEZ), recent studies targeting shallow-water wrecks have filled important knowledge gaps (example Mohan 2013; Das 2014; Yogesh-Kumar et al. 2015) (Table 1). This article further adds essential information about these rarely studied ecosystems at a mesophotic depth and reports a marine sponge from the Andaman Sea/Indian Ocean.

MATERIAL AND METHODS

The sponge, *Chelonaplysilla delicata* (Image 1), was collected from the shipwreck HMIS SM* during a survey conducted to document epifaunal diversity from February to March 2014. The wreck is a 70-m long Royal Indian navy minesweeper that sank in the year of 1942. It is located at a depth of 33m near Chidiyatapu on the edge of the Macpherson Strait (11.477°N, 92.703°E) (Figure 1). Water transparency and temperature were recorded with a Secchi disc and a dive calculator. After collection, the specimen was preserved in 100% ethanol. A surface peel of the easily separable cortex of the specimen was removed and placed in xylene for 24 hours, after which a permanent slide of the peel was mounted with DPX. A single fibre with its base and branches intact was removed from the sponge for species-level identification under a stereo microscope (Image 1B–D). The specimen was identified following Pulitzer-Finali & Pronzato (1999). The preserved specimen is deposited in the National Zoological Collections (NZC) of the Andaman & Nicobar Regional Centre (ANRC), Zoological Survey of India (ZSI), Port Blair.

Benthic cover was assessed by randomly placing 20 (0.25 x 0.25 m) quadrats (Image 2). The photographs were analysed using open-sourced Coral-Net software (Beijbom et al. 2012), and the epifauna was classified into Unknown, Porifera, Scleractinian, *Ircinia* sp. (Porifera), Algae, *Iotrochota* sp. (Porifera), Sediment, *Tubastraea* aff. *coccinea*, *Tubastraea micranthus*, Hard Substrate, Ascidian, and Bleached Coral (modified from Zintzen et al. 2006). Other specimens not within the quadrat have been identified wherever possible to the lowest possible taxonomic level. Later, the data from the annotated quadrats was transferred and processed in Microsoft Excel® (Microsoft 365 MSO, 16.0.13001.20266/32bit). Study maps were created using the open-sourced Quantum Geographic Information System (QGIS ver. 3.6).

RESULTS AND DISCUSSION

Systematics

Phylum: Porifera
Class: Demospongiae
Order: Dendroceratida
Family: Darwinellidae
Genus: *Chelonaplysilla*

Species: *Chelonaplysilla delicata* Pulitzer-Finali & Pronzato, 1999

Paratype: ZSI/ANRC – 14321, 2014, 1 ex., India: Andaman Island: South Andaman: Chidiyatapu (11.477 °N, 92.703 °E), coll. Rocktim Ramen Das.

Diagnosis

Chelonaplysilla delicata predominantly thickly encrusting (<10 mm) but has erect lobes that are about 4–5 cm high. The sponge surface is conulose, and the acute conules separated from each other by 2–5 mm. Oscules 1–3 mm in diameter, flush with the surface and unevenly distributed all over on sponge surface. The texture is soft collapsible and feeble. The fresh specimen was dark violet or purple in colour and retained its colour even in the preserved condition. Sponge surface covered by structured regular reticulation of sand and spicule detritus, which forms regular roundish or oval meshes of 90–155 µm. This reticulation is typical of the genus. Regular rounded fibrous pores, inhalant in nature, is enclosed within these rounded meshes (Image 1D). The skeleton is dendritic, made up of pigmented fibres fragile in nature with repeated branching that originate from a basal spongin plate (Image 1 B,C) and extends towards the boundary. The primary fibre measured to be around

