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Research article

Distribution of Alcyoniid (Cnidaria: Octocorallia, Plexauridae) *Echinomuricea indica* Thomson & Simpson, 1909 from the Northern Arabian Sea, Pakistan

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Abstract: In this paper, we report a new soft coral, a sea fan *Echinomuricea indica* Thomson & Simpson, 1909 from the Northern Arabian Sea, Pakistan. During the present study, five colonies were collected from the sampling area. The collected sea fan colonies were ovate or semicircular with a maximum length of 28 cm. Shape of sclerites varied which includes; thornstar, scaphoid type and rounded. A limited data based on checklist or reports published and available for coast of Pakistan and there is no sufficient published data is available except some taxonomic description as assembled at various levels. This new contribution will help to understand the taxonomic reassessment, diversity, and distribution of the octocorals along the coast of Pakistan.

Keywords: Octocoral, sclerites, *Echinomuricea indica*, thornstar, scaphoid

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Introduction

The anthozoan Cnidarians include polyp forms i.e., stony and soft corals, sea anemones, sea pens and sea fans are abundantly exist in natural marine waters. They are varied in occurrence with the locality, especially with respect to offshore and inshore areas (Bryce *et al.*, 2018). Soft corals are more confined to the shallow coastal habitats along Atlantic-Caribbean, Indo-Pacific, and Mediterranean coastal in tropical and temperate seas (Marques and Collins, 2004). Octocorals have eight or more than eight tentacles, attached to the substratum in shallow water or deep seas within tropical and temperate seas (Daly *et al.*, 2007, Trivedi and Vachhrajani, 2014; Irei *et al.*, 2011; Gul, 2013). The polyps retracted when the colony is out of the water (Fabricius and Alderslade, 2001; Goh and Chou, 1996). A total of 46 octocoral families have been identified and 23 of them are reported in the warm shallow water of the Red Sea, Indian, and Pacific Ocean (Ofwegen and Mcfadden, 2010, Namin and

Ofwegen, 2012). The sea fan belongs to the family Plexauridae which comprises approximately 38 genera and 365 species. The polyps grow in a flat fan-like pattern, distinguished by an axis with a wide, hollow, cross-chambered central core surrounded by fibrous protein substance, known as gorgonin with locules. Corals have great ecological, economical and pharmaceutical importance as 244 compounds have been isolated from different species of soft and hard corals (Kim, 2015). The genus *Echinomuricea* is a potential source of cytotoxic, anticancer and xanthine derivatives have been isolated on commercial level (Parameswaran *et al.*, 2002, Cheng *et al.* 2012).

The taxonomic studies on Octocorals from the Indo-Pacific reefs have generally focused on their abundance and ecological significance (Versevaldt and Ofwegen, 1991; Benayahu, 1995). The taxonomic literature on gorgonians from the Indo-Malayan region includes the monographs of the Siboga and Snellius expeditions

(Nutting, 1910a-f; Stiasny, 1940). Stiasny (1941a-d) and Mai-Bao-Thu and Domantay (1970, 1971) discussed the Philippine aspect of this fauna. Hickson (1906a, b) and Faure (1977) discussed the gorgonian fauna of the Maldives and Mascarene Archipelago, respectively, while recently, Van Ofwegen (1987) described species of the family Melithaeidae from the Indian Ocean and the Malay Archipelago. A comprehensive list describes the species found in the region can be found in Bayer (1981). The published records of gorgonians from Singapore by Verrill (1864) and in a more recent study distribution of 21 species were listed (Goh & Chou 1994). There is a paucity of knowledge about the taxonomic study of Pakistani soft and hard corals which needs attention as only a few papers have been published on corals of Pakistan (Haqq 1977; Siddiqui et al., 2011, Ali et al., 2014). A true coral reef ecosystem has not been found along the coast, however about 29 different species of coral have been reported from Astola and Churna island (MFF Pakistan, 2016). Ali *et al.* (2014) contributed to the abundance, diversity, and distribution of corals. In a more recent study, Gul et al (2015) published a checklist that included 61 anthozoan species from the Pakistan coast. The present study included a new record of sea fan from the coast of Pakistan.

