

**BIOACTIVITY OF MARINE ORGANISMS:
IV. SCREENING OF SOME MARINE ANIMALS
FROM THE INDIAN COAST**

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ABSTRACT

Of twenty eight alcoholic extracts of marine organisms screened for a wide range of pharmacological activities, 15 showed biological activity. Of these two were anti implantation, 3 CNS stimulant, 2 hypotensive, 4 diuretic, 4 hypoglycaemic, 2 spasmolytic, one CNS depressant and one toxic. Five of these extracts showed multiple activities.

Key-words: Bioscreening, marine animals, Indian coast.

During the course of the collaborative project on "Bioactive Substances from the Indian Ocean", an extensive screening of organisms from the Indian coast for biological activity was undertaken. The programme consisted of collection, identification and extraction of marine flora and fauna found along the coastline (including islands) for biological testing. The biological screening data of the extracts of twenty five seaweeds (Naqvi, Solimabi, Kamat, Fernandes, Reddy, Bhakuni and Dhawan, 1981) and twenty six species of marine animals (Kamat, Solimabi, Naqvi, Fernandes, Reddy, Bhakuni and Dhawan, 1981) from the Indian coast, have been published. The present communication reports the broad biological screening data of twenty eight extracts of marine organisms. The biological screening includes tests for antibacterial, antifungal, antifertility, antiviral, hypoglycaemic and a wide range of pharmacological activities (Spasmolytic, Spasmogenic, diuretic, CNS stimulant, CNS depressant, hypotensive etc.).

The marine animals for the study have been collected from the coasts of Goa, Maharashtra, Tamil Nadu & Gujarat and Lakshadweep & Andaman islands during premonsoon and post monsoon periods. Fresh animal material was rinsed in water to free it from extraneous matter, cut into small pieces and immersed in 90% alcohol at ambient temperature. After two days the alcohol was decanted. The process was repeated three times. The solvent from the combined percolate was removed under reduced pressure and below 40°C. The alcoholic extract was finally dried in a vacuum desiccator. Almost all the extracts of marine animals were tested for antibacterial, antifungal, antiviral and a wide range of pharmacological activities. The details of these biological tests have been described elsewhere (Dhar, Dhar, Dhawan, Mehrotra and Ray, 1968; Bhakuni, Dhar, Dhar, Dhawan and Mehrotra, 1969, 1977).

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Table I – Marine animals screened for biological activity

Organisms	Place & month of collection	Biological tests	Activity observed	LD 50 mg/kg
BRYOZOA <i>Bugula</i> sp.	Malvan, M April	A2,4,9-11, B2,3,5,G2, J12,K1, L1-4,N.	-	681
COELENTERATA <i>Cassiopeia</i> sp.	Mandapam, T March	A2,4,9-11, B1-3,6,7, E1,J1-3, K1,L1-4,N	-	> 1000
<i>Parazoanthus</i> sp.	Kanniya Kumari, T March	A2,4,9-11, B1-3,6,7, E1,H,J1-3, K1,L1-4,N	Hypoglycemic and spasmolytic	> 1000
<i>Physalia</i> sp.	Ratnagiri, M October	A2,4,9-11, B1-3,6,7, J1-3,K1, L1-4,N	-	1000
<i>Stoichactis giganteum</i>	Okha, Guj. March	A2,4,9,11, B,1-3,6,7, E1,H,J1,2, L1-4,N	Hypoglycemic	681
ECHINODERMATA <i>Acanthaster planci</i>	Kavaratti, L February	A2,4,9-11, B1-3,6,7, E3,G2,J1-2, K1,L1-4,N	Antihistaminic CNS stimulant	100
<i>Astropecten indica</i>	Ratnagiri, M October	A2,4,9-11, B1-3,6,7, E1,2,G2, J1-3,K1, L1-4,N	Toxic CNS depressant	6.81
<i>Holothuria cinerascens</i>	Mandapam, T October	A2,4,9-11, B1-3,6,7, E3,4,G2, J1-3,L1-4, N	-	316
<i>Pentaceros</i> sp.	Mandapam, T March	A2,4,9-11, B1-3,6,7, E1,H,J1-4, K1,L1-4,N	-	681

Table I (contd.)

