

RESEARCH

Into the Dark

Researchers shine a light in an unexplored world • by Sarah Spell



LAURE CORBARI

Dr. Scott France and graduate students Jana Thoma and Eric Pante take a closer look at freshly collected bubblegum coral. The trio, on board the F. G. Walton Smith, used a remotely operated submersible, the Global Explorer, to collect samples at a depth of almost 4,600 feet in the Bahamas.



DEEP ATLANTIC STEPPING STONES SCIENCE PARTY, IFE, URI, IAO, AND NOAA

A colony of *Paragorgia* grows more than a mile below the surface of the Atlantic Ocean, southeast of Cape Cod, Mass. *Paragorgia* are also called bubblegum corals, because of their sometimes pinkish color and lumpy texture.

THE DEEP. It is a place inhabited by fantastic creatures: fish with see-through heads and multi-directional eyes, giant sea spiders, polka-dotted squids. The ocean floor has its own geography, undersea mountain ranges and volcanoes, sloping hills, canyons and trenches. A seemingly infinite variety of corals occupy the seascape.

Branches of flamingo-colored corals reach out like gnarled, arthritic fingers. Corals that look like earthy fringe trees bear a profusion of frilly, lavender blossoms on dark, delicate stems.

Yet, corals are not rocks or plants. They are living animals.

“It’s a Dr. Seuss world down there,” observed Dr. Scott France, a UL biology professor. He and three graduate students, Mercer Brugler, Eric Pante and Jana Thoma, are pioneers in one of the world’s last frontiers.

“We are explorers, going places where no one has gone before and finding new species,” said France.

The oceans are vast, covering more than 70 percent of the earth’s surface. The sea is dark, deep, cold and highly pressurized. Using even the best available equipment, submersibles called remotely operated vehicles or ROVs, fitted with lights and cameras, scientists can only explore a tiny bit of the deep sea at a time. According to the National Oceanic and Atmospheric Administration, 95 percent of the world’s oceans remain unexplored.

France, Pante and Thoma recently got a glimpse of that world. They spent 18 days in March aboard a research vessel, the F. G. Walton Smith, collecting corals in the previously unexplored waters of the northern Bahamas. Guided by scientists on board the ship, the ROV Global Explorer combed the ocean floor more than a mile deep, collecting sea life and capturing high-definition video. France, chief scientist for the mission, acquired a \$715,500 grant from NOAA for the expedition. Scientific teams from other institutions also participated.

There are only a handful of deep-sea ROVs available worldwide for scientific research. So, for marine biologists — especially students — the chance to study at sea is both rare and valuable. “If I’m training students for the future, I don’t want them to wait for the future to have this kind of experience,” France said.

Pante has participated in three research cruises. They took him to the North Atlantic Ocean; southwest Pacific Ocean, near

New Caledonia; and the Bahamas, in the Atlantic Ocean.

He said finding animals in their natural setting adds an important dimension to research. “Material is very different when it has been sitting in ethanol for months or years. It’s colorless, it’s retracted, it’s wrinkly. So, it’s very interesting to see the animal when it’s freshly collected, when it has all of its colors.”

Pante is poised to do something some young scientists only dream of — name a new species. During the expedition in New Caledonia, he discovered a coral with branches like golden lace. He’s writing a scientific paper that will both describe and name the newly found coral.

Binomial nomenclature — the formal system of naming species — has given living creatures some memorable monikers. There are spiders named for comedian Stephen Colbert and for actor/director Orson Welles; a jellyfish named for rocker Frank Zappa; and a narrow-waisted wasp whose name pays homage to Elvis Presley, *Preseucoila imallshookupis*.

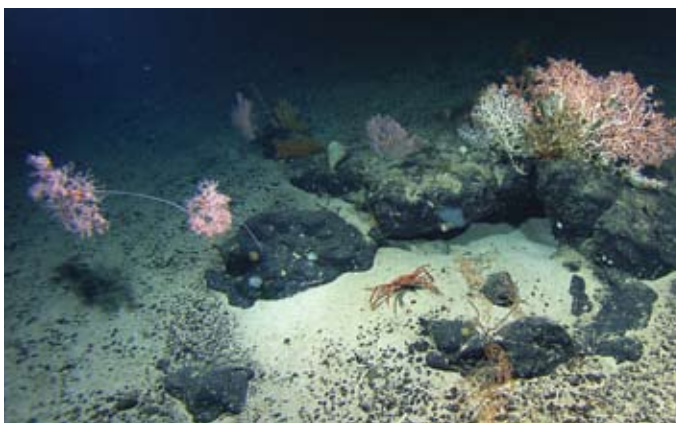
It remains to be seen whether the name of Pante’s coral will be frivolous or formal. What’s more important, says France, is the training Pante is receiving.

“Many people, including myself, may discover a new species, but then send it on to an expert in the field who gives it a name. Eric is training to become one of those experts. So, the process of describing and naming a species is an invaluable experience that goes far beyond classroom training.”

Grad student Mercer Brugler has studied corals on the sea floor in a manned submersible and is also describing a new species of coral.

France is not surprised by those achievements. “I fully expect all of my students to have described new species by the time they complete their studies.”

The odds are good that Jana Thoma



Top: UL Lafayette researchers collected a fragment of this colony of *Iridogorgia magnispiralis* off the coast of New Jersey in 2005. The sample was used to describe this new species. Center: *Metallogorgia melanotrichos* takes its name, in part, from its metallic sheen. A brittle star, a close relative of the starfish, clings to the coral’s inner branches. Bottom: A deep-sea red crab rests in an undersea garden of corals.

will also make a discovery. A pair of New Zealand biologists have calculated that 50 percent to 100 percent of the samples collected in previously unexplored areas turn out to be new species. But figuring out whether a species is truly new cannot be determined at sea; it requires time-consuming detective work in the laboratory.

Just because specimens look alike

doesn’t necessarily mean they are related. Likewise, species that are far apart genetically may have some of the same physical characteristics. So, in addition to looking at physical traits, France and his team also use DNA analysis and comparison.

Thoma, Pante and Brugler carry out the painstaking process. First, DNA is chemically extracted from the coral. Then, a particular gene is isolated in the DNA and that gene is copied, perhaps millions of times, to ensure that there is enough sample material available.


The DNA material goes through another series of chemical reactions, which yield a final product that can be read by a DNA sequencer. Now, the genetic material can be described as a unique pattern of four chemical bases. But researchers still can’t know whether they are looking at a new species.

“Once we have the DNA sequenced, there are hours and hours of editing and running various kinds of software to analyze that,” France said. “As you collect new species, you have to go back and compare each of them to everything that came before.”

The National Center for Biotechnology Information maintains a DNA sequence database; however, that database is incomplete, because the DNA of all known species in the world has not yet been sequenced. So, “finding a match does not necessarily mean that we have found a new species,” France said.

It’s a process that can leave scientists with lots of unanswered questions. France and his students are also trying to find out how species are related and where they are found.

“One of the things that genetics could allow you to do, if you were looking at the right genetic marker, is to be able to take it further and say, ‘Are these corals that we’re looking at isolated to specific places? Are they only found in that canyon? Are they only found on that seamount?’ Ultimately, those are the kinds of questions we would like to be able to answer,” France said. ■

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