Materials and Methods

The samples were collected during the survey of Sonari Beach, Karachi 24° 53' 12.558" N and 66° 41' 55.892" E (25-10-2019) (Figs. 1 & 2). The specimens were found on the coast after casting off sea fans from nearby coral areas i.e. Charna Island and brought to the laboratory. The specimens were washed and then identified on the bases of structural and morphological characteristics of the colonies and the sclerites. Sclerites were extracted by using 5% Sodium hypochlorite following Bayer (1961) and examined under the light microscope (Olympus SZ61 Model: SZ2-ILST with CellSens Entry software for image processing). Morphometric measurements of colony and branches were taken for further analysis. The specimen was deposited in the Marine Reference Collection and Resource Centre MRCC.

Results and Discussion

This new specimen was identified based on variation in sclerites and morphological attributes. Detailed observation and specimen were carefully assayed by the morphological and sclerites appearance in the description below.

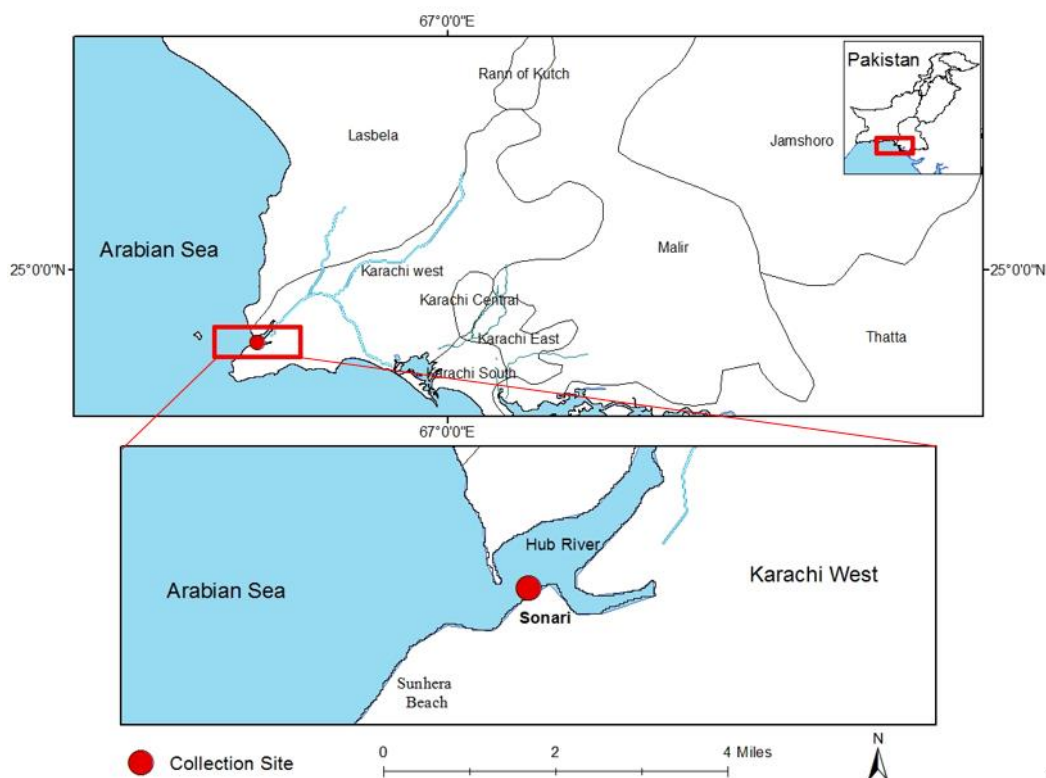


Figure 1: Sampling location of Sea fan collected from the coast of Pakistan.