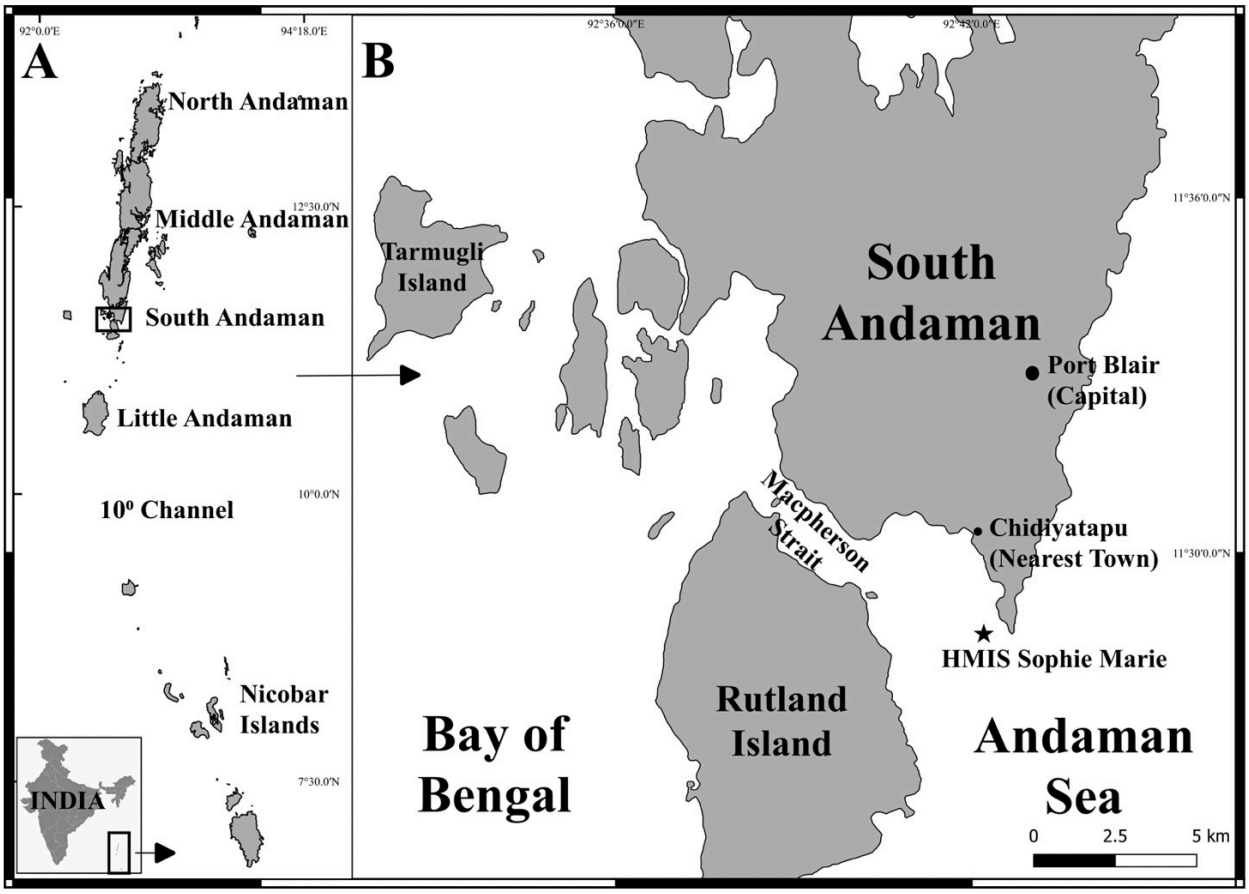

Figure 1. Location of the study area (HMIS Sophie Marie)

