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A taxonomic revision of hermatypic corals (Scleractinia; Family Acroporidae Verrill, 1902) present in zoological museum of the University of Karachi

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Abstract

Six species of hermatypic corals including *Acropora digitifera* (Dana, 1846), *Acropora hyacinthus* (Dana, 1846), *Acropora valida* (Dana, 1846), *Acropora glauca* (Brook, 1893), *Acropora cervicornis* (Lamarck, 1816), *Acropora formosa* (Dana, 1846) of the family Acroporidae Verrill, 1902 were originally collected by James A Murray (Curator and Zoologist at Victoria Museum) in 1880 from the Indian Ocean, Persian Gulf and Arabian Sea. The specimens were present in the Victoria Museum, Frere Hall, Karachi before 1952. Currently these collections are kept in Zoological Museum of the Karachi University. The present revision deals with the detailed taxonomic description of the Acroporidae corals. Species are compared with comprehensive literature and authentic keys.

Keywords: Scleractinia, Acroporidae, Zoological Museum, University of Karachi

1. Introduction

The Family Acroporidae belongs to the order Scleractinia of the phylum Cnidaria. Acroporidae contains 4 zooxanthellate genera (*Montipora*, *Acropora*, *Astreopora* and *Anacropora*) with nearly 200 nominal species reported from tropical Oceans^[1, 2]. Acroporids are one of the most important coral groups among scleractinians, having the largest number of species and the greatest importance in reef-formation of the reefs of the Pacific and Indian Oceans. Acroporids have the growth forms known as hermatypic corals. Branching and lamellar colonies of *Acropora*, and particularly the latter ones, are able to constitute dense populations on reef flats and reef slopes, which can extend along reefs for many hundreds of square meters. The taxonomic characters include: colonies – from massive encrusting to finely branching forms. The acroporids of the Great Barrier Reef (Australia), the Maldives, the Japan, the Philippines and the Red Sea have been described and redescribed in the modern times^[3, 4, 5]. *Acropora* genera of the Acroporidae have a high degree of diversity of all scleractinians (stony corals) of the Indo-Pacific Ocean. Colonies of *Acropora* lamellar-trochal growth forms are often wedged in such colonies, or sometimes they replace them. On a reef-slope they can form multilayered constructions^[5]. According to^[3] *Acropora* have about 113 species while according to^[4] about 180 species are known^[6]. Studied scleractinian corals of Arabian Sea and Gulf of Oman. *Acropora* species are taxonomically one of the most difficult groups. It is noteworthy that the status of genus *Acropora* Oken, 1815 was restored by the International Committee on Zoological Nomenclature only in the later half of the 20th century^[7, 8] though many researchers after^[9] who gathered enough information and taxonomic data to replace *Madrepora* by *Acropora*. In the first half of the 20th century *Acropora* were investigated in detail together with the other scleractinians by numerous workers^[10, 11, 12, and 13].^[14] was actually the first researcher who studied *Acropora in situ* and type material in museum collections. Revision of *Acropora* of the Great Barrier Reef of Australia was done and 41 species described while nearly 100 species were placed under synonymy. Wallace recognized that the main characteristics of the genus are the form of colony branching due to longitudinal growth of axial polyps, and specific mode of budding of radial polyps. Six varieties were distinguished regarding the main colony forms, and 14 forms with respect to radial corallites and the means of their budding from the wall of the axial corallite. The features were employed while identifying and describing these species. Her work provided the base for revision of all *Acropora* by^[15] based on the investigation of these scleractinians

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collected from the Great Barrier Reef of Australia and all type materials of museum collections. Present study consists of taxonomical characterization of six species of Acroporidae coral, which are present in Zoological Museum of Karachi University.

2. Material and Methods

The relevant collection already present in Zoological Museum of Karachi University, which was made by James A. Murry from Arabian Sea, Indian Ocean and Persian Gulf in 1880 and is deposited in Zoological Museum of the University of Karachi. The specimens were examined for detailed morphological characters for taxonomic study. The samples were identified on the basis of their taxonomic diagnostic characters, confirmed and compared with the catalogue^[10], literature and standard keys. The identified specimens are kept in Zoology Museum, Department of Zoology, University of Karachi.

