UCSB team brings home rare marine life

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James Childress,
UCSB professor

Scientist James Childress has collected live sea creatures from the ocean floor and brought them to his lab at UCSB, a first.

White crabs and yellow mussels that live near underwater hot springs have never before survived in captivity. After all, scientists only discovered their bizarre, underwater colonies in 1977.

In his lab, giant sea worms poke their red gills out of tubes they create to protect themselves from hungry fish and to anchor to rocks. The fragile-looking worms wave feathery, soft gills and are able to withstand pressure that would crush a man, in chilly water that would freeze him.

It took several research trips to the ocean off of Costa Rica, over about a dozen years, before scientists could figure out how to keep the animals alive above sea level. Bringing them to Santa Barbara six weeks ago was nerve-wracking.

"With each step, you're always focused on how much longer you can keep them alive," said Mr. Childress, a professor of evolution and marine biology.

He wants the animals in captivity so he can learn more about their physiology and how they survive in the wild. Mr. Childress and his team of scientists in the department of ecology, evolution and marine biology have been studying them since they arrived in Santa Barbara.

They are performing experiments to learn about the animals' metabolism by measuring chemicals in water added to their tanks and then the levels in the water being cycled out of the tanks.

Many factors, such as heat, carbon, oxygen and sulfide, can affect the results. So the experiments must be performed many times. The natural habitat near the vents where the animals live is constantly fluctuating in the same way, and the goal is to determine how fast the creatures grow in ideal versus adverse conditions.

"We really need to explore all the variables," Mr. Childress said. "It's really a complicated experiment."

In the wild, the animals live in an environment like an underwater Yellowstone National Park, with hot springs and "black smokers" that spew dark minerals.

There is a rift in the ocean floor there, meaning that the earth's surface is especially thin because plates in the

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area are separating. Ocean water seeps through cracks in the crust, is heated by magma below and undergoes a chemical reaction before it is spewed back out again with hydrogen sulfide. The animals live off of bacteria that use escaping hydrogen sulfide to convert carbon dioxide into protein and carbohydrates, through a process called chemosynthesis. Unlike photosynthesis, it doesn't require sunlight, which doesn't exist that deep.

For a new home for the animals, Mr. Childress designed special metal tanks, which he had built in the school's physics lab. They can withstand the pressure of 3,000 pounds per square inch created by pumps supposed to mimic even heavier pressure in the animals' habitat.

But first, Mr. Childress had to collect the animals, 1½ miles down off the coast of Costa Rica. He and a team of scientists descended into dark, near-freezing waters in a miniature submarine called the Albin. Three scientists crowded into the cabin seven feet across and picked up the creatures with a mechanical arm.

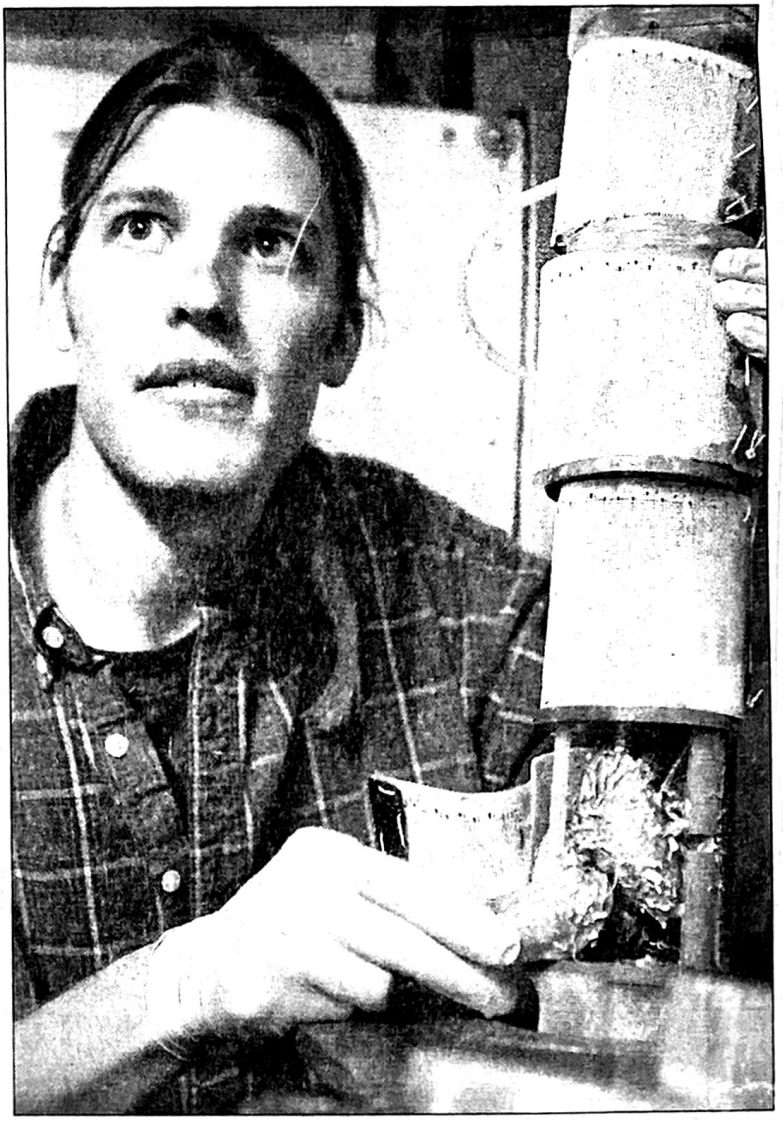
The group had to care for them during a seven-day voyage back to the university.

"It's pretty exhausting to work in here, salt water on the floor, oil leaking from the pumps and the ship moving around. It's something you never get used to," said lab technician Barry Rowan.

Eventually the sea life will die. But Mr. Childress plans another trip next year to collect more samples and get an even better idea of how the animals live.

His goal is to understand their physiology, but findings from these experiments may be used by other scientists to answer other questions.

"There are a lot of interesting evolutionary questions: How do animals evolve to adapt to these situations?" he said.



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UCSB lab technician Barry Rowan had to deal with leaking oil and saltwater underfoot while caring for these yellow mussels and other sea creatures on the journey back from Costa Rica.

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