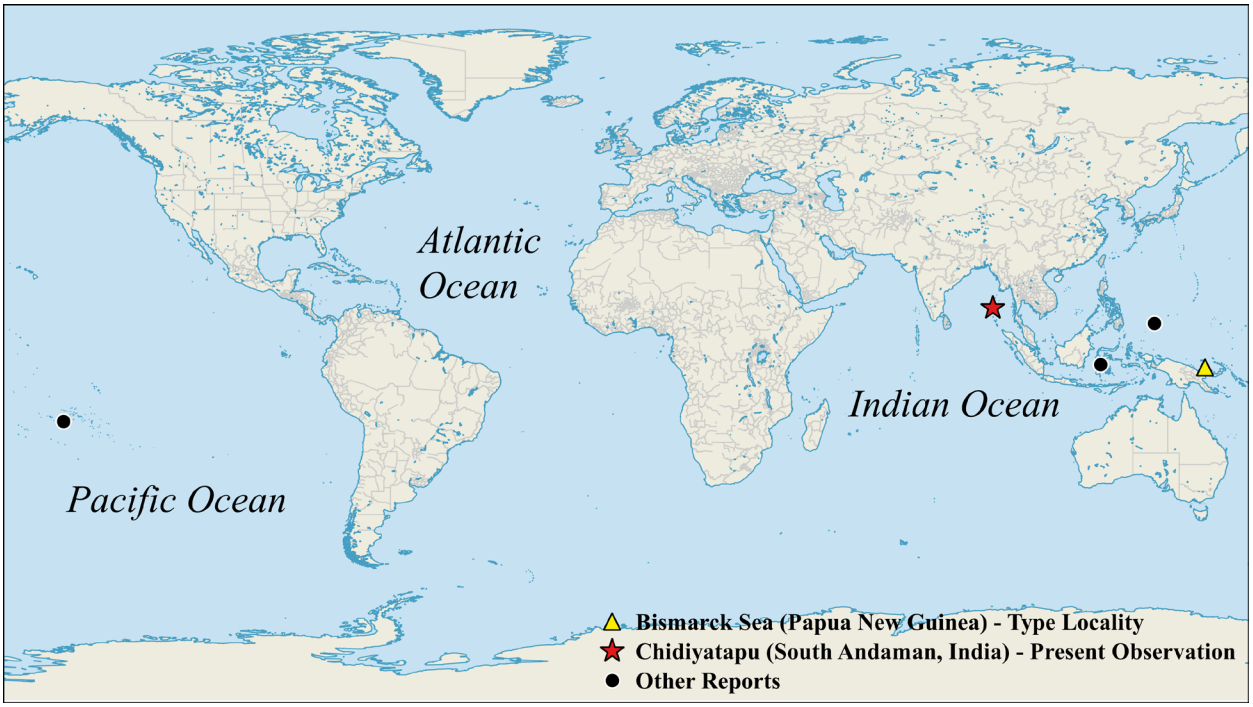

Figure 2. Global distribution of *Chelonaplysilla delicata* Pulitzer-Finali & Pronzato, 1999

Table 1. Information on biodiversity studies in shipwrecks within Andaman & Nicobar Islands

Wreck Name	Co-ordinates	Location	Date of Sinking	Depth (m)	Current Activities	Reference
SS Inchkeith	12.00658°N 92.76898°E	Kyd Island (South Andaman)	1955	14	Scuba	Mohan 2013; Das 2014; Das et al. 2016
HMIS Sophie Marie	**11.47723°N 92.70339°E**	**Chidiyatapu (South Andaman)**	**1942**	**30–33**	**Scuba**	**Present Study**
MV Mars	11.93194°N 92.9567°E	Havelock (Ritchie's Archipelago)	2006	10–16	Scuba	Das R.R. (pers. obs.)
North Bay Wreck	11.71682°N 92.76683°E	Port Blair (South Andaman)	30–40 (yrs)	10	Scuba and Fishing	Yogesh-Kumar et al. 2015
Peel Wreck	12.07339°N 92.97253°E	Havelock (Ritchie's Archipelago)	8–10	9–12	Scuba	Yogesh-Kumar et al. 2015
Japan Wreck	9.191194°N 92.83675°E	Car Nicobar (Nicobar Islands)	40–50	28	Fishing	Yogesh-Kumar et al. 2015
Sinclair Bay Shipwreck	11.8925°N 92.88556°E	Near Ross Island (South Andaman)		8		Mondal & Raghunathan 2017

0.4 mm at its thickest. Spicules are absent.

Distribution

India: Andaman Sea (ANI, South Andaman, Present study). Elsewhere: Bismarck Sea (Papua New Guinea) (Pulitzer-Finali & Pronzato 1999), Indonesia (Sulawesi) (GBIF 2000), Palau (Micronesia) (Ridley et al. 2005), French Polynesia (Alencar et al. 2017) (Figure 2).

Remarks

Chelonaplysilla delicata is very similar to *C. erecta* (Tsurnamal, 1967); however, the latter has fibres anastomosing in nature, whereas the thickness of fibres in *C. delicata* fades in diameter. The specimen mentioned in Pulitzer-Finali & Pronzato (1999) is gray, whereas our specimen is dark maroon in live condition (Image 1A). The specimen was initially misidentified as *C. erecta* (Das 2014; Das et al. 2016). Thus, there was a need for an update and filling of knowledge gaps in this species distribution range.

Comments

The family Darwinellidae possesses sponging fibres with a proper skeleton and fibrous spicules (Van Soest 1978; Bergquist & Cook 2002). It consists of five recognised genera and 45 accepted species. *Chelonaplysilla* is the only genus which is devoid of spicules but consists of a fibrous dendritic skeleton that possesses a distinct laminated bark surrounding a central pith region. A structured and separable cortex that is reinforced by a delicate reticulation of sand grains (Van Soest 1978) distinguishes this genus.

Wreck Biodiversity

Benthic cover assessment (Image 2) reveals that Poriferans were the second most abundant group on the surface of the wreck, mostly encrusting in nature. In most instances, the encrusting sponge genus *Iotrochota* was readily visible. Ahermatypic and invasive sun corals were abundant in selected localities and may have found a successful substrate for further expansion (Image 2A, 3). Few polyps of *Tubastraea micranthus* had signs of bleaching, a stark contrast to their ahermatypic nature. Updated and revised identification following Das et al. (2016) on the wreck surface includes scleractinian genera *Favia*, *Symphyllia*, *Podabacia crustacea*, and *Leptoseris*. A single individual of the Gastropod genus (*Chicoreus*) and a few crinoids. The identified poriferan families include Irciniidae (*Ircinia*), Chalinidae (*Haliclona* (*Reniera*)); Thorectidae (*Hyrtios*), Iotrochotidae (*Iotrochota baculifera*), Thorectidae (*Dactylospongia*), and Dysideidae (*Dysidea* sp.). Tunicates comprised Didemnidae (*Didemnum*), Perophoridae (*Perophora*), and other unidentified spp.

