Drug discovery team to explore newly discovered deep-sea reefs

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From May 22-30, Harbor Branch scientists, along with colleagues from the University of Miami, will use the Harbor Branch Johnson-Sea-Link II submersible to explore for the first time newly discovered deep-sea reefs between Florida and the Bahamas.

The reefs were discovered in 2,000 to 2,900 feet of water last December by a University of Miami team using advanced sonar techniques. A primary goal of the upcoming expedition, which is funded largely by the State of Florida's "Florida Oceans Initiative," will be to search for marine organisms that produce chemical compounds with the potential to treat human diseases such as cancer and Alzheimer's.

"We've found incredible and surprising diversity at other deepwater reefs near Miami and Bimini, and some promising potential disease treatments, so we're very excited about the chance to explore these new areas," says Amy Wright, director of the Harbor Branch Division of Biomedical Marine Research.

Researchers have suspected since the 1970s that deep reefs lay undiscovered between Miami and Bimini because pieces of reef-building corals had been brought up using surface-operated dredge and grab sampling equipment. However, just as the vast majority of the ocean remains poorly mapped and unexplored--even off Miami--these potentially important areas remained unseen.

In December of 2005, as part of the National Oceanic and Atmospheric

Administrations Ocean Exploration program, University of Miami researchers, led by geophysicist Mark Grasmueck and geologist Gergor Eberli, began mapping deepwater habitats off Miami and Bimini using an autonomous underwater vehicle (AUV) equipped with advanced sonar technology. AUVs operate without a tether to the surface and are pre-programmed to independently perform tasks. AUVs have been frequently used in oil exploration and also in a variety of other research programs for mapping purposes, but the Miami researchers believe this is the first time an AUV has been used to map deepwater coral reefs.

Miami's December AUV work revealed what appears to be an extensive system of steep slopes and mounds as high as 350 feet, all of which are likely to harbor a wide array of sponges, corals, fish, and other animals. A camera developed at the University of Miami allowed researchers to get an enticing glimpse of the bottom, but until researchers make it to the seafloor in the submersible they will not be able to determine the extent and biological diversity of the newly discovered reefs. Harbor Branch has discovered a number of other new deepwater reefs in Florida waters in recent years that play important ecological roles, but has never before had the chance to explore this area.

From May 22-26, the team will be working at sites on the Bahamas side of the Straits of Florida, about 10 miles from Bimini. From May 27-30 they will be on the Florida side, beginning about 20 miles out from Miami, though all the reefs are part of the same geological system. After a quick personnel and equipment turnaround, Harbor Branch researchers will return to the Miami area on a separate expedition from May 31 to June 9 to conduct the first in depth survey of deep reef areas in the region to better assess the ecological importance of the reefs and to identify factors responsible for their incredible diversity.

Researchers typically have to spend hours using a ship depth sounder to map an area before determining where to do submersible dives because

maps detailed enough to show the telltale mounds and other features of deepwater reefs simply do not exist for the bulk of the seafloor. With such little information available, Grasmueck compares typical seafloor exploration to arriving on the bottom of the Grand Canyon at night with a flashlight and then attempting to ascertain the significance and topography of the whole canyon based on small swaths revealed by the flashlight. The Miami AUV work has instead made it possible to choose dive sites likely to be vibrant reef areas ahead of time, all with an understanding of the full system being explored.

The expedition will have two main goals. First, the team will use the submersible to explore those seafloor areas that appear most promising based on their sonar map contours. As this "ground truthing" work progresses, the team will be able to better predict correlations between map data and biodiversity on the bottom. Ultimately this will allow them to more accurately assess the ecological importance of the entire area, not just those small swaths observed from the submersible.

During each submersible dive, Harbor Branch experts will be collecting samples of organisms such as sponges and corals that will be tested to determine if they, or microorganisms living within them, produce chemicals with pharmaceutical potential. A key goal is to find and collect organisms that have never been seen, which happens on almost every one of the Harbor Branch team's expeditions. Other organisms will also be collected because even well known species can produce different and potentially important chemicals depending on the depth, temperature, and location at which they are found.

Harbor Branch's quest for drugs from the sea began in the early 1980s and has led to the collection of tens of thousands of marine organism samples and the identification of a number of promising potential drugs now in various stages of development for treating cancer, Alzheimer's, malaria, AIDS and other ailments.

Source: Harbor Branch Oceanographic Institution