

Gorgonian Diversity of Andaman and Nicobar Islands

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Introduction

Gorgonians are marine coelenterates of the class Anthozoa, which include sea fan, sea whips, corals, sea anemones and other related species. Based on structural differences in their symmetry, the Anthozoans are divided into three subclasses:

1. *Octocorallia*,
2. *Hexacorallia* and
3. *Ceriantharia*.

The sub-class *Octocorallia* includes soft corals (*Alcyonacea*), sea fans (*Gorgonacea*), sea pens (*Pennatulacea*) and blue coral (*Helioporacea*). They are colonial in habit, polyps have eight tentacles and the body cavity is also divided into eight radial compartments. The second sub-class *Hexacorallia* or *Zoantharia* includes sea anemones (*Actiniaria*), zoanthids (*Zoanthiniaria*), mushroom anemones (*Corallimorpharia*) and hard corals (*Scleractinia*). Another sub-class *Ceriantipatharia* includes tube anemones (*Ceriantharia*) and black and wire corals (*Antipatharia*), whereas the polyps of the *Hexacorallia* bear six or multiples of six tentacles without pinnules. *Antipatharians* have a slender growth forms, commonly branching, a central skeletal axis covered with thorns and short, cylindrical, non-retractile polyps bearing six tentacles (Katharina and Alderslade, 2001).

Out of the six orders of the sub class *octocorallia*, the *Alcyonacea* and *Gorgonacea* are widely distributed in coastal belts of the Indo Pacific region (Benayahu and Loya, 1977; Nishihira, 1981). Recently Grasshoff (2000) introduced the new suborder *Calcaxonia* for the five gorgonian families that are characterized by heavy calcification of the axis (*Ifalukellidae*, *Chrysogorgiidae*, *Primnoidae*, *Ellisellidae* and *Isididae*). The axis has no soft cross – chambered core, but is solid throughout and the calcareous deposits comprise a large proportion of the axial material compared to the horny substance.

Taxonomic studies on gorgonian species along the coast of India and its adjacent waters have been carried out by Pratt, (1903), Thompson and Crane, (1909), Thomson and Simpson, (1909). According to Thomas *et al.* (1995), in India, 27 species of gorgonians belonging to 8 families and 19 genera have been reported. Among them 12 species of gorgonians from 4 families and 9 genera were reported from the northeast coast of India. However in the Andaman and Nicobar Islands, 10 species from 4 families and 9 genera have been recorded (Venkataraman *et al.*, 2004). There are scattered taxonomic descriptions of gorgonians in most parts of the Asian region and isolated distributional records, many of them inadequately substantiated.

In India, the gorgonians exported are commercially classified under 4 types namely **Black, Red, Flower and Monkey tail** (Thomas and Rani, 1987). Venkataraman *et al.* (2004) reported 27 species of gorgonians belonging to 8 families and 19 genera from India. Among them 12 species of gorgonians from 4 families and 9 genera were reported from the northeast coast of India (Thomas *et al.*, 1995). Recently Zoological Survey of India reported 51 species belonging to 25 genera, 8 families, and 3 sub-orders in the coral reef environments of Andaman and Nicobar Islands. Among them **44 species belonging to 24 genera and 7 families are new to India**. This paper gives an updated list of all known gorgonian species found in the Andaman and Nicobar Islands.

Materials and methods

Study has been done at 18 sites throughout Andaman and Nicobar Islands during July 2009 to June 2011 (Fig. 1). Specimens were collected by using SCUBA (Self Contained Underwater Breathing Apparatus) from 5m to 40m depth, preserved in 70% ethanol. The specimens were identified based on the morphological characteristics of the colonies and sclerites structure. Sclerites were extracted using 5%

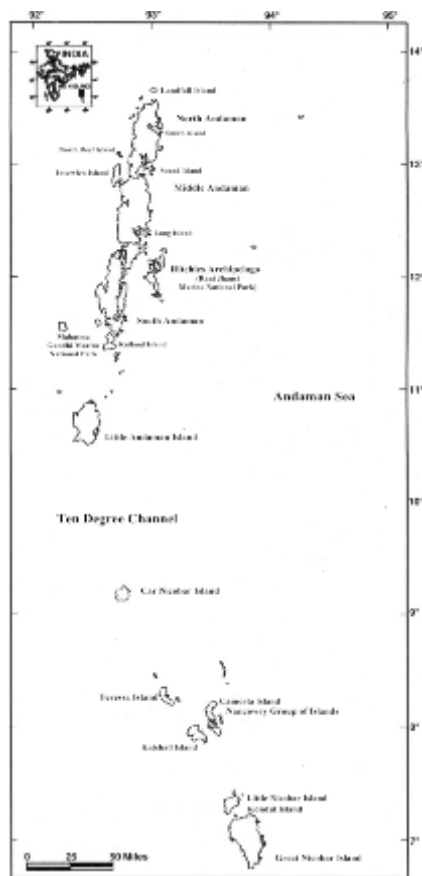


Fig. 1: Map showing the study sites

Sodium hypochlorite (Bayer, 1961) and examined under the compound microscope (Leica – DFC 500), and underwater pictures were taken using Sony T-900 camera. Identified specimens were deposited at the National Zoological Collection of Zoological Survey of India, Port Blair. Bayer *et al.* (1983) keys were used for the identification of species.