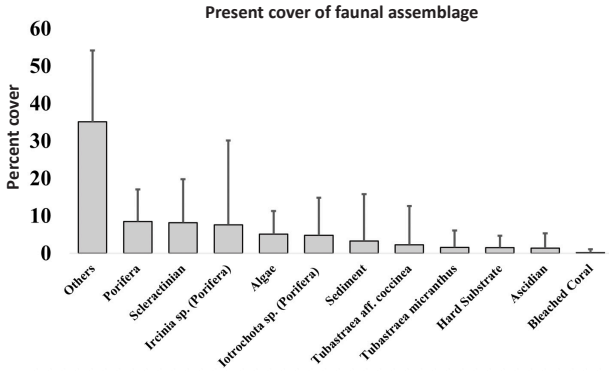

Figure 3. Mean percent cover of epifauna obtained from (0.25m x 0.25m) quadrats (n = 20).

The faunal organisms that thrive in artificial reefs (shipwrecks) are an important part of the marine community (Zintzen et al. 2006; Amaral et al. 2010).

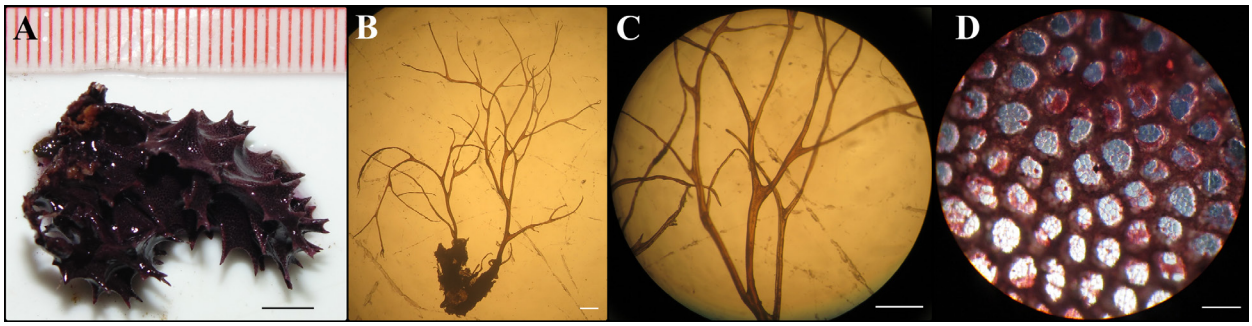

Image 1. *Chelonaplysilla delicata* [ZSI/ANRC-14321]: A—Freshly collected specimen | B—Branching fibres and basal sponging plate | C—Closer view of pigmented, branching, dendritic spongin fibre, | D—Inhalant pores surrounded by rounded meshes reinforced by sand grains. Scale (A) 5mm (B) 2 mm, (C) 2 mm, (D) 155 µm. © A—Rocktim Ramen Das, B–D—Titus Immanuel.

