OPEN ACCESS at journalijcir.com

Review Article

ISSN: 2395 -5775

SPONGES OF SOUTHEAST COAST; A REVIEW

Chandrakala, N and Priya, S

Abstract

The marine environment is a rich source of bioactive compounds. The present study was carried out to investigate sponges overview of classification, functions, and biologically active metabolites from sponge and their activities of marine sponges collected from South East Coast of India.

Key Words: Sponges, Southeast coast.

INTRODUCTION

Sponges are the most primitive of multicellular animals(metazoa).acellular grade of construction without true tissues; body plans range from simple (asconoid, syconoid) through to complex (leuconoid)produced by varying degrees of in folding of the body wall and complexity of water canals throughout the sponges. Adults are asymmetrical or radically symmetrical. Sponges play important roles in so many marine habitats but very little information is known about their diversity, biology and ecology as compared with most other animal groups. then many benthic (sea bottom) habitats sponges are often the dominant animals. They have evolved an amazing range of growth forms, best described as highly irregular and sometimes completely plastic, frequently altered by prevailing external conditions (currents, turbidity, salinity, etc). Adults are sedentary (sessile) attached to the seabed or other substrate for most of their lives, although many have larvae that motile, swimming and crawling away from their parent.Sexes are separate, or sequentially hermaphroditic, although most population dispersal and recruitment is asexual (through budding, fragmentation from storm events etc). Larvae are motile incubated within parent or broadcast into the seawater: parenchymella (solid, ciliated)amphiblastula(central cavity) they filter sea water to eat, breath and excrete waste products. Sponges often have complex water canal systems running throughout the body, with smaller inhalant (ostia)and larger pores(oscules) sponges are able to actively pump up to 10 times their body volume each hour, making them the most stable, long lived animals, although growth rates vary enormously between different groups, some sponges, like haploscierids can grow centimeters in weeks, and may have shooter life spans. Others sponges, like the living fossil Sclerosponges are very slow growing, with the largest known individuals (up to 30 m diameter)throughout to be around 5,000 years old.

Classification

Distinguishing taxonomic features

The general architecture of the skeleton is used to differentiate families. The particular combinations of spicular types to define genera, and the form and dimensions of single spicule types to differentiate species. Other morphological characters include shape, colour, consistency, surface (smooth, rough, or convulse) and distribution and character of the oscula. which often shows remarkable interspecies variation cytological and embryological features are used as diagnostic characters in both general classification and species identification of the Demospongiae and Calcarea. Ecological and distributional characters are important in distinguishing species.

Class:1 calcarea (L., calx = lime) or Calcispongiae: (L., calx = lime ,Gr., sponges =sponge)

They have a skeleton of separate calcareous spicules which are monaxon or tetraxon: tetraxon spicules lose one ray to become triadiate.they are solitary or colonical; body shape vase-like or cylindrical. They may show asconoid ,syncoid or leuconoid structure. They are dull colored sponges less than 15m in size. They occur in shallow waters in all oceans.

Order:1 Homocoela

Asconoid sponges with radially symmetrical cylindrical body. Body wall is thin and not folded, spongocoel is lined chanocytes.

Example: *Leucosolenia, Clathrina.*

Order: 2 Heterocoela

Syconoid or leuconoid sponges having vase shaped body. The body wall is thick and folded chanocytes line only radial canals.

Example: *Sycon,* or *scypha,Grantia.*

Department of Zoology Kundhavai Naacchiyaar Govt Arts College For Women (a),
Thanjavur, Tamilnadu, India
Correspondence and Reprint Requests: Chandrakala, N and Priya, S

Received: December 27, 2016 | **Accepted:** January 18, 2017 | **Published Online:** February 28, 2017

Conflict of interest: None declared | **Source of funding:** Nil

Class;2 Hexactinella or Hyalospongiae
Gr., Hyalos = glassy; sponges=sponge)

They are called glass sponges: skeleton is of siliceous spicules which are triaxon with rays. In some of the spicules are fused to form a lattice like skeleton. there is no epidermal epithelium chanocytes line finger shaped chambers. They are cylindrical or funnel shaped and is found in deep tropical seas; they grow up to one meter.

Order:1 Hexasterophora

Spicules are hexasters; i,e star like in shape radical canals or flagellated chambers are simple. They are not attached by root tuffs but commonly attached to a hard object.
Example: *Euplectella, Farnera.*

Orer:2 Amphidiscophora

Spicules are amphidiscs. No hexasters. They are attached to the substratum by root tuffs.
Example: *Hyalonema, Pheroema.*

Class :3 Demospongiae (Gr. Dermos = frame ; Spongos = Sponge):

It contains the largest number of sponge species. Large sized, solitary or colonical. The skeleton may be of sponging fibres with siliceous spicules or there may be no skeleton. Spicules are never six rayed they are monaxon or tetraxon and are differentiated into large megasclers and small microscleres. Body shape is irregular and the canal systems is leucon type. Generally marine few freshwaters forms.