Result and discussion

A total of 103 species under 41 genera, 11 families, 3 sub orders and 2 orders (Table 1 and Figs. 2 &3) were reported from Andaman and Nicobar Islands. Andaman Islands harbour the maximum of 93 species whereas 18 species found in Nicobar Islands. Order Gorgonacea contributes 102 species while only one species under Order Alcyonacea reported from these islands. Taxonomy of gorgonian study in India is very scanty (Thomas *et al.* 1995).

Gorgonians mostly tend to settle in deep, turbid and strong under water current environments, which perhaps hinder the survey and collection of specimen. Considering the importance of gorgonians, the Government of India brought all the species of gorgonids under Schedule-I of Wildlife (Protection) Act, 1972 in order to conserve these resources and augment their natural beds. The Andaman and Nicobar Islands is known for its high biodiversity and affinities to the Indo-Malayan and Indo-Chinese regions (Smith, 1930), thus further extensive surveys can bring our more number of species from these Bay Islands.

Table 1: List of species reported in Andaman and Nicobar Islands

Sl. No.	Species	Andaman	Nicobar
Subclass: Octocorallia			
Order: Gorgonacea			
Sub Order: Calcaxonia Grasshoff, 2000			
Family: Ellisellidae Gray, 1859			
Genus: Dichotella Gray, 1870			
1	<i>Dichotella gemmacea</i> (Milne Edwards & Haime, 1857)	+	
Genus: Ellisella Gray, 1858			
2	<i>Ellisella azilia</i> (Grasshoff, 1999)	+	
3	<i>Ellisella andamanensis</i> (Stimpson, 1986)	+	
4	<i>Ellisella cercidia</i> (Grasshoff, 1999)	+	
5	<i>Ellisella eustala</i> (Grasshoff, 1999)	+	
6	<i>Ellisella marisrubri</i> (Stiasny, 1938)	+	
7	<i>Ellisella nuctenea</i> (Grasshoff, 1999)	+	
Genus: Junceella Valenciennes, 1855			
8	<i>Junceella delicata</i> (Grasshoff, 1999)	+	

Sl. No.	Species	Andaman	Nicobar
9	<i>Junceella eunicelloides</i> (Grasshoff, 1999)		+
10	<i>Junceella juncea</i> (Pallas, 1766)	+	+
11	<i>Junceella miniacea</i> (Thompson & Henderson, 1906) Genus: Viminella Gray, 1870	+	+
12	<i>Viminella crassa</i> (Grasshoff, 1999)	+	
13	<i>Viminella junceelloides</i> (Stiasny, 1938) Genus: Nicella Gray, 1870	+	
14	<i>Nicella dichotoma</i> (Gray 1860)	+	
15	<i>Nicella flabellata</i> (Whitelegge, 1897)	+	+
16	<i>Nicella laxa</i> Whitelegge, 1897	+	
17	<i>Nicella pustulosa</i> (Thomson & Simpson, 1909) Genus: Verrucella Milne Edwards & Haime, 1858	+	
18	<i>Verrucella cerasina</i> (Grasshoff, 1999)	+	
19	<i>Verrucella corona</i> (Grasshoff, 1999)	+	
20	<i>Verrucella diadema</i> (Grasshoff, 1999)	+	
21	<i>Verrucella flexuosa</i> (Lamarck, 1815)	+	
22	<i>Verrucella granulata</i> (Esper, 1788)	+	
23	<i>Verrucella gubalensis</i> Grasshoff, 2000	+	
24	<i>Verrucella klunzingeri</i> Grasshoff, 2000	+	
25	<i>Verrucella umbraculum</i> (Ellis & Solander, 1786) Family : Isididae Lamouroux, 1812 Genus: Isis Linnaeus, 1758	+	
26	<i>Isis hippuris</i> Linnaeus, 1758 Genus: Acanella Gray, 1870	+	+
27	<i>Acanella robusta</i> Thomson & Henderson, 1906 Genus: Keratoisis Wright, 1869	+	
28	<i>Keratoisis gracilis</i> (Thomson & Henderson, 1906) Sub Order : Holaxonia Gray, 1859 Family: Acanthogorgiidae Gray, 1859 Genus: Callogorgia Gray, 1858	+	
29	<i>Fanellia fraseri</i> (Hickson, 1915)	+	
30	<i>Callogorgia indica</i> Versluys, 1906 Genus: Calicogorgia Thomson & Henderson, 1906	+	
31	<i>Calicogorgia tenuis</i> Thomson & Simpson, 1909 Genus: Muricella Verrill, 1868	+	
32	<i>Muricella bengalensis</i> Thomson & Henderson, 1906	+	
33	<i>Muricella complanata</i> Wright & Studer, 1889	+	