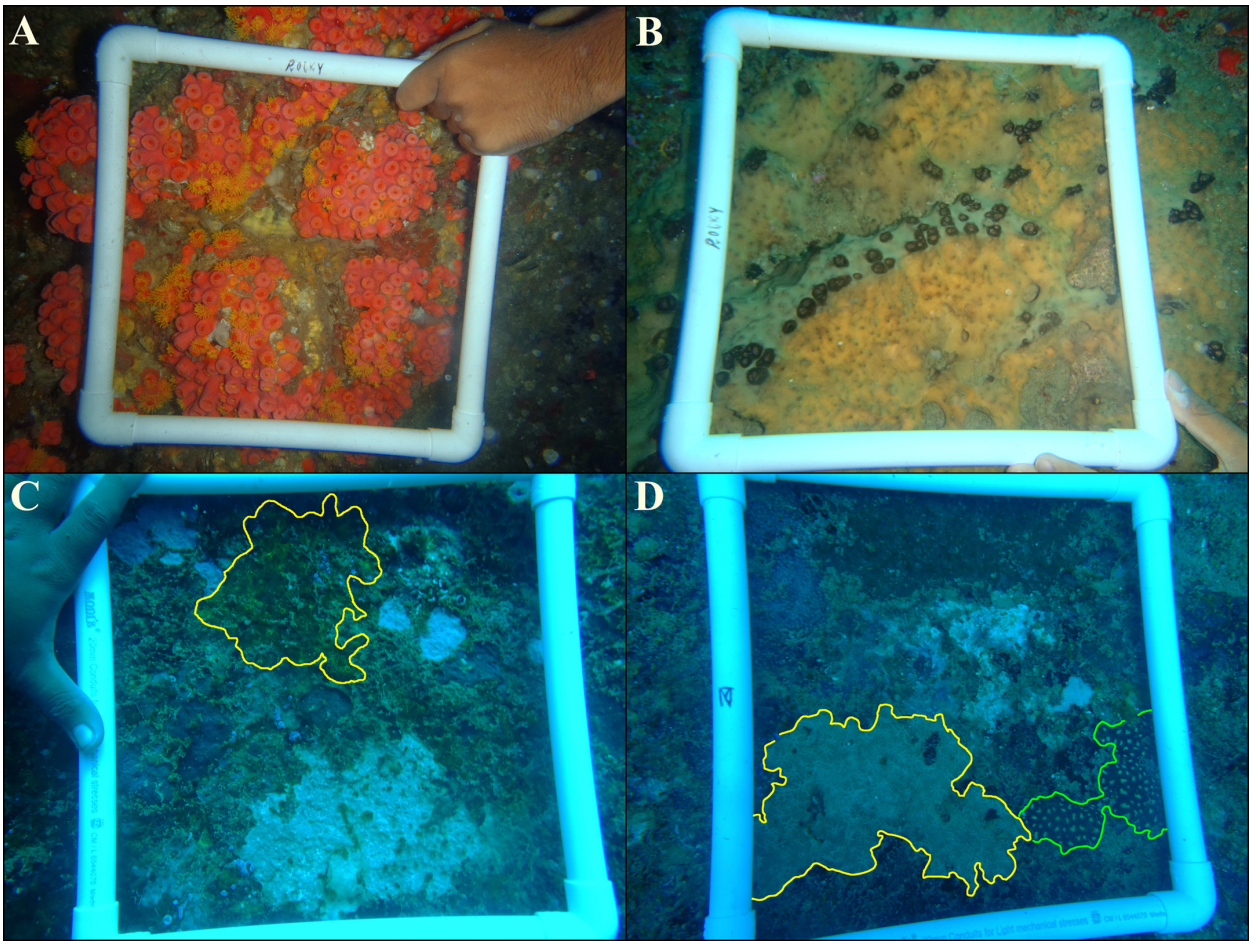

Image 2. A—*Tubastraea* aff. *coccinea* (adapted from Das et al. 2016) | B—*Ircinia* sp. | C—Mixed assemblage of communities, Encrusting sponge *Iotrochota* sp. (Green) | D—Mixed assemblage, Sponge (Yellow), coral (green). © Rocktim Ramen Das.

With increasing anthropogenic impacts on natural coral reef habitats, artificial reefs are regarded as a successful alternative (Perkol-Finkel & Benayahu 2005). As a result, it becomes important to understand the biological communities growing in these habitats (Thanner et al. 2006). Sponges, which naturally occupy shipwrecks, are one of the dominant organisms in such habitats, as evidenced in the present study. However, its diversity will be strictly limited to the environmental settings. For example, some species of the genus *Iotrochota* are found in sheltered environments (Cleary & de Voogd 2007) as seen in our observation (Image 2C). Similarly, shipwrecks

Image 3. A part of the wreck HMIS SM. (Arrow: invasive *Tubastraea micranthus*). © Karan Baath.

are also known to act as successful substrates for many non-native species, as reported from the Atlantic and the Red Sea (Perkol-Finkel et al. 2006; Soares et al. 2020). Repeated encounter of *Tubastraea* aff. *coccinea* (Image 2A) earlier misidentified as *Dendrophyllia* sp. and T. *micranthus* (Image 3) in the study site is a strong evidence from the Andaman Sea (Das et al. 2016) (Figure 1). The sponge species reported herein is at a much-extended depth compared to its initial described type locality (see Pulitzer-Finali & Pronzato 1999).

Technical difficulties have hampered studies on these habitats at mesophotic depths (Massin et al. 2002; Zintzen et al. 2006). But with the rapid scale development of remotely operated vehicles and submersibles, detailed exploration of these ecosystems can be well predicted. Further, these areas might be a hub for various underexplored flora and fauna and might be effective in reviving threatened marine life due to the loss of natural ecosystems.

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