Sub class:2 Tetractinellida

Sponges are mostly solid and simple rounded cushion like flattened in shape usually without branches. Skeleton comprised mainly of tetraxon siliceous spicules but absent in order Myxospongida. Canal systems is leuconoid type: shallow water form.

Order: 1 Myxospongida

1. Simple structure.
2. Skeleton absent.

Examples : *Oscarella, Halisarca.*

Order:2 Carnosa:

1. Simple structure.
2. Asters may be present.

Examples:*Plakina*

Order 3 Choristida

Spicules are differentiated into megascleres and microscleres.

Examples:
Geodia, Thenea.

Subclass :2 Monaxonida:

Monaxonids occur in variety of shapes from rounded mass of branching type or elongated or stalked with funnel or fan shaped. Skeleton consists of monaxon spicules with or without sponginthey are found in abundance throughout the world.

Order 1: Hadromerida

Monaxon megascleres in the form of tylostyles. Microscleres when present in the form of asters. Spongin fibres are absent.

Examples:*Clionea,Tethya*

Order 2 : Halichondria

Monaxon megascleres are often of two types, viz., monactins and diactins. Microsclers are absent. Spongin fibers present but scanty.
Example: *Halichondria*

Order 3: Poecilosclerida

Monaxon megascleres are of two types, one type in the ectoderm and another type in the choanocyte layer. Microsclers are typically chelas,sigmas and toxas.
Example: *Cladorhiza.*

Order 4: Haplosclerida

Monaxon megascleres are of only one type ,viz., diactinal. Microscleres are absent. Spomgin fibres are present.

Examples: Chalina, Pachychalna,Sponilla.

Sub class 3 Keratosa

Body is rounded and massive with a number of conspicuous oscula. Skeleton composed of network of spongin fibres only. Siliceous spicules are absent.
Examples: Euspongia, Hippospongia.

Biologically active metabolites from sponges

The azacyclopropene, dysidazirine was isolated from the grey sponge Dysidea fragilisis that lacks a spicule skeleton; instead it has a network of fibres loaded with sand grains,broken spicules and other foreign material. It is strong conclude and forming locate or digitize cushions and elastic when compressed. It is a common sponge along most coasts of Western Europe. the dysidazirine reported an IC50 value of 0.27 μg/ml against L1210,the mouse lymphocytic leukemia cells (Molinski and Ireland 1988). Ficulnic acids A from the sponge ficulina ficus C = suberites focus Linnaeus 1767)reported inhibition on the growth of the mouse lymphocytic leukemia cells (L1210) with an ID50 value of 10-12 μg/ml (Guyot *et al.*,1986).it is an orange sponge with one or more conspicuous, large oscules. It has a velvety smooth appearance. It enjoys its distributed North East Atlantic Coast mostly in places with tidal currents.

Bio active compounds from sponges:
Long-chain Acetylenes:

Numerous aliphatic compound have been isolated from sponges and a number of these have been reported to be cytotoxic. Feverous from the monoacetylenic alcohols with different reactive groups from the sponge cribrichalina vasculum collected in Beilze were toxic to the mouse P388 cellline (IC 50,1.0,1.3,1.1,0.2,0.1 µg/ml respectively) and they also showed in vitro immunosuppressive activity in lymphocyte reaction tests (Gunasekaran and Faircloth 1990). This appears to be first report of branched chain aliphatic acetylenic compounds from marine organisms. Smooth cones,to car shaped or fan shaped,sometimes torn or crooked by waves or predators;colr tan to vinaceous . the skeleton of cribrochalina is made of thick multispicular tracts cemented by spongin and is found distributed in Santa marta Colombia (Hallock *et al*.,1995).

Duryne that was isolated from the carribean sponge (ribochalina dura was found toxic to marine leukemia cells (IC5O 0.07 µg/ml) and also colon lung and mammary cell lines,with MIC 0.1µg/ml (Wright *et al*.,1987) Petrosia ficiforms is one of the sponges found producing more acetylenes that have different purposes in industry. One among them is petrosynol a polyacetylene of 30 atoms showed antibiotic activity and was also active in the starfish egg assay at 1µg/ml (Fusetani *et al*., 1987) Cimino *et al*., (1990) have described a number of C46 polyacetylenes that were active in the brine shrimp assay (IC 50 0.002-0.12µg/ml)and the sea urchin egg assay (IC50-1.50µg/ml).

