## SCIENCE NEWS of the week

# The World's Deepest-Dwelling Plant

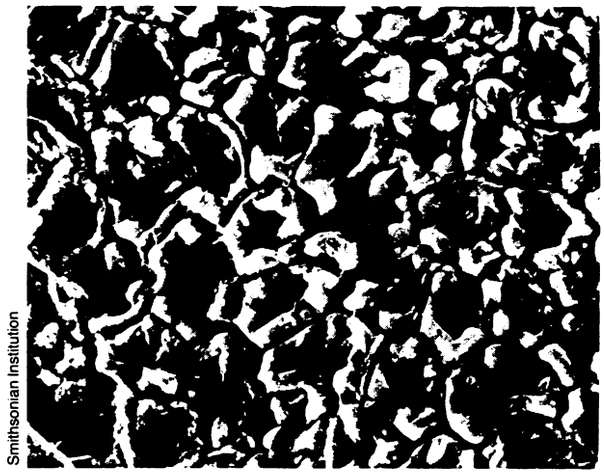
Even in the clearest waters, sunlight rarely ventures below 180 meters, so no one expected to find photosynthetic plants growing in the midnight depths of the ocean beyond that. But there they were in the beam of the Johnson Sea Link I research submersible: meter-wide patches of a new species of coralline, or red, algae doing just fine at 268 meters below the surface — making the algae the deepest-dwelling macrophyte (plant visible to the naked eye) ever documented. "We saw that and just couldn't believe that it was down that deep and was abundant too," says Mark M. Littler, a botanist at the Smithsonian Institution's National Museum of Natural History in Washington, D.C. "It just blew us away."

At 268 meters, Littler estimates that the light intensity is 0.0005 percent of its value at the ocean surface. This is several orders of magnitude weaker than light found illuminating all other known plant life on earth; the rule of thumb has been that a marine plant can just survive, without any growth, at 1 percent of the maximum surface intensity. Finding an abundance of algae in this previously unknown deep-sea realm means that these plants play a much more important role in the food chain and production of sediments in the ocean than previously thought, says Littler.

Littler, Diane S. Littler and James N. Norris, also at the Museum of Natural History, and Stephen M. Blair at the Harbor Branch Foundation, Inc., in Fort Pierce, Fla., report in the Jan. 4 SCIENCE that they discovered the algae last October while exploring a previously uncharted seamount off San Salvadore Island in the Bahamas. The researchers decided to look at the seamount because its 45-degree slope, far less severe than the nearly vertical underwater terrains that mark the Bahamas, would allow more exposure to light. They found nothing exceptional about the seamount environment — no unusual chemicals, for example — so it is conceivable that similar deep-dwelling plants could be found elsewhere, they say.

The researchers do not know if the algae possess some mechanism that enables them to supplement photosynthesis by harvesting other forms of energy in addition to sunlight. But the group has shown in laboratory experiments that these plants not only photosynthesize actively but are about 100 times more efficient at capturing and using light energy than their shallow-water counterparts.

A major question to address on future cruises to the seamount, says Littler, is what causes the algae's increased efficiency. One contributing factor is the plant's unique structure. Like other types of algae, this deep-level species extracts dissolved calcium from the ocean to produce calcium carbonate, or limestone, which then lines the plant's cell walls. In other species, the limestone screens out the light. But in the new algae, the limestone coats the vertical walls, leaving the tops and bottoms of the cells relatively thin. The cells are stacked up in columns so that any light hitting the top row can penetrate down to the lower cells.



Smithsonian Institution

*Scanning electron micrograph of newly discovered algae that live deeper in the ocean and with far less light than any other plant known on earth. This surface view has been magnified 1,600 times. In direct sunlight, the algae look purple.*

The new species of algae was not the only scientific treasure uncovered by the researchers. The seamount was home for a flourishing community of sea life and set depth records for other species of algae that have been found elsewhere in shallower waters. From 518 meters, the base of the seamount, up to 268 meters, the researchers found sponges. At 268 meters, the seamount was dominated by the new algae, which covered 10 percent of the seamount surface. This species was found all the way up to the top of the seamount at about 70 meters, where the light intensity measured 1 percent of the surface value. But even this light was shielded from the newly discovered algae because, beginning at 220 meters, other species began to grow on top of the new algae, up to three layers deep.

"When we got to the top of the seamount, we couldn't believe how lush it was up there. It was like discovering a rain forest for the first time, albeit on a much smaller scale, recalls Littler. "Anywhere in the tropics, algae are relatively scarce and hard to find. And there they were just overlapping each other in the kind of canopy structure that's found in forests [with the more light-demanding plants on top]."

Of the 100 varieties of marine plants the researchers found, a dozen are new to science. It is possible that there are even more, because the scientists really weren't looking for new species at the time.

The researchers measured the photosynthesis and calcification rates of four known green algae species that thrived between 150 and 100 meters on the seamount. They conclude in an upcoming paper in DEEP SEA RESEARCH that these rates are comparable to those of shallow-water forms, and that because of their abundance, deep-dwelling algae probably contribute much more to the production of sand and sediments than previously supposed.

Moreover, in the process of producing limestone, algae, like corals (which are animals), build reefs. Finding these algae at these depths, says Littler, implies that they can build reefs deeper than corals, which are generally active only above 90 meters. The recent discovery, he says, "opens up a whole area in marine biology and sediment geology." — *S. Weisburd*

## UNESCO exit

This week, the United States' withdrawal from the United Nations Educational, Scientific and Cultural Organization (UNESCO) became official (SN: 1/28/84, p. 55). The move, however, leaves U.S. scientists unsure about their future participation in UNESCO-coordinated, international scientific studies.

"Nobody has really deeply explored whether other channels are available and would have the competence to deal with these scientific matters, and whether scientific colleagues abroad would be agreeable to these arrangements," says Walter A. Rosenblith, National Academy of Sciences foreign secretary. "No real arrangements have been made so far ... for transitional, institutional arrangements."

Although money is still available for UNESCO projects until the end of the 1985 fiscal year in September, "nine months in science is not an awful long time to make new arrangements," says Rosenblith. "The fact is that no new planning can sensibly take place during that period." □