POSSIBLE EFFECTS OF CYCLONE WINIFRED ON CIGUATERA ENDEMICITY AT SUDBURY REEF, NORTH QUEENSLAND

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Ciguatera poisoning is caused by eating certain fishes from coral reef waters, and is common along the far northern and eastern coastlines of Australia. The symptoms of the disease involve neurological and gastro-intestinal disorders with normal recovery usually requiring between several days and several weeks. Ciguatera incidence in some parts of Queensland approaches three cases per 10 000 persons (Capra and Cameron, 1985). It is now the greatest single factor affecting the marketing of tropical reef fish and species such as the narrow-barred Spanish Mackerel. The value of the commercial catch for this fishery in the Great Barrier Reef Region in 1979-80 was $6 million. Other fisheries affected but not included in the Great Barrier Reef Region are; the mackerel fisheries of Hervey Bay and the remainder of south-eastern Queensland. Ciguatera has a considerable effect on consumer confidence in seafood and the prospect of legal action is of considerable concern to the marketing sector.

The principal toxin responsible for ciguatera is ciguatoxin but other toxins (maitotoxin for example) may be involved. Recent work has shown that ciguatoxin is indeed the toxin responsible for ciguatera in Queensland (Lewis and Endean, 1983 and 1984). A benthic dinoflagellate, Gambiordiscus toxicus, has been implicated with ciguatoxin production in French Polynesia (Yasumoto et al., 1977). Gillespie et al. (1985a) examined the distribution of benthic dinoflagellates, and found G. toxicus to be widely distributed along the Queensland coast.

Man-made as well as natural reef disturbance in the form of dredging and blasting of channels, storms and the anchoring of ships often precedes the occurrence of ciguatera outbreaks. It has been suggested that this can be explained by the colonisation of "new surfaces" (Randall, 1958) by macroalgae which attract epiphytic micro-organisms such as G. toxicus (Yasumoto et al., 1980). There have been few reports of a direct link between cyclones and ciguatera. Bagnis (1981a,b) used epidemiological data to demonstrate that natural disturbances in the Marquesas Islands have often been followed by an increased incidence of ciguatera in the short and longer term.

Previously the effect of man-made reef disturbance on Hayman Island on macroalgal flora and populations of benthic dinoflagellates has been examined (Gillespie et al., 1985b). At this site human perturbation had no significant influence on either the macroalgal community or the benthic dinoflagellate populations and did not cause an increase in ciguatera endemicity.

Coral reefs in the Cairns area had been surveyed for G. toxicus populations in October, 1983. Low population densities up to 50 per gram of algae substrate were found at that time. One of the sites examined was on the north-west edge of Sudbury Reef which in February, 1986 suffered some effects of cyclone Winifred. This area was revisited in May, 1986, to examine the extent of damage as well as changes in population density of G. toxicus and the toxicity of the benthic detritivore Ctenochaetus striatus. The toxicity of pooled livers of C. striatus is often used as an index of the ciguatoxicity of coral reef ecosystems (Yasumoto et al., 1984). G. toxicus population densities were determined by the method of Gillespie et al. (1985a). C. striatus were collected by spearing and the livers extracted using a standard procedure for assay of ciguatoxin (Lewis and Endean, 1984).

Slight damage to the coral of Sudbury Reef was noticed. Very little live hard coral was present, presumably as a result of previous Acanthaster planci infestations. A few larger dead coral boulders had apparently been dislodged and fallen from individual bommies. Soft coral dominated the available surfaces. There was no obvious change to that observed in October 1983.

In reporting G. toxicus population density the "highest value" rather than mean values has been used, principally because the sampling procedure which involves the sampling of only foliose macroalgae, is rather biased. Population densities found on Sudbury Reef in 1983 reach levels of 50 per gram but in May, 1986, were found not to exceed five per gram. Livers of C. striatus collected in May, 1986, were also only slightly toxic, each containing 0.12 M.U. (one mouse unit is the amount of toxin required to kill one 20 g mouse) or .08 M.U. per gram of liver.

In this case, it is apparent that cyclone Winifred would have had very little effect on ciguatera endemicity on Sudbury Reef, using G. toxicus populations densities and the toxicity of C. striatus livers as a guide. Previous studies by Bagnis (1969) have shown that up to 18 months after a disturbance may be required before ciguatoxin appears in the food chain. The situation following cyclone Winifred should therefore be monitored for up to two years, before clear conclusions can be drawn. More attention should also be given to reefs closer to the path of cyclone Winifred. The Department of Primary Industries will attempt to carry out this work as a part of its normal studies on the link between reef disturbance and ciguatera.

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