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New Records of Five Species of Scleractinian Corals to Indian Waters from Andaman and Nicobar Islands

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Abstract- Oligotropic waters of Andaman and Nicobar archipelago harbor a rich diversity of faunal communities. Scleractinian corals are recorded from this group of islands are highly diverse in comparison with the other reef areas of India. Five species of hermatypic corals viz. *Acroporalovelli* Veron and Wallace, 1984 and *Acropora willisae* Veron and Wallace, 1984 belonging to Acroporidae family, *Myceto- phyllia lamarckiana* Milne Edwards and Haime, 1848 and *Isophyllia sinuosa* (Ellis and Solander, 1786)under Mussidae family and *Porites cumulates* Nemenzo, 1955 of Poritidae family are recorded for the first time in Indian waters from Andaman group of islands. The range distribution of this five species increases the Indian scleractinian database upto 611 species, of which 579 species from Andaman and Nicobar Islands. The present paper dealt with the morphological characteristics of these four newly recorded species of scleractinians with their distribution and conservational status.

Keywords: *Scleractinian corals, New record, Mycetophyllia, Andaman and Nicobar Islands.*

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New Records of Five Species of Scleractinian Corals to Indian Waters from Andaman and Nicobar Islands

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Abstract- Oligotropic waters of Andaman and Nicobar archipelago harbor a rich diversity of faunal communities. Scleractinian corals are recorded from this group of islands are highly diverse in comparison with the other reef areas of India. Five species of hermatypic corals viz. *Acroporalovelli* Veron and Wallace, 1984 and *Acropora willisae* Veron and Wallace, 1984 belonging to Acroporidae family, *Myceto- phyllia lamarckiana* Milne Edwards and Haime, 1848 and *Isophyllia sinuosa* (Ellis and Solander, 1786)under Mussidae family and *Porites cumulates* Nemenzo, 1955 of Poritidae family are recorded for the first time in Indian waters from Andaman group of islands. The range distribution of this five species increases the Indian scleractinian database upto 611 species, of which 579 species from Andaman and Nicobar Islands. The present paper dealt with the morphological characteristics of these four newly recorded species of scleractinians with their distribution and conservational status.

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I. Introduction

Coral reefs are one of the most imperative biological creatures of marine ecosystem in shallow tropical seas and nourish several numbers of imperious ecosystem services [1, 2]. The structural organization, gradual developmental pattern along with accumulation and secretion of calcareous aragonite skeleton of the coral reefs can be seen under main three categories such as fringing reefs, barrier reefs and atolls [3] while a number of different types of other small reefs like, patchy reef, ribbon reef, table reef etc. can be seen throughout the world's ocean. Geographical ranges along with ecological parameters attributes the most for the settlement of corals. The diverse species content, complex structure, inter-linking correlation with a wide number of other associated species demonstrates the immortal role of coral reefs for the sustenance marine biodiversity. Along with the ecological services, it also takes active part for the coastal and marine protection, conservation, fishery and aquaculture, industrialization of ornamentation, biomedical applications, climatic restoration, chemical balance in world's ocean and so on [4]. Nearly 500 million people depend directly and indirectly on coral reefs for their livelihoods, food and other resources [5], while 30 million of the poorest human populations in the world depend entirely on coral reefs for their food [5]. Andaman and Nicobar Islands are the biologically diverse islands of Indian Ocean due to its geographic location with the presence of sustainable biogenic marine habitat. This paper deals with new record of five species of scleractinian corals from Andaman and Nicobar Islands to Indian waters along with their previous distribution.

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II. Material and Methods

Surveys were conducted from February 2013 to April 2015 to explore the scleractinian coral species at Andaman group of islands by employing Self-Contained Underwater Breathing Apparatus (SCUBA) diving. The underwater species recording was done for detailed identification with the help of Canon Power Shot G15 while small portions/colony of the three species was sampled for detailed morphological studies. Corallites of the specimen were studied in details under stereo zoom microscope (Leica, M 205 A). Identification of species was made in conjunction with Veron and Pichon [6], Veron and Wallace [7], Veron [3] and Wallace [8]. The global status of the species was recognized by IUCN Redlist category and criteria [9]. On completion of detailed taxonomical characters, the specimens were registered in National Zoological Collections and deposited at Zoological Survey of India, ANRC, Port Blair.

III. Results

Five species of scleractinian corals were recorded as new to Indian waters from Andaman and Nicobar Islands on the basis of their taxonomical studies.