P.ficiformis has a compact has a compact hard texture with spherical oscula irregularly spread over the surface. It s found on the underside of rocks, on overhangs and in caves between 5m and 70m depth.the species has been reported at Adriatic sea. Aegen sea, Azores, Canaries, Maderia.

Biologically active metabolites from sponge and their activities details of the compounds, source and it potential biological activity.

Sponges have medicinal potential due to the presence in sponges themselves or their microbial symbionts of chemicals that may be used to control viruses, bacteria, tumors and fungi.

From sea sponge to HIV Medicine

Tectitethya crypta (formerly known as Cryptotheca crypta) is a large, shallow water sponge found in the Caribbean. It was first for medical purposes in the 1950s when few scientists or doctors thought to look for medicines in the ocean. But in the sponge, scientists isolated two chemicals –aptly named spongothymidine which were used as models for the development of a number of ani-viral and anti-cancer drugs. these include the HIV drug AZT, a breakthrough in AIDS treatment in the late 1980s,anti-viral drugs to treat herpes and an anti-leukemia drug. The latter was approved in 1969 and was the first marine-drug approved for cancer treatment.

S.no	Compound	Source	Bioactivity	References
1	Dysidazirine	dysideafragilis	Showed inhibition on the growth of the mouse lymphatic leukemia cells (L1210)	Molinski and Ireland (1988)
2,	Ficulinic acid A	Ficulinafucus	-DO-	Guyot *et al*., (1986)
3,	Monoacetylenic acids	Cribrochalina vasculum	In vitro immune suppressive activity	Gunasekara and Faircloth (1999)
4,	Duryne	Cribrochalina dura	Toxic to marine leukemia cells and also colon, lung and mammary cell lines	Wright *et al*., (1987)
5,	Petrosynol	Petrosia ficiforms	Antibiotic activity and active in the starfish egg assay. Active in the brine shrimp assay and the seaurchin egg assay	Fusetani *et al*., (1987). Cimino *et al*.,(1990)
6,	Xestin A, Xestin B	Xestospongia sp	Toxic against P388 cells	Quinea *et al*.,(1986)
7,	Cyclic peroxide acids	Plakortis angulospiculates	Inhibiting the growth of P388 Cells	Gunasekara *et al*., (1990)
8,	Acanthifolicin	Pandaros acanthifolium	Strong cytotoxic activity against P388 cells.	Schimitz *et al*.,(1981).
9,	Okadacic acid	Halichondria okadai	-DO-	Tachibana *et al*.,(1981)
10,	discodermolide	Disodermia dissoculta	Potent inhibitor of tumor cell growth in several MDR cancer cells	Gunasekara *et al*.,(1990 b)
11,	,fijianolides A Fijianolides B	Spongin mycofijiensis	Active against P388 and HT-29 human colon tumor cells	Quinoa *et al*.,(1988)
12,	Mycalolides A-C	mycale	Highly cytotoxic against B 16	Fusetani *et al*., (1898 b)
13,	Norhalichondrins A			
14,	Alkaloid	Teichaxinella morchella and Ptilocaulis walpersi	Showed cytotoxicity to L1210 Cells	Wright and Thompson (1987)
15,	Girolline	Pseudaxinyssa cantharella	Active against P388	Ahond *et al*.,(1989)
16,	Pyronaamide	Leucetta	Toxic to KB cells	Akee *et al*.,(1990)
17,	Series of 2 amino imidazole alkaloids namidines	Leucetta chagosensis	Showed cytotoxiciy against p388 cells	Carmley *et al*.,(1989b)
18,	Dragmacidon A	Dragmacidian sp	Showed cytotoxiciy against L1210 cells	Morris and Anderson (1989)
19,	Theonelladins A Theonelladins B	Theonella swinhoei	Showed cytotoxiciy against L1210 cell lines and KB cells	Kobayashi *et al*.,(1989).
20,	Manzamine A	Haliclona sp	Active against P388 cells in vitro	Sakai *et al*.,(1989).

References

Ayling L (1979) sub tidal sponges in the cape rodnoy to okakari paint marine reserve. *leigh laboratory bulleton* (unpublished)83 p.

Batson ,P.(2003) chaper 6 sponges,PP.86-88.in deep Newzealand. Blue water, black abyss Canterbury university press,240 p.

