THE DINOFLAGELLATES PRESUMED TO CAUSE CIGUATERA POISONING: A PRELIMINARY ASSESSMENT AT ANIBARE BAY, NAURU.

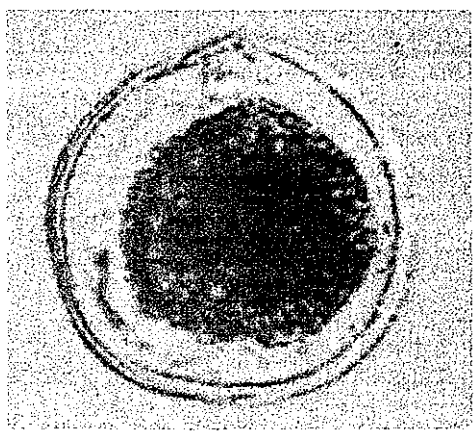

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Table of Content

Page

Introduction

Nauru is an uplifted limestone island that is surrounded by a narrow coral reef platform and a very deep drop off. The land area is approximately 22 kilometres with the highest point of 30 metres above sea level. Anibare Bay is located on the windward eastern side of the island. A channel was blasted back in the 80s to allow better access by small skiffs and canoes to the open sea during the westerly bad weather. A build up of sand and rock debris that have accumulated at the mouth and in the deeper parts of the channel itself had been observed. This makes the channel a bit unsafe especially during low tide. The Nauru Council has spent a considerable amount of time and money on the maintenance of the channel removing sand and coral boulders. The cause of sand and boulder build up could have been attributed to the narrowness of the channel itself (pers.comm.). It was in 1998 that the government of Nauru through the Island Development Industry (IDI) and the Nauru Fisheries and Marine Resource Authority planned to widen and deepen the channel in an effort to minimise the rate of debris build up.

The Atoll Research Programme which is part of the Marine Studies Programme of the University of the South Pacific had actively been involved in some small projects with the Government of Nauru through the Fisheries Division and IDI. It was also participated in the initial carrying out of an assessment programme on the current status of the density of the dinoflagellates presumed responsible for ciguatera poisoning. The Fisheries Division is determined to continue to do the assessment programme with technical and professional support from the Atoll Research Programme.

The main objectives of the assessment are 1) to compile a data base on the current status of the density of the dinoflagellates presumed to cause ciguatera poisoning, including *Gambierdiscus toxicus*, before further blasting, 2) to continue monitoring any changes in the levels of the dinoflagellates, and 3) to safegurd the health of the people of Nauru by identifying fish species that are potentially toxic at Anibare surrounding reef..

Study Area

Nauru is surrounded by a narrow strip of reef with a sharp

drop off beyond the reef crest. The study area is on the reef adjacent to Anibare District on the eastern side of the island (Figure 1).

