Ciguatera — Parameters of a Tropical Health Problem

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Ciguatera fish poisoning is a significant health and resource problem in the tropical world, largely because of its uneven and unpredictable distribution in space and through time. Here, the problem is reviewed with evidence from the Pacific Basin. The contemporary distribution of ciguatera and the species commonly perceived to be toxic are considered and a hypothesis relating the greater prevalence of ciguatera in the eastern Pacific to reduced species diversity is presented. The problem is also considered as a public health phenomenon (the mean reported incidence for the Pacific region as a whole in 1981 was 109/100,000) and attention is given to island dwellers' adaptation to the problem, their explanations of its etiology, as well as its detection, prophylaxis, and cure.

KEY WORDS: ciguatera; fish poisoning; marine biotoxins; ciguatoxin; neurotoxins; dinoflagellates; marine resources; Pacific Islands; health; adaptation.

INTRODUCTION

"Don't eat the red fish." Variations of this warning are commonplace on islands across the tropical oceans of the world. Island inhabitants are cautioning against eating fish which have concentrated toxins produced by a bottom-dwelling dinoflagellate, Gambierdiscus toxicus. The ingestion of these toxins results in what is clinically known as ciguatera fish poisoning. The recently identified dinoflagellate (a unicellular aquatic microorganism

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with two flagella) may be one of a group of related organisms which cause the human illness. The picture is further complicated by the fact that *G. toxicus* produces more than one toxin. Ciguatera is a particularly enigmatic public health problem because of its uneven and largely unpredictable distribution in space and time and because toxic fish are indistinguishable from nontoxic ones.

Ciguatera was recorded in the Pacific in the early 1600's, and it was recognized in the Caribbean at least a century earlier. Ciguatoxic fish are widely distributed in tropical waters; this and the fact that the fish themselves give no evidence of being affected by the toxin suggest that ciguatera has probably existed for longer than the 500 years documented by the historical record. The research on which this paper was based was carried out in the Pacific from 1977-1982 but similarities exist with other tropical insular regions, most notably the Caribbean, concerning the ecology of the causative organism, related distributional correlates, and patterns of human response to the problem. These will provide a fertile field for further research.

**HUMAN ILLNESS**

The symptoms associated with ciguatera intoxication are polymorphous. Bagnis (1973b) listed five distinct syndromes: (1) a digestive syndrome, (2) a cardiovascular syndrome, (3) a neurological syndrome which includes sensitivity disturbances, neuromotor disturbances, and sensory disturbances, (4) a cutaneous mucous membrane syndrome, and (5) general effects on health. Lewis (1981) compared symptoms compiled by a number of workers (Bagnis, Kuberski, and Laugier, 1979; Iosefa, 1979; Sorokin, 1975) for various Pacific locations. Paresthesias, numbness, and tingling of the mouth and/or extremities are the most commonly reported symptoms. In most reports, they occur in at least 80% of the cases, followed by sensation reversal, arthralgia (joint pain), myalgia (muscle pain), itching, and various manifestations of gastrointestinal distress: abdominal pain, nausea, vomiting, and diarrhea. A paradoxical sensory reversal, in which cold things seem hot to the touch, is the common clinical hallmark of ciguatera.

**SENSITIZATION**

Intoxication does not produce immunity. In fact, at least in the eastern Pacific, there appears to be an immunological sensitization to the toxin(s). Successive intoxications generally bring about more severe symptoms.