Berquist :P.R.(1970) the marine fauna of Newzealand: Porifera demospongiae part 2 (Axinellida and halichondria). Newzealand oceanographic institute memoir,51,85p.

Berquist P.R.(1978) sponges: Hutchinson London ,268 P.

Cook,S.D.Berquist ,P.R.(1998) Revision of the genus Psammocinia (Porifera; Demospongiae; Dictyoceratida)with six new species from Newzealand. *Newzealand journal of marine and freshwater Research* ,32.399 -426.

Dendy ,A.O (1924),Porifera. Part 1.non: Antartic sponges . Nature History Report .British Antartic (Terra Nova) Expedition 1910. *Zoology* 6, 269-392.

Fromont,J., Alvarez,B., Gomez,O.,Roberts,E,(2010) Tetrapocilin (Demospongiae :Poecilosclerida;Guitarridae) in Australia descriptions of a new species. Records of the Western Australian Museum 26, 70-86.

Gray,J.E(1843) Additional radiated animals and annelids.PP.292-295In;Dieffenbach,E.(ed),Travels in New Zealand;with contributions to the Geography, Geology, Botany and natural history of the country. *John Murray London*.Vol2, v+396 P.

Hooper, J.N.A Wiedenmayer,F. (1994) Porifera, PP.1-620.In wells, A .(Ed), Zoological catalogue of Australia volume 12(CSIRO; Melbourne).

Kelly,M,(2007) The marine fauna of Newzealand ;Poifera; Lithistid Demospongiae (Rock Sponges). NIWA biodiversity Memoir, 121,100 P.

Kelly,M. Sim-Smith,C.(2012) A review of Ansonia, stryphnus, and Ecionemia (Demospongiae; Astrophorida;Ancorinidae) with descriptions of new species from Newzealand waters, zootaxa, 3480,1-47.

Kelly-Berges , M.,Bergquist,P.R.(1994).A redescription of Aaptos with descriptions of new species Aaptos (Hadromerida; Suberitidae) from northern Newzealand. *Journal of zoology* 234,301-323.

Pritchard, K.,Ward, V.,Battershill, C.,Berquist,P.R(1984)Marine sponges; Forty –six sponges of northern Newzealand. *Leigh Laboratory Bulletin*,14,149P.

Rutzer.K., & Stone,S.M (1986) Discovery and significance of Albany Hancock microscope preparations of excavating sponges (man; Hadromerida; Clioidae) *Proc. Biol. Soc. Wash*.99(4);658-675.

Sara.M.,Sara,A (2004)A revision of Australian and Newzealand WW(Porifera; Demospongiae)with preliminary analysis of species groupings. Invertebrate systematic,18,117-156.

Soest ,R.W.M.Van . Guiterman.J.D.,& Sayer.M (1981) Sponges from Roaring water Bay and Lough Ine. *Journal sherkin* ISL. 2;35-49.

Stephen .S.,J(1912)Marine Porifera of the clare Island survey Proc.Roy.Irish.Acad.,31(59):1-41.

Topsent .E., (1890) etude des Spongiaries.I. Observation sur quelques species du genre Raspalia Nardo,Revue boil.N.Fr.,NO 8;289-298.

Topsent .E(1891)essay sur la faune des Spongiaries de Roscoff.Arch.Zool.exp.gen.ser2 9:523-554.

Tuzet.E(1973) Sponges calcaries In:P.P.Grasse.ed.Traite de Zoologie.3. spongiaries, masson. Paris,716 PP.

VAN soest,R.W.M&Weinberg,S,1980. A note on the sponges and octocorals From sherkin Island and Lough Ine.Co.Cork.*Irish Nat.J.*,20., no 1: 1-15.

Vosmager G.C.J (1928) Bibliography of sponges 1551-1913. cambridge university press 12 & 234 PP.

Wiedenmayer F (1977) Shallow water sponges of the western Bahamas Experientia, suppl.28.287 PP.

White .G,.W (1978) Setting up the microscope. microscpy,33:376-383.

Whitelegge.T.1901. Report on sponges from the coastal beaches of new south wales. *Records of the Australian Museum* 4(2):1-70.

Yang .L.H.L.Miae, O.O.Lee, X.Li,2007. effect of culture conditions on antifouling compound production of a sponge-associated fungus. *Applied Microbiology, Biotechnology* 74:1221-1231.

Zampella ,A.D.,M.V.Auria,L.G.Paloma,A.Casapullo,L.Minale 1996.Callipeltin A, an anti HIV-cyclic depsipeptide from the New Caledonian litisthida sponge callipelta sp. *Journal of American chemical society* ,118 6202-6209.

****