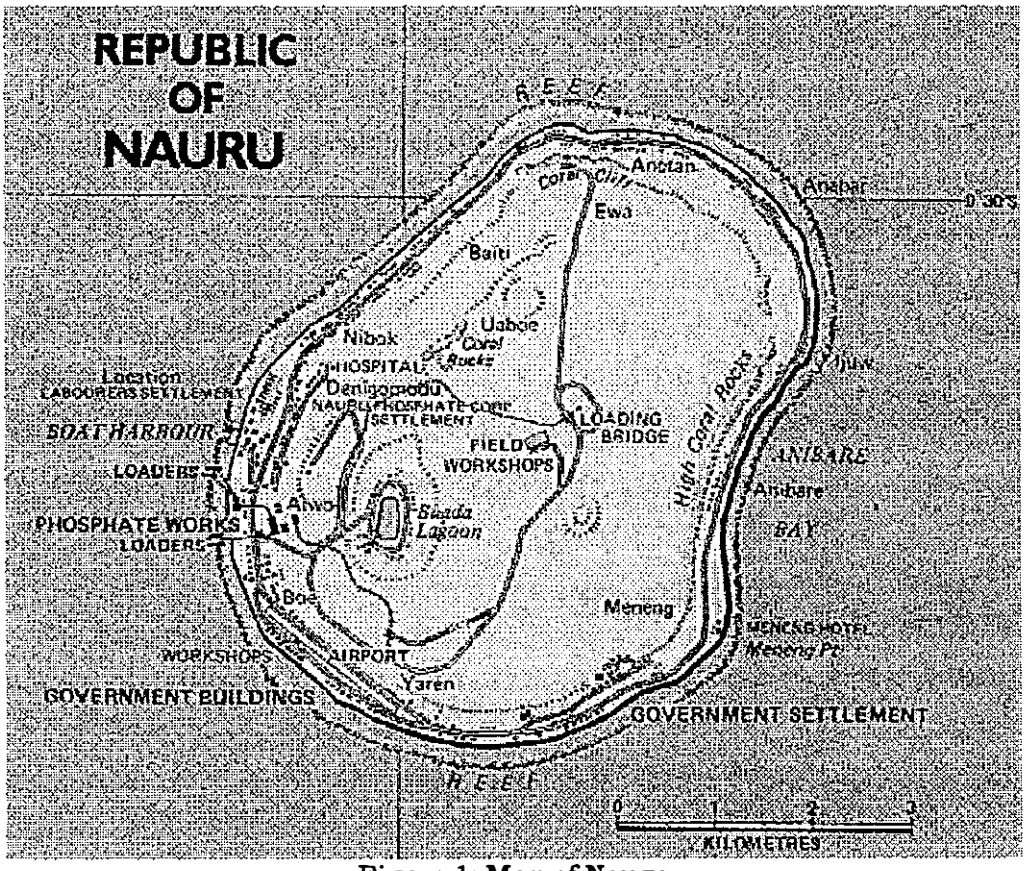

Figure 1: Map of Nauru

History of Ciguatera

The Island of Nauru has been known to be free of ciguatera outbreaks up to 1991 (Tebano, T. 1991). Information on the toxic dinoflagellates responsible for ciguatera fish poisoning is scarce or non-existent A study conducted by Tebano (1991) investigated the number of fish poisoning cases obtained from the national hospital and the type of fish responsible for each individual case. Despite the low number of cases reported from this study the amount of reef damage as a result of human activities is quite evident. This is mainly due to the popular recreational sport of spear fishing compounded by the introduction of scuba diving which was rapidly taken up by a huge number of Nauruans who could afford the equipment with their revenue from phosphate mining. The number of reef is declining dramatically.

Methods

The method used in carrying out the population density of the suspected dinoflagellates was similar to that outlined in Yasumoto et. al. (1980) and Tebano (1991).

Three algal species were collected because of their abundance and availability in the surrounding area. These are *Halimeda. opuntia, Tolypiocladia glomerulata* and a red green algae. Samples were collected in plastic bags at depths of 20 to 40 feet using scuba gears. They were taken back to the laboratory for processing and cell count. The initial processing involved a vigorous shaking of the samples in a plastic bag for approximately 2 minutes. This is intended to dislodge any epiphytic dinoflagellate present. The content of the bag was then passed through sieves of decreasing sizes from 500 μm, 125 μm and 38 μm. The residue retained on the 38 μm was transferred to a 0.25-ml vial. Three replicate drops of each sample were placed at a time onto a counting slide and the number of each dinoflagellate species were counted and recorded.

Results

Dinofllagellate species

Three species of the presumed toxic dinoflagellate were identified from the samples taken. These were *Gambierdiscus toxicus, Prorocentrum lima* and *Oestreopsis siamensis.* All species were found to occur at low numbers with no significant differences in density (Table 1).

Table 1. Average density of dinoflagellate for the samples taken.

Dinoflagellate. species.	Average	SE
Proocentrum .lima	0.042	0.020
Oestreopsis .siamensis	0.034	0.016
Gambierdiscus toxicus.	0.013	0.007

Table 2. Average dinoflagellate species density per gram of algae species

Algal species.	Average	± SE
Tolypiocladia glomerulata	0.053	0.015
Halimeda. opuntia	0.032	0.010
Red green algae	0.004	0.001

Tolypiocladia glomerulata harbors the highest density of dinoflagellate species with an average of 0.053 ± 0.015 cells per gram of host algae (Table 2).

Discussion

Results show that *Gambierdiscus toxicus*, the presumed precursor of ciguatoxin responsible for ciguatera fish poisoning (Yasumoto, T. et al. 1980, 1981,) is present around the boat channel at the Anibare Bay. Despite its low density of 0.042 on average, there is a potential for an outbreak given the right stimuli. *Proocentrum lima, Oestropsis siamensis* and *Gambierdiscus toxicus* were the only dinoflagellate species encounted in this study. As the study concentrate mainly around the channel, there is a chance that more species of dinoflagellate are present.

It is difficult to pinpoint at this stage whether this has been the

status prior to or post the blasting because of the rarity of studies being carried out on the island. Tebano (1991), indicated that poisoning around the area was observed to have flared up a few months after the blasting of the channel according supports the belief that reef disturbance could be linked to increases in the number of ciguatoxic reef fishes. Indeed, Anibare Bay had been identified as one of the reef areas with a potential of habouring toxic fishes (Tebano, T. 1991).

Tolypiocladia glomerulata, Halimeda opuntia and a red green algae represent some of the most common and abundant algal species around the area. The distribution of algal species on Nauru has not been well established. It is anticipated that work will soon be underway in the coming months.

The Fisheries Division of the Government of Nauru and Atoll Research Programme are working closely to establish a monitoring program on ecological and biological changes resulting from construction and other man-made activities in the area.

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