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A New record of a hard coral species *Galaxea fascicularis* (Linnaeus, 1767) of (Scleractinia; Anthozoa; Hexacorallia; Zooantharia; Family Oculinidae, Gray, 1847) collected from Paradise Point, Arabian Sea, Sindh Coast, Pakistan

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Abstract

We report the first record from Pakistan of Scleractinian coral species *Galaxea fascicularis* (Linnaeus, 1767) belonging to the Family Oculinidae (Gray, 1847). The specimens have been found in Paradise Point on the Arabian Sea, a beach located at 31 km west of Karachi city, Sindh, Pakistan. *Galaxea fascicularis* is common in the Indo-Pacific and its presence has been recorded in the Red Sea and in the Gulf of Aden. The present study presents detailed morphological and taxonomical description of the new record.

Keywords: New record, Scleractinia, Oculinidae, Sindh Coast.

1. Introduction

Biodiversity assesment plays a key role in determining conservation actions and establishing conservation priorities areas of interest (Faith and Walker, 1996) [6]. The quantification of species richness and distribution can give valuable information on the state of the environment and on the dynamics of its change.

The role of biodiversity in providing ecosystem services is actively debated in ecology, and the diversity of functional groups (groups of ecologically equivalent species; Naeem and Li 1997) is considered as important as species diversity (Kremen 2005). For several ecosystem services, a few dominant species seem to play the major role (Hooper *et al.* 2005), however, many other species are critical for ecosystem functioning and this redundancy provide “insurance” against disturbance, environmental change, and the decline of the dominant species (Tilman 1997; Ricketts *et al.* 2004; Hobbs *et al.* 2007).

Coral reefs are one of the most biologically diverse ecosystems on earth and can provide several ecosystem services important for human welfare (i.e fisheries, tourism and cultural values; Bellwood *et al.*, 2004) [3].

The Sindh Coastal region is located in the southeastern part of Pakistan between the Indus border along the Sir Creek on the east and the Hub River along the Balochistan coast on the west. This coastal region is about 350 km long and can be divided into the Indus Delta Creek and Karachi coast. Notwithstanding the ecological importance of the area, the diversity of corals has still not been completely assessed.

The main scope of the present work is to describe a new record of scleractinian coral from the Sindh region and contribute to the coral biodiversity assessment for this area. Taxonomy of Scleractinia is principally based on morphological features of the skeleton (Lang, 1984; Tambutte *et al.*, 2007) [7, 16]. Identification conventionally rely on easily observable traits (Veron & Pichon 1976; 1980; 1982; Veron *et al.* 1977; Wallace 1999) [23, 22, 24, 21, 25] which include the corallite wall, septa, costae, coenosteum, paliform lobes, columellae, colour, tissue expansion, asexual budding mode and various morphometric dimensions (Lang 1984; Wallace 1999; Veron 2000) [7, 25, 20].

The present study present the taxonomical characterization of a new record of coral from Paradise Point, Sindh Coast, Pakistan consisting in a species belonging to the family Oculinidae.

2. Materials and methods

The survey was carried out at Paradise Point, Sindh Coast (Fig 1) in June 2010. Samples were collected by hand picking in shallow water at 4m depth.

A total of two specimen were collected at a depth between 6 and 8 meters at Paradise Point, Sindh Coast, Pakistan in June, 2010. Collector: Abid Raza. Specimen were deposited in the Zoological Museum, Department of Zoology, University Karachi, Pakistan.

After the collection the specimens were kept in fresh water for 3 days, washed with running seawater and dried.

The taxonomic identification was based on the original description of Vaughan (1918) [18]. Corallites of the specimen were examined in detail to the morphological features under a dissecting microscope and samples were identified using the morphological and taxonomic characters on completion of the examination of taxonomic features, accepted morphological characters, such as color, branching pattern, corallite wall, septa, coenosteum and columellae. Pictures of the specimen were taken with a 12 megapixel digital camera and analyzed with software for image treatment (ImageJ). The specimen were registered in National Zoological collection and deposited at Zoological Museum of Karachi University, Karachi, Pakistan.