Sl.No.	Species	Andaman	Nicobar
34	<i>Muricella paraplectana</i> (Grasshoff, 1999)	+	
35	<i>Muricella ramose</i> (Thompson & Henderson, 1906)	+	
36	<i>Muricella robusta</i> Thomson & Henderson, 1909	+	
37	<i>Muricella rubra</i> (Thompson & Henderson, 1906) Genus: Acanthogorgia Gray, 1857		
38	<i>Acanthogorgia breviflora</i> Whitelegge, 1897		+
39	<i>Acanthogorgia muricata</i> Verrill, 1883	+	
40	<i>Acanthogorgia spinosa</i> Hiles, 1899 Genus: Anthogorgia Verrill, 1868	+	+
41	<i>Anthogorgia glomerata</i> Thomson & Simpson, 1909	+	
42	<i>Anthogorgia ochracea</i> (Grasshoff, 1999)		+
43	<i>Anthogorgia racemosa</i> Thomson & Simpson, 1909	+	
44	<i>Anthogorgia verrilli</i> Thomson & Henderson, 1906 Family: Gorgoniidae Lamouroux, 1812 Genus: Rumphella Bayer, 1955	+	
45	<i>Rumphella aggregate</i> (Nutting, 1910)	+	
46	<i>Rumphella torta</i> Klunzinger, 1877 Genus: Hicksonella Nutting, 1910	+	
47	<i>Hicksonella princeps</i> Nutting, 1910 Genus: Lophogorgia	+	
48	<i>Lophogorgia lutkeni</i> (Wright & Studer, 1889) Family: Plexauridae Gray, 1859 Genus: Elasmogorgia Wright & Studer, 1889	+	
49	<i>Elasmogorgia flexilis</i> Hickson, 1905 Genus: Villogorgia Duchassaing & Michelloti, 1862	+	
50	<i>Villogorgia ceylonensis</i> (Thomson & Henderson, 1905)	+	
51	<i>Villogorgia rubra</i> Hiles, 1899	+	
52	<i>Villogorgia tenuis</i> (Nutting, 1908) Genus: Psammogorgia Verrill, 1868	+	
53	<i>Psammogorgia ridlei</i> Thomson & Simpson, 1909 Genus: Menella Gray, 1870	+	
54	<i>Menella indica</i> Gray, 1870	+	
55	<i>Menella kanisa</i> (Grasshoff, 2000)	+	+
56	<i>Menella kouare</i> Grasshoff, 1999	+	
57	<i>Menella praelonga</i> (Ridley, 1884)	+	
58	<i>Menella woodin</i> Grasshoff, 1999 Genus: Bebryce Philippi, 1841	+	

