

# The Explorers Club Flag Report

## Flag #53

### Stromatolites: Oldest CyanoBacteria Records

An investigation of their fossil and current presence in the Western Hemisphere

Geographic Region: Exumas Cays, Bahamas

Country/Countries of Destination: Bahamas

Ultimate Destination: Latitude 23.1N, Longitude 75.9W



#### Purpose/Objectives:

Stromatolites are believed to represent the earliest form of "life" on Earth as cyanobacteria (prokaryotic bacteria) from 2.5 billion years ago. While not strictly "fossils" in the technical sense, their residual structures provide us with the basic constructs of earliest life. We will a) further research the arresting connections between the living and fossil counterparts of existing Exumas stromatolites and their fossil records and b) identify possible locations of present stromatolite formations other than those currently known to exist in the tidal channels between islands.

#### Accomplishments:

- ✚ identified and video-documented stromatolite locations
- ✚ collected core samples of substrate
- ✚ collected selected samples of intact stromatolites, petal appendages
- ✚ captured video footage for creation of mosaic of major stromatolite field
- ✚ created still and video documentation of processes

## Challenges:

Tidal currents of 2-3.5 knots imposed working constraints on both diving and drilling activities. Work periods were planned around the brief time frame of slack tide, (generally a scant hour), with potentially two to three opportunities per day. Consequently, preparation for and execution of work activity required pre-planning, as well as flexibility to cope with the unexpected.

Three experienced divers were tasked with coring/drilling duties. Mike Miller identified some challenges of this operation, including:

- + unfamiliarity with equipment, thus a self-training period required
- + different methods were attempted to find best process for differing occasions
- + tidal current conditions -slack current provided the better working conditions for the divers in terms of stationary footing, but hampered visibility, while swifter current enabled better visibility during drilling, but was a challenge to the divers' stability
- + operating with partners with whom one had not known or worked with
- + logistics of communication
- + modification of diving weights in order to weigh out for current conditions

## Activities:

### Drilling/coring

A hydraulic compressor, fueled by 16 hp gasoline engine, was mounted on Carolina skiff, which thus served as a working platform for jack hammering and drilling. Five cores of substrate were extracted from various locations on the Adderly channel floor. Substrate samples were also collected by hand with chisel/hammer/pry bar by both the drilling team members and scientists.



### Dye tests

In order to observe current flow around stromatolites, both individual and throughout the stromatolite “fields”, a series of dye tests were run. Current action was documented with high definition video footage at the large stromatolite field in Adderly channel, as well as at various other nearby locations.



### Stromatolite samples

With Bahamian government permission, several stromatolites were collected for study purposes. Selections were made by the scientists.



### Stromatolite locations survey

While the larger stromatolite fields in this area of the Exumas have been well documented, a systematic survey was conducted to identify further areas of interest.



## **Expedition Leaders**

### **Dr. Robert N. Ginsburg**



Professor Robert Ginsburg is known worldwide for his research, leadership, and teaching. Some know him through his pioneering works on Florida's reefs and sediments; others know him through publications that revealed unexpected processes inside reefs of Bermuda. Still others have built on his arresting findings on the origins of reef walls of Belize or the evolution of the Bahamas during glacial epochs. Three generations of graduate students and young researchers fortunate to have been inspired by his teaching.

He has long taken a leading role in international science as the organizer and chairperson for international conferences on reefs, as the originator of a program of Global Sedimentary Geology, and most recently, as the head of the International Year of the Reef (1997) that was a focus of research and education worldwide.

Educating divers, boaters and the public about reefs has a high priority for Ginsburg. He believes the more people understand about reefs, the more likely they are to take care to protect them. Florida's remarkable living coral reefs and their fossil counterparts exposed on the Florida Keys, offer a special opportunity to explain how these undersea cities are established, developed, and become limestone.

Widely known for his geological research on tropical marine sediments in Florida, the Bahamas, Bermuda and Belize, Ginsburg has committed his energy and experience to the development of the International Year of the Reef. Instead of his former focus on the geological record of reefs, he now is concerned with diagnosing the condition of living reefs and the effects of natural and people-produced impacts on this remarkable ecosystem. Instead of teaching how reefs and sediments become limestone, he now emphasizes the efficient recycling in reefs and how their functions resemble those of cities.

Born in Texas and schooled in Illinois, he holds a doctorate in geology from the University of Chicago. His scholarly works have earned him recognition from several scientific societies in the United States and Canada. And his success as the organizer of national and international scientific initiatives is widely appreciated.

## Expedition Coordinator

### Captain Tim Taylor



Captain Tim Taylor is an accomplished naturalist and explorer with over 25 years of underwater experience. He is currently President and CEO of the Research Vessel Tiburon, Inc., based in Key West Florida. Learning to dive in Maine, in 1979 Tim followed his passion to Florida where he has spent the last 25 years full time, on or under the water. Over the past 18 years, Tim has owned several innovative diving operations, specializing in exploring new locations and sharing them with the scientific community and public. In recognition of his achievements, he has been accepted as a Fellow in the prestigious [Explorers Club](#) for his discovery of [Sherwood Forest Reef](#) in the Dry Tortugas. This reef is considered a centerpiece of the Tortugas Ecological Reserve and has become world famous since its discovery in 1997. Tim's experience includes 18 years as a US Coast Guard Captain, numerous instructor ratings, underwater still and video expertise, and extensive field work. He has hosted many noted marine specialists such as Dr. Sylvia Earle, Dr. Eugenie Clark, Frank Goddio, Dr. Sue Hendrickson, Dr. Jeff Carrier, and Wes Pratt, to name a few. He has also played a key role in other projects such as "Licensed to Kill", a James Bond movie and several underwater documentaries. He has been awarded accomplishment certificates by the U.S. Navy in producing UW ops training films and is currently doing support work on Air Force telemetry towers in the Gulf of Mexico. He produced, shot and directed "The Florida Keys Sportsman", founded Scubaworld Online (one of the first scuba industry databases on the Internet), and has guided many world famous researchers and explorers on expeditions in the Bahamas, Cuba and the Florida Keys. The ocean and Key West are home for Tim, his 10 years old son Garrett and 8 years old daughter Brooke.



### Trip Members:

Tim Taylor, FNO4, - Captain -RVTiburon, Expedition coordinator, photographer  
Dr. Robert Ginsburg, Rosentiel School of Marine and Atmospheric Sciences, University of Miami, Lead scientist and Expedition leader  
Mark Palmer, geologist and sponsor  
Maryanne Palmer, sponsor  
Jacqueline Morales, R.N., Captain, and chef  
Michael G. Miller, diver and drill team member  
Noah Planasky, research assistant, Rosentiel School of Marine and Atmospheric Sciences, University of Miami  
Henning Peters, PhD. candidate and research assistant, University of Brenen, Germany  
Dave F. Cox III, Coral Gables, FL - diver and drill team member  
Ken Marks, researcher  
Currier Randall, DVM, crew  
Pat Ayers, diver and drill team member