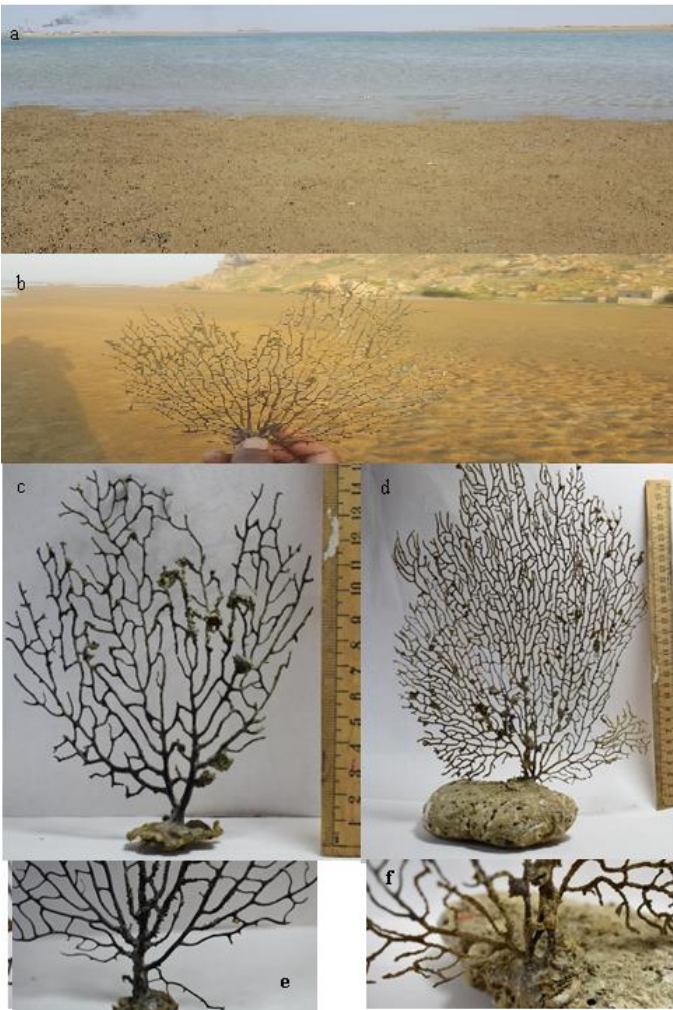


Figure 2: *Echinomuricea indica* a, b Collection and colony of sea fan at the site; c, d colony of sea fan; e, f; enlarged view of a stalk of the colony.

Taxonomy

- Cnidaria Hatschek, 1888
- Anthozoa Ehrenberg, 1834
- Octocorallia Haeckel, 1866
- Alcyonacea Lamouroux, 1812
- Holaxonia Studer, 1887
- Plexauridae Gray, 1859
- Echinomuricea* Verrill, 1869

Echinomuricea indica Thomson and Simpson, 1909

(Fig.2 b-f)

Material Examined: Sonari Beach (24° 53' 12.558" N, 66° 41' 55.892" E) from the Sonari Beach, Karachi 24° 53' 12.558" N and 66° 41' 55.892" E.

Description:

The shape of the collected colonies of sea fan was ovate or semicircular with a maximum length of 28 cm and the minimum was 16.2cm. Colony comprises slender, long, thick, and many tree or whips like branches that grow near

the base of the main axial branch. The branches of the colony arise directly from the stalk; identity loses after a short distance and the branchlets formed often transverse in a radial pattern. Stems are cylindrical with rounded tips. The branchlets from branches of the main stalk grow transversely in an irregular radial pattern and then fused together into different small branchlets curve upwards. These branchlets terminate in blunt tips and reticulation with mesh size (Table. 2). The axial core of the coral skeleton is horny and hollow as it contains no sclerites. This is covered by a layer of tissue called coenenchyme in which calcareous sclerites are embedded and are abundantly distributed which help in making of the skeleton of *E. indica*. The sclerites are varied in shape which includes; thorn star (with multiradiate, pentaradiate, tetra and triradiate shapes), spindle or scaphoid shaped and rounded (Fig. 3). Maximum length of specimen was 28 cm, width 22 cm; and the Minimum length 6.2 cm, width 13.5 cm. The size of the sclerite ranges between 0.30 mm to 0.80 mm (Table 1). Thorn star spicules were *Echinomuricea* type, size ranged between 0.4 to 0.8 mm long (2) Scaphoid tuberculated type have blunt tubercles on both sides they are about 0.46 to 0.15 mm long while rounded was about 0.30 to 0.54 mm in diameter (Table 1).

