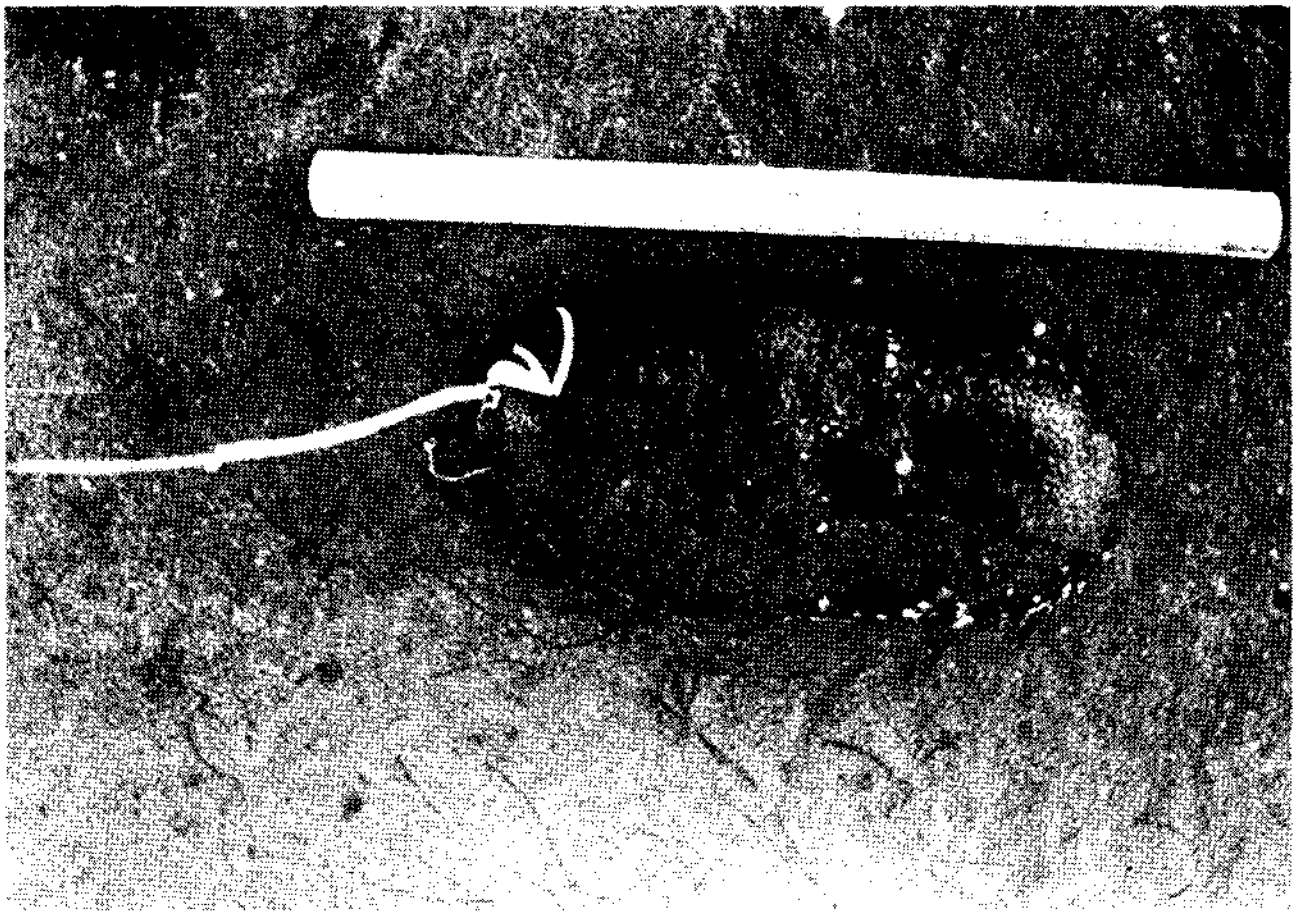
Bioactive Agents From Sea

The bioactive compounds from the sea are essentially secondary metabolites of certain species of organisms.

The upsurge of interest during the last decade in the ocean as potential source of bioactive compounds and new drugs has stimulated a flurry of activity in the research laboratories and clinics throughout the world.

