

GRANTING BODY
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Problems of Paralytic Shellfish Poisoning (R/EQ-31)

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INTRODUCTION

A great deal is still unknown about the process involved in the phenomenon of Paralytic Shellfish Poisoning (PSP). What is known is that PSP is related to the presence of toxic dinoflagellates (phytoplankton) in the water column. Also in the water column are decapod crustacean larvae, which constitute a significant fraction of the zooplankton that feed on the phytoplankton.

These toxic dinoflagellates are clearly shown to be spreading and threatening Southern California as shown from our own monitoring studies in the Los Angeles Harbor area. The causative agent of PSP, the toxic dinoflagellate Gonyaulax catenella, was isolated from the waters of the Los Angeles Harbor and subsequently cloned cultures of these cells were obtained. This was the main motivation of the present project.

Further motivation drives from fish kill due to ingestion of copepods that fed on toxic dinoflagellates. In the present experiments in the laboratory, feeding crab larvae with toxic dinoflagellates, resulted in the accumulation of PSP by the crab larvae. It is probable that transfer of toxin from crab larvae to fish may also be a cause of fish kill.

The results from these studies may elucidate the effects of PSP on marine trophic levels other than those of bivalve molluscs to man.

GOALS AND OBJECTIVES

The overall goals of the project:

1. In the development of yellow rock crab, Cancer anthonyi, larvae.
2. To determine if PSP can enter and affect coastal food chains in any manner other than through adult shellfish.
3. To understand the effect exerted by crab larvae fed on toxic dinoflagellates on certain fish and/or

fish larvae. This will test the possible occurrence of fish kill and the existence of PSP.

The trainee's objectives:

1. To conduct feeding experiments to specifically study the larval stages of a decapod crustacean (C. anthonyi) fed only on unialgal cultures of certain diatoms and nontoxic species of dinoflagellates.
2. To conduct feeding studies using cultures of G. catenella, a toxic dinoflagellate which was isolated from the Los Angeles Harbor waters, to determine the possible bioaccumulation of toxin by the crab larvae.
3. To conduct a series of feeding experiments using different kind of fish and/or fish larvae and those crab larvae fed on toxic dinoflagellate, G. catenella, to determine possible fish kill.

RESULTS AND FINDINGS

In July 1982, I isolated cells of G. catenella, a toxic dinoflagellate and causative agent of PSP, for the first time from the waters of the Los Angeles Harbor. Clonal cultures of these cells have been established, and the extract prepared from these cultures and tested by the new fly bioassay proved to be toxic.

Initially, larvae of yellow rock crab were successfully grown in the laboratory from zoeal stages to megalopa when fed only on unialgal cultures of nontoxic phytoplankton, including diatoms and dinoflagellates as the sole food source. As a feeding experiment, freshly hatched crab larvae were exposed to the cultures of G. catenella. Crab larvae ingested the cells and survived an eight-day experiment. Further feeding studies were made to investigate if the larvae accumulate PSP toxin. Crab larvae were exposed to a culture of G. catenella, then were collected, washed with filtered sea water, blotted dry and homogenized in an acidic solution. The extract of the larvae was tested by the fly bioassay and shown to be toxic.

The crab larvae capable of raptorial feeding on G. catenella showed normal development. They are unaffected by the PSP toxin, but accumulate it.

Further studies are being conducted to investigate the effects of toxic crab larvae (those fed on G. catenella) on

fish and/or fish larvae. This has important ecological implications for coastal food chains.

PERSONAL GAINS

This study has helped me learn the usage of the sensitive fly bioassay and the application of the assay for measurement of PSP toxin and the toxicity. My findings from this project were very important and I have been awarded an honorable mention by the Sea Grant Association for the results of this project. The project also helped me to complete a part of my dissertation research work.