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Aquarius Aquanauts Study Chemical Warfare on Coral Reefs to Reveal Secrets of Seaweed and Fish Ecology

Key Largo, Florida - The last Aquarius undersea laboratory science mission of 2004 will study how reef plants and corals use chemical defenses to ward off predators.

The six-person crew is led by Deron Burkepile, Georgia Institute of Technology. He is joined by Alex Chequer, Brock Woodson, and John Parker all of the Georgia Tech School of Biology. Dr. Mark Hay of the Georgia Institute of Technology is the principal investigator for the mission and will be overseeing the project from the surface. UNCW habitat technicians include Jay Styron and Thor Dunmire, who provide operational support inside Aquarius for the mission.

Hay's team will use their experience in marine ecology and chemical ecology to investigate how grazers, specifically parrotfish and surgeonfish, affect seaweeds and corals in the Florida Keys National Marine Sanctuary. Using Aquarius gives Hay and his colleagues an ideal platform from which to set up their experiments and to make observations. Said Hay, "Twenty years ago I used an underwater lab called Hydrolab (the predecessor to Aquarius) to discover how some seaweeds escaped and deterred herbivores (animals that eat plants) by a combination of growing at night and producing toxic chemicals. Aquarius will allow us to live on the ocean floor and be more constantly connected with our favorite marine system than any other humans on earth. Who could ask for more?"

Owned by the National Oceanic and Atmospheric Administration (NOAA) and operated by UNCW, Aquarius is a unique national asset - it is the only undersea research platform of its kind in the world. It rests in a sand patch surrounded by coral reefs, 63 feet deep, and 3.5 miles offshore at Conch Reef. Aquarius "aquanauts" live and work on the seafloor for extended periods using a special SCUBA diving technique called saturation diving that provides nearly unlimited bottom time to conduct scientific studies. Mr. Otto Rutten, associate director of the NOAA's Undersea Research Center at UNCW, said, "We've had another successful mission year and we are happy to have Dr. Hay continue his exciting research with us. The Hay group always work hard to take full advantage of Aquarius capabilities, while enjoying life in this unique marine ecosystem".

At first glance, seaweeds appear to be ripe food items for grazing fishes, but looks can be deceiving. Many seaweeds produce chemicals or construct hard calcium carbonate skeletons that protect them from grazing. The chemicals essentially make the seaweeds taste bad. Hard calcium carbonate skeletons can either make it difficult to take bites or the mineral can disrupt fish digestion. Hay added, "Herbivory on undisturbed coral reefs is more intense than in any other habitat; time-lapse movies have shown that fishes may

bite small areas of the bottom more than 100,000 times a day. The seaweeds that persist in the face of this tremendous grazing pressure are among the best defended of all plants.”

The aquanauts will conduct experiments to determine if common grazing fishes prefer certain types of seaweeds, and if mixes of grazing fish species (some resistant to chemical defenses and others resistant to calcification) are critical to prevent seaweeds from overgrowing corals. If herbivores differ considerably in their responses to seaweed defenses, then some herbivores, or mixes of herbivores, could be crucial to maintaining ecosystem function by preventing seaweeds from overgrowing and smothering live corals.

During each Aquarius mission, anyone with Internet access can watch live web cameras, read expedition journals from the aquanauts, view project summaries and pictures, and much more at the NURC/UNCW Aquarius website: www.uncw.edu/aquarius. Also during this mission, one outreach event will take place. On Monday November 15 Discovery Channel’s Animal Planet will interview Dr. Hay inside Aquarius.