Table 1. The size of the sclerite extracted from *Echinomuricea indica* Thomson and Simpson, 1909.

	Shape of Sclerites	S. No.	Micrometre	millimeter
A	Thornstar	1	819.4	0.8194
		2	871.32	0.87132
		3	554.33	0.55433
		4	618.14	0.61814
		5	492.14	0.49214
B	spindle	1	1156.37	1.15637
		2	14527	14.527
		3	468.9	0.4689
C	circular	1	547	0.547
		2	309.8	0.3098
		3	373.8	0.3738

Table 2. Length of *Echinomuricea indica* colonies. LS, Length from stalk (cm); WS, wingspread of Colony/branches(cm); SS, Stalk size(cm); Mean MS, Mesh size of fan spans.

Colony of Sea fan	LS (cm)	WS(cm)	SS(cm)	Mean MS(cm ²)
1 st	16.2	13.5	4.2	0.65
2 nd	22.8	23.5	2.5	1.06
3 rd	28	22	2.7	1.14

4 th	18.5	15.3	3.5	1.71
5 th	22.5	17.5	-	1.32

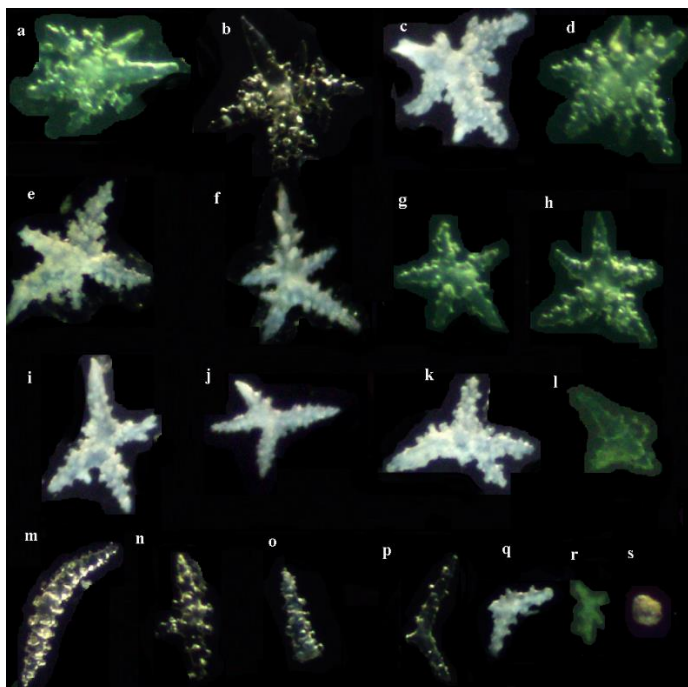


Figure 3: Sclerites found in *Echinomuricea indica*. a-d; Multiradiates, e-h; Pentaradiates, i-k; Tetraradiate l; Triradiate, m-r; Scaphoid type, s; Rounded shape sclerites

The shape and size of the colony: Colony ovate or even circular shape; divided radially in one plane (Fig. 2). The specimen at hand is up to 22.8 cm tall with a maximum of 23.5 cm branch spread (Table 2).

Habitat: *Echinomuricea indica* is distributed along shallow reef beaches with a rocky substrate.

Distribution: Tropical Indo-Pacific, Indian Ocean, Pakistan (new record)

Concluding Remarks: The distribution of *Echinomuricea indica* is evident along the coast of Pakistan through this new record. The paucity of published material indicated the importance of this study in the taxonomy, extent of distribution and diversity of the octocorals in Pakistan.

Ethical Approval

The authors do not declare ethical approval.

Conflicts of Interest

The authors declare that they have no conflict of interest.

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