Sl. No.	Species	Andaman	Nicobar
59	<i>Bebryce mollis</i> Phillipi, 1842	+	
60	<i>Bebryce sirene</i> (Grasshoff, 1999)		+
61	<i>Bebryce studeri</i> Whitelegge, 1897	+	
	Genus: Echinogorgia Kolliker, 1865		
62	<i>Echinogorgia flabellum</i> (Esper, 1791)	+	
63	<i>Echinogorgia flora</i> Nutting, 1910	+	
64	<i>Echinogorgia macrospiculata</i> Thomson & Simpson, 1909	+	
65	<i>Echinogorgia multispinosa</i> Thomson & Henderson, 1905	+	
66	<i>Echinogorgia ramulosa</i> (Gray, 1870)	+	
67	<i>Echinogorgia reticulata</i> (Esper, 1791)	+	
68	<i>Echinogorgia toombo</i> (Grasshoff, 1999)	+	
	Genus: Echinomuricea Verrill, 1869		
69	<i>Echinomuricea andamanensis</i> Thomson & Simpson, 1909	+	
70	<i>Echinomuricea indica</i> Thomson & Simpson, 1909	+	
71	<i>Echinomuricea indomalaccensis</i> Ridley, 1884	+	
78	<i>Echinomuricea ochracea</i> Thomson & Simpson, 1909	+	
73	<i>Echinomuricea reticulata</i> Thomson & Simpson, 1909	+	
74	<i>Echinomuricea splendens</i> Thomson & Simpson, 1909	+	
75	<i>Echinomuricea uliginosa</i> (Thompson & Henderson, 1909)	+	
	Genus: Euplexaura Verrill, 1869		
76	<i>Euplexaura amerea</i> (Grasshoff, 1999)		+
77	<i>Euplexaura rhipidalis</i> Studer, 1895	+	
	Genus: Trimuricea Gordon, 1926		
78	<i>Trimuricea caledonica</i> (Grasshoff, 1999)		+
	Genus: Villogorgia Duchassaing & Michelloti, 1862		
79	<i>Villogorgia tenuis</i> (Nutting, 1908)	+	
	Genus: Menacella Gray, 1870		
80	<i>Menacella gracilis</i> Thomson & Simpson, 1909	+	
	Genus: Placogorgia Wright & Studer, 1889		
81	<i>Placogorgia indica</i> Thomson & Henderson, 1906	+	
82	<i>Placogorgia orientalis</i> Thomson & Henderson, 1906	+	
	Genus: Paramuricea Koelliker, 1865		
83	<i>Paramuricea indica</i> Thomson & Henderson, 1906	+	
	Family: Keroeidae Kinoshita, 1910		
	Genus: Keroeides Studer, 1887		
84	<i>Keroeides gracilis</i> Whitelegge, 1897	+	

Sl. No.	Species	Andaman	Nicobar
85	<i>Keroeides koreni</i> Wright & Studer, 1889 Sub Order: Scleraxonia Studer, 1887 Family: Melithaeidae Gray, 1870 Genus: Acabaria Gray, 1859	+	
86	<i>Acabaria cinquemiglia</i> (Grasshoff, 1999)	+	
87	<i>Acabaria ouvea</i> (Grasshoff, 1999) Genus: Melithaea Milne-Edwards, 1857	+	
88	<i>Melithaea caledonica</i> (Grasshoff, 1999)		+
89	<i>Melithaea ochracea</i> (Linnaeus, 1785) Genus: Melithaea Milne-Edwards, 1857	+	
90	<i>Melithaea ornata</i> (Thomson & Simpson, 1909)	+	
91	<i>Melithaea philippinensis</i> (Wright & Studer, 1889)	+	
98	<i>Melithaea variabilis</i> (Hickson, 1905) Genus: Mopsella Gray, 1857	+	
93	<i>Mopsella rubeola</i> (Wright & Studer, 1889) Genus: Wrightella Gray, 1870	+	
94	<i>Wrightella braueri</i> Kükenthal, 1919 Family: Subergorgiidae Gray, 1859 Genus: Annella Gray, 1858		+
95	<i>Annella mollis</i> , Nutting, 1910	+	+
96	<i>Annella reticulata</i> (Ellis & Solander, 1786) Genus: Subergorgia Gray, 1857	+	+
97	<i>Subergorgia reticulata</i> (Ellis & Solander, 1786)	+	
98	<i>Subergorgia rubra</i> Thomson, 1905	+	+
99	<i>Subergorgia suberosa</i> (Pallas, 1766) Family: Anthothelidae Broch, 1916 Genus: Solenocaulon Gray, 1862	+	+
100	<i>Solenocaulon sterroclonium</i> Germanos, 1895	+	
101	<i>Solenocaulon tortuosum</i> Gray, 1862 Family: Parisididae Aurivillius, 1931 Genus: Parisis Verrill, 1864	+	
102	<i>Parisis fruticosa</i> Verrill, 1864 Order: Alcyonacea Lamouroux, 1812 Family: Nidaliidae Gray, 1869 Genus: Nidalia Gray, 1834	+	
103	<i>Nidalia alciformis</i> (Simpson, 1907)	+	
	Total	93	18



Acanthogorgia breviflora Whitelegge, 1897



Acanthogorgia spinosa Hiles, 1899



Anthogorgia ochracea (Grasshoff, 1999)



Muricella paraplectana (Grasshoff, 1999)



Muricella ramosa (Thompson & Henderson, 1906)



Verrucella corona (Grasshoff, 1999)

Fig. 2: Gorgonians of Andaman and Nicobar Islands



Acabaria cinquemiglia (Grasshoff, 1999)



Acabaria ouvea (Grasshoff, 1999)



Bebryce sirene (Grasshoff, 1999)



Ellisella marisrubri (Stiasny, 1938)



Junceella delicata (Grasshoff, 1999)



Trimuricea caledonica (Grasshoff, 1999)

Fig. 3: Gorgonians of Andaman and Nicobar Islands

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