3. Result

3.1 Family Acroporidae Verrill (1902)

colonies massive or ramose, plocoid, branching; basal epitheca present; corallites small; wall porous; synapticulothecate merging with coenenchyme, pseudocostae; septa non exsert in two cycles, composed of simple spinifroms trabeculae projecting inwards and upwards from vertical wall trabeculae, fusing to form laminae; columella wholly absent; endotheca and exotheca thin, tabular, flaky spinose or striate one surface, light; coenosteum reticular.

3.2 Acropora Oken (1815)

Type Species: *Acropora muricata* (Linnaeus, 1758)

Corallum porous; colonies mostly ramose, arborescent; branched, bushy, plate-like, rarely encrusting, corallites two types, axial and radial corallites on the tip of the branches, radial corallites immersed or projecting, corallites without columella; porous corallites walls; septa in two cycles (12); columella absent.

3.3 Acropora digitifera (Dana, 1846)

Madrepora digitifera Dana (1846)

Acropora digitifera (Dana) 1846; Verrill (1902); Crossland (1952); Wells (1954); Nemenzo (1967); Veron and Wallace (1984); Veron (1986); Wallace and Dai (1997); Wallace (1999)

Colonies massive base; branches dichotomously and up to 35 mm length and 8-14 mm in diameter, the lateral branches and tip of the branches rounded; axial corallites 2-4 mm diameter with calices of 8-14 mm diameter and radial corallites nariformis with flattened lower walls, arranged in compact vertical rows; septa well developed in all corallites, two cycles of septa represented by straight laminae of different length developed in axial and radial corallites, longer with axial corallites up to 2/4 of a corallites radius and in radial corallites exceed 2/3 of a corallite radius; coenosteum on the corallites and in intercorallite spaced dense and reticular structure with clearly developed fine ridges.

Distribution

Indian Ocean, Western and Central Pacific Ocean.

3.4 Acropora hyacinthus (Dana, 1846)

Madrepora hyacinthus Dana (1846)

Acropora hyacinthus (Dana) 1846; Wells (1954); Nemenzo

(1967); Wallace (1978; 1999); Veron and Wallace (1984); Veron (1986); Wallace and Dai (1997)

Acropora spicifera (Dana); Nemenzo (1967)

Plat like rounded with marginal attachment, bent funnel-shape or multilayer spiral forms; radial branches compactly arranged and highly anastomosed, short brachlets; radial corallites present around an axial and a branch forming a rosette; exsert axial corallites 2mm and have a cylindrical shaped with deep calice of 5-1 mm in diameter; corallites of the primary horizontal branches cylindrical or immersed; septa in the axial corallites with directive, primary septa with the length of up to 2/4 of a corallites radius, first cycle of septa incomplete or minor or reduced to separate spines or absent; radial corallites have several septa on the lower side of the calice and one directive is large; corallites walls have distinct cosate which intersect synapticalae, forming a lattice structure.

Distribution

Indian Ocean, Western and Central Pacific Ocean.

3.5 Acropora Valida (Dana, 1846)

Madrepora valida Dana (1846)

Madrepora valida (Dana) 1846; Verrill (1902); Wells (1954); Nemenzo (1967); Zou (1975); Veron and Wallace (1984); Veron (1986); Wallace and Dai (1997); Wallace (1999)

Acropora variabilis (Klunzinger); Craosland (1952); Scheer and Pillai (1974); Wallace (1978) branches short, main branch subdivided to give rise branches 2-5 cm long and about 1 cm thick; axial corallite exsert up to 3 mm in diameter at the tip, conical shaped and rather thick; radial corallites raniform, half tubular, subimmersed or exsert, highly crowded and appearance with narrow tips, arranged in longitudinal rows parallel to the long axis of branches, tips curved and beaked; a circular opening, small and oval, length of the radius 3-4mm diameter; calice 0.3 -0.5 mm in diamete' two cycles of septa present; axial corallites have two set of complete septa reaching 1/2 of a corallites radius, primary septa distinguished by their large size, first cycle of septa complete in the form of laminae reaching 2/4 of a corallite radius, second cycle of septa short then the first cycle of septa; corallites covered by costae and tip of the spinules divided or not divided, intercorallites; coenosteum coarse; wall of the radius compact.