The bioactive compounds found in marine organisms have drawn the attention of researchers. The bioactive compounds from the sea are essentially secondary metabolites of certain species of organisms. Some of them show a favouring or hindering growth effect on other communities of marine organisms and some others exhibit various pharmacological properties. The upsurge of interest during the last decade in the ocean as potential source of bioactive compounds and new drugs has stimulated a flurry of activity in the research laboratories and clinics throughout the world.

The biological significance of these bioactive compounds are many. They play an important role in catching prey, in defence mechanisms and as a highly repellant material to predators. The nematocyst toxins in sea anemones and jellyfish, cephalo-toxins in the salivary glands of octopods, sting toxins in cone shells, venomous toxins of spines and skins of certain fishes and toxic secretions of opisthobranch molluscs without shells are examples.



Bohadschia marmorata Jalger — highly toxic echinoderm — source of sapanin, Holothorin A

The toxins produced by corals or sponges have protective function against predators and against the settling and encrustation by the larval forms of sessile animals which adversely affect biosynthetic activity in the symbiotic zooxanthellae. The various antibiotics and terpenoids present in corals or sponges serve as defensive agents. Some of the bioactive compounds have physiological significance. Fishes which undergo vertical migration contain large amounts of wax esters and lipids instead of glyceride in other fishes. Toxic substances like tetrodotoxin in tetraodontid fish eggs, wax esters in mullet roe and dinoguneliin in ichthyotoxic fish serve a physiological function for embryonic development.

Bioassay experiment being conducted on mouse

Certain marine organisms which are normally eaten safely by humans suddenly become poisonous and produce toxic reactions which sometimes may even be fatal. Some organisms in a particular area become toxic under certain ecological conditions at a particular time of the year which may become concentrated in a higher organism in the food chain and these when consumed cause toxic reactions and death in the humans. The marine animals may also accumulate the toxic substances released into the environment by either dead or live organisms, by taking up the organic compounds from water. Variability of toxicity in a given species depends on seasonal, ecological or physiological factors. Many species of shellfishes are filter feeders and have to feed on a diet in their vicinity without choice and they alternate toxins in their digestive glands without any harm to themselves but to those who ingest them.