Organisms	Place & month of collection	Biological tests	Activity observed	LD 50 mg/kg
MOLLUSCA				
<i>Aplysia benedicti</i> (Eliot)	Okha, Guj. December	A2,4,9-11, B1-3,6,7, E1,H,J1-3, K1,L1-4,N	Hypoglycaemic	681
<i>Cellana radiata</i> (Born)	Okha, Guj. December	A2,4,9-11, B1-3,6,7, E1-2,H,J1-4, K,L1-4,N	Hypoglycaemic	1000
<i>Elysia grandifolia</i>	"	A2,4-9,11, B1-3,6,7,E1, 2H,J1-3,K1, L1-4,N	-	> 1000
<i>Ischnochiton comptus</i>	Okha, Guj. December	A2,4,9-11, B1-3,6,7, E1,G2,H, J1-3,K1, L1-4,N	Antifertility	> 1000
<i>Littorina</i> sp.	Vasco, G December	A2,4,9-11, B1-3,6,7	-	-
<i>Melibe rangi</i>	Okha, Guj. December	E1,H,J1,2 K1,L1-4,N	CNS stimulant	178
<i>Perna viridis</i>	Vasco, G March	A2,4,9-11, B1-3,6,7, E3,G2,J1-2, K1,L1-4,N		21.5
<i>Turbo intercostalis</i>	Malvan, N October	A2,4,9-11, B1-3,6,7, E1,2,J1-3, L1-4,N	Hypotensive	681
PORIFERA				
<i>Aurora globostellata</i> (Carter)	Andaman February	A2,4,9-11, B1-3,5,7, J1-3,K1, L1-4,N	Diuretic	> 1000
<i>Axinella</i> sp.	"	A2,4,9-11, B1-3,5,7,G2, J1-3,K1, L1-4,N	"	825
<i>Callyspongia</i> sp.	Ratnagiri, M October	A2,4,9-11 B1-3,6,7, E1-2,J1-4, K1,L1-4,N	Antiviral	681

Table I (contd.)

Organisms	Place & Month of collection	Biological tests	Activity observed	LD 50 mg/kg
<i>Cliona celata</i> (Grant)	Anjuna, G February	A2,4,9-11, B1-3,5,7, E1,2,G2, J1-3,K1, L1-4,N	-	> 1000
<i>Dendrilla cactus</i> (Selenka)	"	A2,4,9-11, B1-3,5,7, G2,J1-3, K1,L1-4,N	Hypotensive and spasmolytic	> 1000
<i>Dysidea fragilis</i>	"	A2,4,9-11, B1-3,5,7, E3,G2,J1-2, K1,L1-4,N	Diuretic	681
<i>Dysidea herbacea</i> (Keller)	"	A2,4,9-11, B1-3,5,7, G2,J1-3,K1, L1-4,N	"	> 1000
<i>Ircinia ramosa</i>	Malvan, M February	A2,4,9-11, B1-3,6,7, J1-2,K1, L1-4,N	Antiviral CNS stimulant	100
<i>Oceanapia</i> sp.	Andaman, February	A2,4,9-11, B1-3,5,7, G2,J1-3,K1, L1-4,N	-	> 1000
<i>Phyllospongia foliascens</i>	"	-	-	681
<i>Tedenia anhelans</i> (Lieberkuhn)	Binage, K	A2,4,9-11, B1-3,5,9, E1,2,G2, J1-3,K1, L1-4,N	-	> 1000

M - Maharashtra, G - Goa, Guj. - Gujarat, T - Tamil Nadu, K - Karnataka, L - Lakshadweep.

Codes for biological tests: A - antibacterial (A1, *Bacillus subtilis*; A2, *Staphylococcus aureus*; A3, *Salmonella typhi*; A4, *Escherichia coli*; A5, *Agrobacterium tumefaciens*; A9, *Streptococcus faecalis*; A10, *Klebsiclla pneumoniae*; A11, *Pseudomonas aeruginosa*; A12, *Protens vulgaris*); B, anti-fungal (B1, *Candida albicans*; B2, *Cryptococcus neoformans*; B3, *Trichophyton mentagrophytes*; B4, *Microsporium canis*; B5, *Aspergillus niger*; B6, *Aspergillus fumigatus*; B7, *Sporotrichum schenckii*); E, antiviral (E1, Ranikhet Disease virus; E2, *Vacinia virus*; E3, Semliki Forest virus); G, antifertility (G2, anti-implantation in rats); H, hypoglycaemic; J, effect on cardiovascular system (J1, effect on respiration; J2, cardiovascular

effects; J3, effect on preganglionically stimulated nictitating membrane; J4, effect on heart rate); K, effect on isolated tissues (K1, spasmolytic); L, effect on central nervous system (L1, gross effects; L2, hypothermia; L3, analgesia; L4, supramaximal electroshock seizure pattern test); N, diuretic and Q, anti-inflammatory. LD50 values are expressed mg/kg ip in mice).

Table I gives the list of species examined, activity observed and the intraperitoneal LD₅₀'s in mice.

Surprisingly sea cucumber *Holothuria cinerascens* did not show any toxicity inspite of lack of cuverian glands. This might be due to the fact that the species is always found concealed underneath the boulders and are never found exposed as some other holothurians do.

The most promising activity observed was the anti-implantation activity in *Ischnochiton camptus*. Preliminary experiments conducted on mice have shown that this extract is 100% active. The occurrence of such activity in this species has not been reported hitherto. This and other active extracts have been taken up for detailed chemical investigation, the results of which will be published later.

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