Family: ACROPORIDAE Verrill, 1902
Genus: *Acropora* Oken, 1815

*a) Acroporalovelli*Veron and Wallace, 1984(Fig. 1)

i. *Material examined*

Three colonies were observed at Ray Island (Lat. 12°57.454'N; Long. 92°54.452'E) of North and Middle Andaman at the depth of 8 m on 21.ii.2013. One

small portion of the colony was sampled for taxonomical analysis (Reg. No.: ZSI/ANRC-12429).

ii. *Description*

Colonies are caespitose with terete or slightly tapered main branches or hispidose with compacted, elongate, tapering branches. Radial corallites are immersed on the lower branches. These are tubular and appressed on upper branches. Upper branch corallites have dimidiate openings. Axial corallites are dome shaped. Coenosteum is reticulate or finely costate.

Colour: Colony is pale brown or blue.

Habitat: The colonies are seen on the shallow and tropical reef environments up to the depth of 10 m.

Occurrence in A and N Islands: Rare.

IUCN Red List Category and Criterion: Vulnerable, 2014.

iii. *Distribution*

In India: Andaman and Nicobar Islands; *Elsewhere*: Australia, Eritrea, Fiji, French Polynesia, Guam, Indonesia, Kiribati, Marshall Islands, Mauritius, Micronesia, Federated States of Myanmar, Nauru, New Caledonia, Norfolk Island, Northern Mariana Islands, Palau, Papua New Guinea, Pitcairn, Réunion, Saudi Arabia, Solomon Islands, Sri Lanka, Thailand, Tuvalu, Vanuatu, Wallis and Futuna, and Yemen.

Fig. 1 : Acropora lovelli Veron and Wallace, 1984

*b) Acroporawillisae*Veron and Wallace, 1984 (Fig. 2)

i. *Material examined*

Two colonies were observed at Cinque Island (Lat. 11°19.703'N; Long. 92°43.037'E) of South Andaman at the depth of 27 m on 30.iv.2015.

ii. *Description*

Coralla is corymbose in structure with short branchlets. Axial corallites are incipient and proliferous. Radial corallites are tubular and appressed near branchlet tips with nariform openings. Septa are bilaterally symmetrically arranged. The coenosteum between corallites is spongy with fine spinules.

Colour: Colony is grey, cream, blue or brown.

Habitat: The colonies are seen on the shallow and tropical reef environments up to the depth of 30 m.

Occurrence in A and N Islands: Rare.

IUCN Red List Category and Criterion: Vulnerable, 2014.

iii. *Distribution*

In India: Andaman and Nicobar Islands; *Elsewhere*: Australia, Cambodia, Comoros, Indonesia, Japan, Kenya, Madagascar, Malaysia, Mauritius, Mayotte, Micronesia, Federated States of Mozambique, Palau, Papua New Guinea, Philippines, Réunion, Seychelles, Singapore, Solomon Islands, Somalia, South Africa, Taiwan, Province of China, Tanzania, United Republic of Thailand and Viet Nam.

Family: MUSSIDAE Ortmann, 1890

Genus: Mycetophyllia Milne Edwards and Haime, 1848

Fig.2 : Acropora willisae Veron and Wallace, 1984

c) *Mycetophyllialamarckiana*Milne Edwards and Haime, 1848 (Fig. 3)

i. *Material examined*

Five colonies were observed at Trilby Island (Lat. 13°25.636'N; Long. 93°04.273'E) of North and Middle Andaman at the depth of 24 m on 05.iii.2015. A small colony was sampled for taxonomical studies (Reg. No.: ZSI/ANRC-12203).

ii. *Description*

Colonies are solid in structural confirmation, rounded or circular plates like. Valleys are shallow and continuous. Those are radiating from the original point of growth. Vaguely concentric corallite centres to plate margins. One row of mouths are visible in valleys Columellae are rudimentary.

Colour: Colony is grey, cream, blue or brown.

Habitat: The colonies are seen on the deep for e reef environment up to depth of 75 m.

Occurrence in A and N Islands: Rare.

IUCN Red List Category and Criterion: Least Concern, 2014.

iii. *Distribution*

In India: Andaman and Nicobar Islands; *Elsewhere*: Anguilla, Antigua and Barbuda, Bahamas, Barbados, Belize, Bonaire, Sint Eustatius and Saba, Cayman Islands, Colombia, Costa Rica, Cuba, Curaçao, Dominica, Dominican Republic, Grenada, Guadeloupe, Haiti, Honduras, Jamaica, Mexico, Montserrat, Nicaragua, Panama, Saint Barthélemy, Saint Kitts and Nevis, Saint Lucia, Saint Martin, Saint Vincent and the Grenadines, Sint Maarten, Trinidad and Tobago, Turks and Caicos Islands, United States, United States Minor Outlying Islands, Venezuela and Bolivarian Republic of Virgin Islands.

