

A PRELIMINARY SURVEY OF ICHTHYOTOXIC COMPOUNDS FROM PAPUAN SOFT CORALS (COELENTERATA : OCTOCORALLIA, ALCYONACEA)

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Soft corals (Coelenterata, Octocorallia, Alcyonacea) are benthic, sessile, colonial organisms which account for a substantial proportion of living biomass and cover, particularly on coral reefs of subtropical and tropical waters. They are one of the most important groups of animals and quite common on coral reefs in the Indo-Pacific, specially in a large area extending from the Great Barrier Reef to Okinawan waters of Japan. In many parts of these area, a wide variety of alcyonacean soft corals are distributed in the benthic community, sometimes surpassing the scleractinians (hard corals) in percent cover.

Soft corals are extraordinarily rich and diverse source of secondary metabolites (SCHEUER, 1973), many of which have been found to be bioactive (for example, cytotoxic, antiviral, antifungal, and antitumoral activities). The majority of these secondary compounds produced by soft corals belong to the chemical class called terpenes (SCHEUER, 1978), which play important roles to survive in their natural environment.

Soft corals are fleshy in texture and sessile, lacking the ability to flee marine predators. However, the incidence of predation on this group is low compared with scleractinian (or hard) corals which constitute an important food source for some groups of common reef fish, molluscs, asteroid echinoderms (crown-of-thorns), crustaceans and annelids. Soft corals must therefore possess defensive substances (chemicals) against predation.

As a part of our continuing studies on biologically active secondary metabolites from soft corals (UCHIO *et al.*, 1985 and 1989), preliminary ichthyotoxicity tests were performed to isolate the active compounds on the collection of soft corals from tropical waters of Papua New Guinea : Toxicity is an important factor for organisms in defense against predation. In this report, we describe the results of toxicity tests using common freshwater fish *Oryzias latipes* (the Japanese killifish, Medaka) as test organism on organic (dichloromethane) extracts of eight soft corals collected from coral reefs of Motupore and Pig islands. (Coral sampling was performed between November 21 to December 3 of 1990)

In the ichthyotoxicity tests listed in Table 1, all the eight soft coral extracts were found to be toxic at highest concentration of 50 ppm to the test fish. No toxicity was found only in the extract of *Alcyonium* sp. at a concentration of 25 ppm. Three toxic samples at a concentration of 10 ppm were *Nephtea* sp., *Sarcophyton* sp., and *Sinularia* sp.c, the latter two of which were furthermore found to be toxic at lower concentration of 5 ppm. Both the extracts of *Sarcophyton* sp. and *Sinularia* sp.c killed all fish (a total of 5) in one hour at the concentration of 50 ppm. Of the eight samples, only the extract of *Sinularia* sp.c showed 100% lethal to five test fish at the lowest concentration of 3 ppm, indicating the highest level of toxicity.

In order to isolate and identify organic molecules responsible for these ichthyotoxicity, chemical analyses of eight soft coral extracts are now in progress.

Table 1. Ichthyotoxicity data derived from laboratory experiments exposing *Oryzias latipes* to crude dichloromethane extracts of soft corals from Papua New Guinea.

Species name	50 ppm				25 ppm				10 ppm				5 ppm				3 ppm				2 ppm			
	Time(hr)				Time(hr)				Time(hr)				Time(hr)				Time(hr)				Time(hr)			
	1	6	12	24	1	6	12	24	1	6	12	24	1	6	12	24	1	6	12	24	1	6	12	24
Sarcophyton sp.	5	5	5	5	4	4	5	5	1	1	5	5	0	0	0	4	0	0	0	0	0	0	0	0
Alcyonium sp.	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nephtea sp.	0	0	5	5	0	0	2	3	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Shinularia sp.a	0	1	5	5	0	0	2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shinularia sp.b	0	0	1	5	0	0	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shinularia sp.c	5	5	5	5	4	4	5	5	2	4	4	5	0	0	0	5	0	0	0	5	0	0	0	0
Shinularia sp.d	0	0	2	2	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Xenia sp.	0	0	0	5	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Controles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Soft coral specimens were collected from coral reefs of Motupore and Pig islands at depths of 2–5 m. The corals were frozen on collection, and freeze-dried. The freeze-dried animals were then crushed in mortar and extracted with dichloromethane to provide crude organic extracts, from which suitable amount were weighed out and dissolved in a small quantity of methanol to prepare a concentration range for the test listed below. The soft coral extracts dissolved in methanol were the added to test aquaria, each containing fresh wather (200 ml) and five specimens of the test fish *Oryzias latipes* (Japanese killifish). Data represent number of fish (out of a total of 5) killed within time period specified for each of the test aquaria. Toxic: $1 \leq n \leq 5$ fish died in 24 hours of treatment with the soft coral extracts.

References

- SCHEUER, P. J. 1973. Chemistry of Marine Natural Products. Academic, New York.
- SCHEUER, P. J. 1978. "Chemical and Biological Perspectives." Marine Natural Products, Voll II, Academic, New York.
- UCHIO, Y., EGUCHI, S., NAKAYAMA, M., & HASE, T. 1985. Tetrahedron Letters, 26:4487-4490.
- UCHIO, Y., NAKATANI, M., HASE, T., KODAMA, M., USUI, S. & FUKAZAWA, Y., 1989. Tetrahedron Letters, 30:3331-3332.