Oceanography with a FLARE

A new undersea project will use a movable habitat to study coral reefs off Florida

by Louise A. Purrett

Man's efforts to study the creatures and minerals of the sea have been long hampered by the simple presence of all that water. The inability to spend long periods of time underwater has forced scientists to rely on such long-distance techniques as netting fish and scraping up rock samples with buckets. Though much has been learned with these techniques, they leave much to be desired. The zoologist needs to know not only what a fish eats and where it lives, but also how it behaves in its natural environment and how it interacts with other fish. An essential part of a geologist's work is examining at close range the matrix from which a rock is extracted. "On land," notes Robert Dill, a National Oceanic and Atmospheric Administration geologist, "we don't look at rocks from airplanes."

Project Tektite (SN: 11/8/69, p. 423), off St. John in the Virgin Islands, was an important step in erasing this difficulty and was enthusiastically endorsed by the scientists who participated. But it had one limitation: The underwater habitat was stationary. "There is no single site in the whole world that would satisfy the broad range of scientific interests," explains William Rainnie of Woods Hole Oceanographic Institution. Now, in its most ambitious undersea project, NOAA is embarking on a three-month study using a mobile underwater habitat.

With Rainnie as project director, the Florida Aquanaut Research Expedition (FLARE) will involve eight separate projects in which teams of two or three scientists will live for several days at a time in an undersea mobile habitat called EDELHAB II. EDELHAB II, built by students at the University of New Hampshire, will be carried to three locations off the coast of Florida by the Woods Hole catamaran LULU. At each site, EDALHAB will be moored at depths of 40 to 50 feet and LULU will remain with it to provide support services.

At EDALHAB's first location, on Long Reef just south of Miami, scientists will watch the reaction of various kinds of fish to several experimental traps, making on-the-spot improvements based on their observations. Other teams will collect some 1,100 water samples and analyze them for alkalinity, dissolved oxygen, acidity, temperature, calcium, magnesium, salinity and carbon 14. They will expose a section of the sea floor, taking cores of underlying layers, to study the age and origin of reefs. Dill says the geologists are especially interested in learning when and how oil develops. A large portion of the world's oil now comes from undersea reefs.

The plants and animals that inhabit a reef are especially vulnerable to changes in surrounding waters because they are relatively immobile. In an attempt to define the effects of pollution on the reef community, the scientists will study two different reefs, Long Reef, in a relatively uncontaminated area, and another reef near a sewage outflow just north of Miami. At the unspoiled reef, the researchers will attempt to fix a standard against which the healthiness of other reefs can be evaluated. They will seal portions of the reef under a number of plastic domes of various sizes up to four feet in diameter. Meters in the domes will record changes in oxygen pressure, light and temperature. The data will allow calculations of the rates of photosynthesis and respiration for the plants and animals living within the dome.

Because so many and varied types of life inhabit reefs, they are popular sites both for commercial fishing and recreation. If fish will accept a manmade reef, the number of such places could be increased. Some time before the beginning of FLARE, about 100 discarded automobile tires were deposited just inside Elbow Reef. FLARE researchers will observe the sizes and species of fish and invertebrates that gather at this artificial reef, comparing their behavior to that of inhabitants of natural reefs nearby.

Several more general studies of reef ecology will concentrate on the structure and size of reef communities, size of hunting areas and home ranges used by fish, and the relation between reef vegetation and plant-grazing marine animals. Previously scientists have tried to understand the ecology of an ocean area by netting samples of fish and bringing them to the surface. This way they could determine general distributions and diet and could try to figure out what the fish was doing when caught, says John VanDerwalker, who is in charge of scientific operations. But the man-in-the-sea, he continues, can see what the fish does from hour to hour. "We may see symbiotic relationships hard to detect from the surface."

In yet another project, three botanists will investigate the relation between climate and increases or decreases in quantities of seaweed, and identify the various species inhabiting temperate, subtropical and tropical Atlantic waters. Seaweed serves as a nursery for young marine animals and a feeding ground for various commercial and sport fish. Many chemicals extracted from seaweed have found uses in industry and medicine.

FLARE, part of NOAA's Manned Undersea Science and Technology program, is scheduled to begin Jan. 27 and to end in mid-April. □

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