

Charactrization of Fluorescent Proteins In Marine Organisms

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LONG-TERM GOAL

My principal goal is to understand the function, evolution, and taxonomic distribution of fluorescent proteins in marine organisms. Several hypotheses have been postulated regarding the function of these ubiquitous proteins including protection from the damaging effects of ultraviolet radiation and the augmentation of photosynthesis by fluorescent resonance energy transfer. I hope to be able to ascertain the function of these proteins and provide new data to answer these important questions.

OBJECTIVES

This project is directed at understanding the optical properties of coastal benthic communities in general, and in particular, coral reefs. Coral reefs have been a focus of study on fluorescent proteins and almost all corals examined to date contain one or more of these compounds. The role of green fluorescent protein (GFP) in the ecology of marine organisms and the potential commercial utility of these, and other, fluorescent proteins is presently undergoing a renaissance of interest as more fluorescent proteins are identified in the marine environment. The scientific objectives of my project are:

1. to make comprehensive taxonomic collection of marine organisms in tropical, temperate, polar, and deep sea environments to examine various taxa for fluorescent proteins.
2. to understand the evolutionary relationship between fluorescent proteins of different taxa
3. to understand the function of fluorescent proteins in those taxa expressing them
4. to understand what environmental variables affect the expression of fluorescent proteins in those taxa expressing them

APPROACH

The approach is similar to that taken for two scleractinian corals from the Bahamas; *Montastraea faveolata* and *Montastraea cavernosa*. Collections are made and samples archived for biophysical and molecular analyses of the fluorescent proteins. Differential expression of these proteins under different environmental conditions will also be examined (see Fig. 1 for example of different GFP concentrations with depth).

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14. ABSTRACT My principal goal is to understand the function, evolution, and taxonomic distribution of flourescent proteins in marine organisms. Several hypotheses have been postulated regarding the function of these ubiquitous proteins including protection from the damaging effects of ultraviolet radiation and the augmentation of photosynthesis by fluorescent resonance energy transfer. I hope to be able to ascertain the function of these proteins and provide new data to answer these important questions.					
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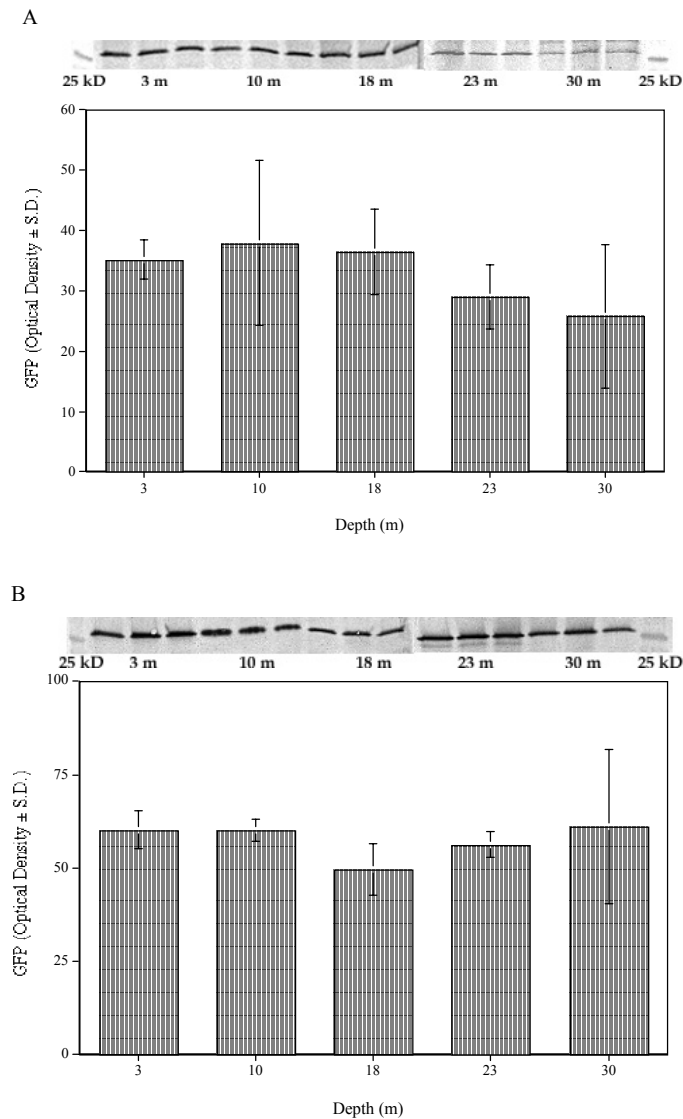


Figure 1. Bathymetric westerns against GFP for *Montastraea faveolata* and *Montastraea cavernosa*. A) Optical density ($\pm$ SD) of immunoblots for GFP from field samples of *M. faveolata*. B) Optical density ($\pm$ SD) of immunoblots for GFP from field samples of *M. cavernosa*. No significant effect of depth was detected for either species.

WORK COMPLETED

Extensive collections of marine organisms have been made in the Bahamas down to a depth of 300 fsw. Additional collections have been made in the Gulf of Maine and Hawaii and are planned for Antarctica, hydrothermal vents, and the Pacific Northwest. We have begun to isolate RNA from these samples to synthesize cDNA and eventually sequence fluorescent protein genes.

RESULTS

This project is in the early stages but initial results suggest the presence of fluorescent proteins in non-tropical environments with extremely low light levels and without symbionts. This again begs the question of function which will continue to be investigated.

IMPACT/APPLICATIONS

In addition to understanding the evolution and function of these proteins there is the possibility of discovering new fluorescent proteins with spectral properties desired by the biotechnology community and therefore the potential for commercialization exists.

TRANSITIONS

No data from the is project is presently being used by others.

RELATED PROJECTS

Charlie Mazel-ONR, CoBOP

PUBLICATIONS

None