Genus: Isophyllia Milne Edwards and Haime, 1851

Fig. 3 : Mycetophyllia lamarckiana Milne Edwards and Haime, 1848

d) Isophylliasinuosa(Ellis and Solander, 1786) (Fig. 4)

i. *Material examined*

Three colonies were observed at North Bay (Lat. 11°41.962'N; Long. 092°45.219'E) of South Andaman at the depth of 5 m on 6.i.2014.

ii. *Description*

Colonies are massive in structure. The development pattern of this species is meandroid in nature. The valleys of the colony are short and sinuous. Septal are categorized in arrangements. They are thin. The septa are well ornamented with pointed fine teeth. Columella centres are extended and difficult to distinguish.

Colour: Colonies are green, lavender or yellow while the colour of the valleys and walls are contrasting.

Habitat: The colonies are seen on the shallow and protected reef environments up to the depth of 20 m.
Occurrence in A and N Islands: Rare.

IUCN Red List Category and Criterion: Least Concern, 2015-4.

iii. *Distribution*

In India: Andaman and Nicobar Islands; *Elsewhere*: Anguilla, Antigua and Barbuda, Bahamas, Barbados, Belize, Bermuda, Bonaire, Saint Eustatius and Saba, Cayman Islands, Colombia, Costa Rica, Cuba,Curaçao, Dominica, Dominican Republic, Grenada, Guadeloupe, Haiti, Honduras, Jamaica, Mexico, Montserrat, Nicaragua, Panama, Saint Barthélemy, Saint Kitts and Nevis, Saint Lucia, Saint Martin, Saint Vincent and the Grenadines, Saint Maarten, Trinidad and Tobago, Turks and Caicos Islands, United States, United States Minor Outlying Islands, Venezuela, Bolivarian Republic of Virgin Islands and British.

Family: PORITIDAE Gray, 1842

Genus: Porites Link, 1807

Fig. 4 : Isophyllia sinuosa (Ellis and Solander, 1786)

e) Porites cumulates Nemenzo, 1955 (Fig. 5)

i. *Material examined*

Twelve colonies were observed at Oliver Island (Lat. 12°59.585'N; Long. 92°58.154'E) of North and Middle Andaman at the depth of 6 m on 16.v.2014. One small portion of the colony was sampled for taxonomical studies (Reg. No.: ZSI/ANRC-12354).

ii. *Description*

Colonies are highly fused flattened and developed branches. Corallites are angular and superficial with a diameter of 0.8 mm. Branch surfaces are smooth. Corallite walls are thin. Triplet is fused. 5 tall pali are present. One dentricle is present. Columella is tall.

Colour: Colony is cream or pale brown.

Habitat: The colonies are seen on the shallow and protected reef environments up to the depth of 20 m.

Occurrence in A and N Islands: Rare.

IUCN Red List Category and Criterion: Vulnerable, 2014.

iii. *Distribution*

In India: Andaman and Nicobar Islands; *Elsewhere*: Australia, Cambodia, Indonesia, Malaysia, Papua New Guinea, Philippines, Singapore, Solomon Islands, Taiwan, Province of China, Thailand and Viet Nam.

Fig. 5 : *Porites cumulates* Nemenzo, 1955

IV. Discussion

The corals are one of the primitive faunal communities but the gathering of knowledge on them was initiated during the period of mid-19th[10, 11]. The studies of corals of India as well as Andaman and Nicobar Islands were pioneered by Alcock during 1900 on deep sea corals [12]. Since then, contributions from various authors enhanced the scleractinian coral species database of India up to 199 species [13-22]. In a detailed checklist and descriptive manual, Venkataraman *et al.* [23] mentioned a total of 177 species of scleractinian corals belong to 57 genera and 15 families from Andaman and Nicobar Islands while India was with 208 species under 60 genera 15 families including other three reef areas such as Gulf of Mannar and Palk Bay, Lakshadweep and Gulf of Kachchh. Since the year 2009, the taxonomic exploration of scleractinian lives have been priotorised in these islands by Zoological Survey of India resulted with the reporting of 575 species from Andaman and Nicobar Islands and 607 species from India [24]. Identification of five species of scleractinian corals such as *Acropora lovelli*, *Acropora willisae*, *Mycetophyllia lamarckiana*, *Isophyllia sinuosa* and *Porites cumulates* increase the species database of Andaman and Nicobar Islands and as well as India. Recording of a species under the genera *Mycetophyllia* is also made for the first time from Indian waters under the family Mussidae and included under 8th one with the existing genera of same family [24]. Three species of scleractinian corals among the four under Acroporidae and Poritidae family were listed as vulnerable (VU) and other two species belong to Mussidae family was listed under least concern (LC)species according to IUCN 2015.4 Red List categorization [9]. The record of threatened species along with the other species from Indian waters signifies the stable ecological ambience for scleractinian corals as well as accelerating our ideas for the construction of progressive conservatory and managing measures.

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