3. Results

Morphology and taxonomic characters

Corallum: The entire skeleton of a specimen in the order Scleractinia (stony coral).

Plocoid: Corals that have corallites adjoined only towards their base; *i.e.* in which tall, separate corallites arise from the basal part of the corallum.

Corallite: The skeleton surrounding an individual polyp.

Calices: The upper or open end of a corallite in the order Scleractinia (stony coral).

Septa: Plural of septum

Septal cycles: Relating to the formation and arrangement of the septa. Septa are laid down in radial series or cycles, the first cycle consisting of six primary septa, the second of six secondary septa, the third of 12 tertiary septa.

Septal margin: The upper free edge of the septum.

Coenosteum: The area of skeleton between the corallites in the calcareous cnidarian corals [e.g. the order Scleractinia (stony coral)].

Columella: A vertical central structure within a corallite in the order Scleractinia (stony coral).



Galaxea fascicularis (Linnaeus, 1767)

Galaxea fascicularis (Syn. *Madrepora fascicularis*), Linnaeus (1767); Vaughan, (1918) [18]; Crossland (1952) [51]; Nemenzo (1959) [9]; Ma (1959) [8]; Chevalier (1971) [41]; Scheer & Pillai (1974, 1983) [12, 13]; Veron & Pichon (1980) [22]; Veron (1986, 2000) [19, 20]; Sheppard & Sheppard (1991) [14]

Corallum massive, placoid, thick encrusting, columnar up to 3 mm high and 6 mm in diameter; corallites polygonal, cylindrical, 8 to 12 mm in diameter at the top, 7 – 10 mm high; calices circular, oval or distorted, 2 to 4 mm deep; adjacent corallites 2-3 mm apart; septa exsert; the total number of septa 42 to 50 per calyx; four to five septa are formed; the first, second and third cycles of septa equal in size; lateral septal surface covered by fine spines and first three cycles of septa of the axial septal margins saw-like dentate with fine denticles; 10 - 14 septa reached the columella; columella 1-2 in diameter; costae have different length according to the different size of septa; coenosteum formed of fine, prominent large, elongate vesicles covered by fine granules and range of size (0.4-0.8mm).

Distribution: Sindh Coast, Pakistan, Red Sea to Samoa and entire tropical zone of the Indo-Pacific from the Red Sea and Madagascar to Japan, the Great Barrier Reef of Australia, West and East Indian Ocean.

4. Discussion

We reported the first record of *Galaxea fascicularis* from Pakistan, giving a contribution to the knowledge of the total biodiversity of corals in Pakistan.

In 1988, coral reef were considered absent in Pakistan and the coastal environment of Pakistan was considered not favorable to the growth and formation of coral reefs (UNEP, 1986; Alizia *et al.*, 1988) [17, 2]. Thus the Red Data Book of IUCN (1996) does not include any coral species under provision of the United Nations Conservation on the Law of the Sea (UNCLOS) relating biodiversity of Pakistan. The first records of living corals in Sindh are reported by Srivastara (1991) [15] at the eastern part of Karachi in the Gulf of Katch (Port Okha, Pirotan Island). According to Ali & Memon (1995) [1] a significant amount of living corals was observed between the Churna Island and Cape Monzes (24° 52' 38. 57'' N, 66° 38' 3.53'' E).

A previous survey, performed in 2013 along the Arabian Sea coast, reported the families Acroporidae, Faviidae, Poritidae and Oculinidae (Order Scleractinia) and the family Gorgonidae (order Alcyonacea; Raza, 2013) [11]. In the last 5 years, new scleractinian species have been recorded at each survey, suggesting that several intensive surveys are still required in order to properly assess the scleractinians diversity and their associated community in Pakistan. According to the UNESCO World heritage convention, a natural heritage is defined as the sum of the elements of biodiversity, including flora and fauna and ecosystem types. Scleractinians fauna represent an important part of a country's natural heritage and it is therefore urgent for Pakistan to have precise evaluation of this diversity in order to implement correct strategies for the management and conservation of the Country's natural heritage.

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