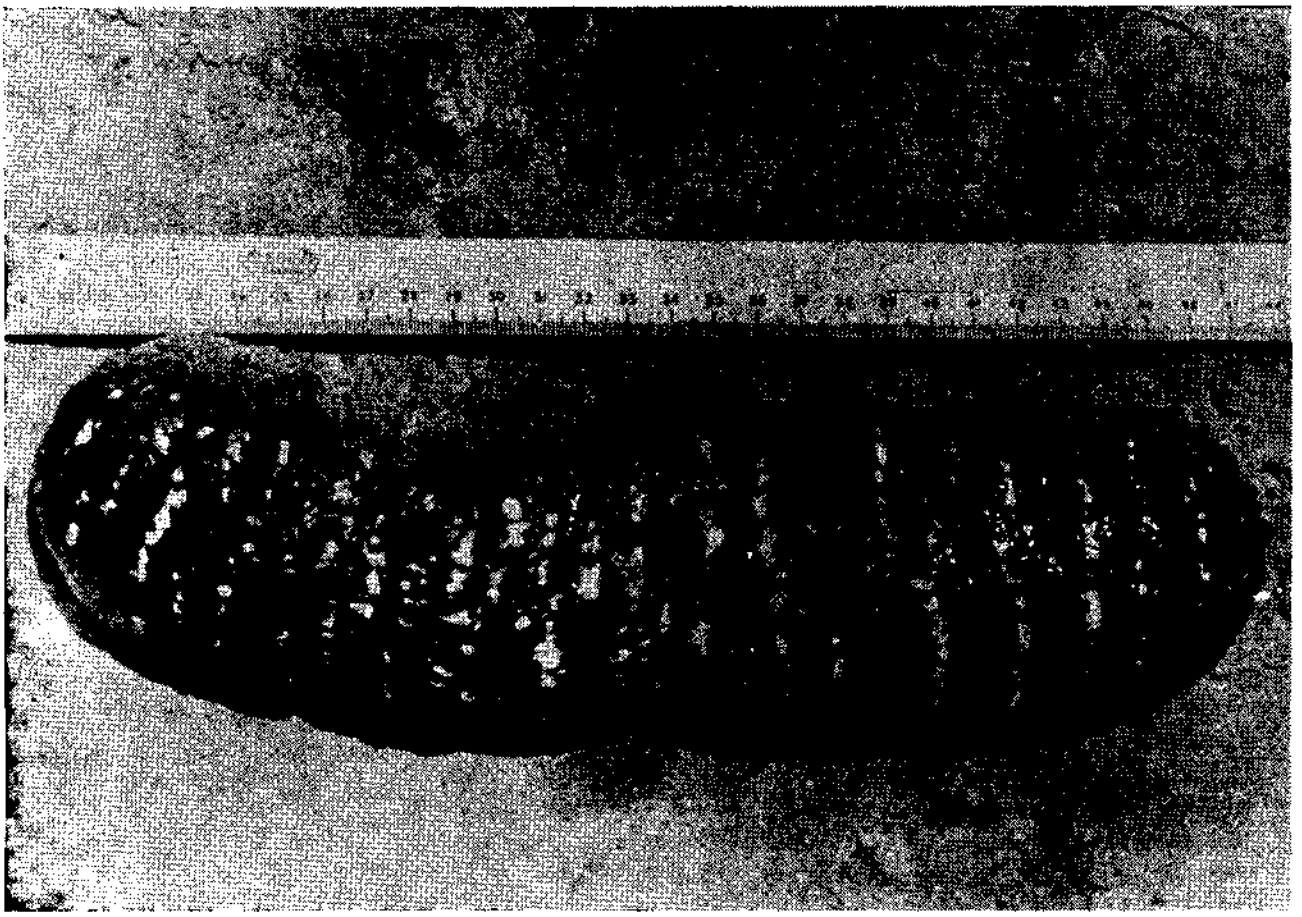
The food poisoning caused by consumption of fish associated with coral reefs in the tropical and subtropical waters has interfered with the fishing activity. The blooming of red tides and other toxic dinoflagellates during certain seasons and in some areas of marine environment has produced toxicity and other bioactivity. Many people who go to the sea for recreation and fishing are affected by strings of sea urchins, jelly fishes, sting rays, cone shells and by dermatatis caused by the blue green algae. The knowledge of the bioactive agents is thus of great public health significance.

In recent years numerous scientific articles have been published on the biomedical aspects of the marine organisms. sea". Many chemotherapeutic products have been isolated from various organisms. It is now known that marine organisms are sources of bioactive compounds such as antibiotics, antitumour, anticoagulants, antiviral, antiulcer, haemolytics, analgesic, antilipemic and cardioinhiibitory agents, stimulants, depresents, fungicides, insecticides and pharmaceutical adjuvants and stabilizers.

The chemical reactions, interactions and transformations of these metabolites cause

centain peculiar changes in the marine environment. Many algae contain extracellular metabolies which have toxic or microbial activity of varying degrees. Such marine algae can keep the ecosystems free of microbes and parasites which will be of great advantage to the mariculture of commercially important marine animals free from disease. Some of the toxins from echinoderms may also find use in eradicating the predators from culture farms. The growth-promoting bioactive substances can be used in mariculture and agriculture for increasing the yield.

In view of the significant role, the bio-compounds a research project on bioactive agents from marine organisms has been taken also at the Central Marine Fisheries Research Institute under the leadership of Shri D. S. Rao. Under this study 168 marine organisms belonging to corals, alcyonarians, mollucs, echinoderms, unicellular and higher algae have been subjected to bioassays. The bioassays conducted are Itthality and toxicity tests on mice, fingerlings of Chanos, Thilapia Nemolytic and antimicrobial activities are tested in other fishes. The latter are carried out against Vibrio alginolytious, V. perahaemolyticus, Bacillus, Staphylococcus aureus and Salmonella typhii. The investigations on the isolation and characterisation of the various chemical compounds from the bioactive marine organisms that are available in quality are carried out. Further studies on the distribution of prostagladin and its related compounds (PGRC) in the gorgorians and sponges and the utilisation of prostaglandin endoperoxide (PGEP) in mariculture are also in progress. The results of the above studies are being published elsewhere.



Holothorin A (Metriatyla) Scabra Jalger — Another toxic echinoderm — source of sapanins