Distribution

Indian Ocean, Western and Central Pacific Ocean.

3.6 Acropora glauca (Brook, 1893)

Madrepora glauca Brook, 1893

Acropora glauca (Brook); Veron and Wallace (1984)

Colonies with branching, corymbose and caespito - corymbose; sub horizontally radiating out from the colony center; branches dichotomize, several lateral short projections in their upper parts; merging, branches form a strong laminar lattice-like; axial corallites exsert, 1 mm in 3.5 mm diameter with a calice diameter of slightly more than 1 mm; radial corallites are tubular, crowded, with straight, or more rarely oblique; lower part of the wall flattened; nariform corallites develop on the upper part of branches; corallites sizes are 1.8-2.5 mm; calices are about 1 mm diameter; septa of the first cycle of axial and radial corallites well developed, represented by regular laminae reaching 3/4 of a corallite radius; directive primary septa longer than other septa; second cycle of septa arranged in the same way, in radial corallites, incomplete and do not reach half of a corallite radius; spines of the third order

septa met in some corallites; coenosteum is reticular or finely costate.

Distribution

Central and Northern Vietnam, eastern and western coasts of Australia.

3.7 *Acropora cervicornis* (Lamarck, 1816)

Madrepora cervicornis Lamarck, 1816

Madrepora cervicornis Pourtales, 1871

Isopora muricala Vaughan, 1901

Acropora cervicornis (Lamarck) Verrill (1902); Almy & Carrion-Torres (1963); Goreau & Wells (1967); Roos (1971); Smith (1971); York (1971); Cairns (1982); Veron (2000)

Colonies arborescent, tubular branches, distinct axial -tubular corallites at branch terminals and radial corallites distributed relatively uniformly on branches; radial corallites form bracts rather than tubes; axial corallites slightly larger; tubular corallites highly exsert; secondary branches diverge from primary branches at 30 to 90 degree angles; branches may fuse to adjacent branches (anastomosis) forming a pretzel-like maze; calices about 1 mm in diameter; corallites have porous walls, 1 to 3 mm long; twelve septa; wall porous; synapticulo- thecate with well-developed septa.

Distribution

Persian Gulf and Indian Oceans.

3.8 *Acropora formosa* (Dana, 1846)

Madrepora formosa Dana, 1846

Acropora formosa (Dana): Hoffmeister (1925)

Acropora (*Acropora*) *formosa* (Dana): Veron & Wallace (1984)

Colonies areborescent, large shrubs, bushes, branching irregular, straight branched 1-1.5cm diameter; corallites covered by fine coaste of thin spinules with highly divided tips axial corallites 2 to 205 mm thick, with a calice of a variable diameter (0.4 to 1.2 mm); radial corallites highly projectingm tubular, slightly oblique ascending crowded, 2 to 3 mm long, 1-2 mm thick; corallites oriented; short corallites seprated between exsert corallites, former adjoining walls of the latter; septa of axial corallites dimly developed than the radial radials; septa in 2 cycles; first cycle of septa complete set, second cycles of septa incomplete with radial corallites; first cycles of septa well developed, as distinct laminae up to 2/3 of a corallite radius, second cycle septa inconsistently; coenosteum between corallites, similar structure or finely reticular.

Distribution

Widely distributed on Indo-Pacific reefs.

4. Discussion

In the present study six species, belonging family Acroporidae corals have been identified. The study of hard corals were compared with the previous research such as catalogue of Madreporarian corals; described and catalogue species of two closely allied genera *Montipora* and *Acropora* from Indo-pacific [16], Corals of the World [4], outline the classification of scleractinian of Arabic, Indo pacific and a few Atlantic genera [1]. 208 species among 60 genera belong to 15 families of scleractinian corals were reported from the Indian Ocean [17], 9 species of *Acropora* in witch 6 species are first time

reported 2 species are new from the area of Persian Gulf, Iran [18].

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