

Exploring the deep

Illuminating life in dark waters

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Deepwater is a dark, cold, low-oxygen, high-pressure environment.

What could possibly live under these circumstances?

"More than you can imagine," as Chris Kelley, a program biologist with the Hawaii Undersea Research Laboratory, said recently.

"What looks inhospitable to us are places where animals are thriving," he said. "The deep oceans are host to a breathtaking, beautiful range of life, which we don't know much about."

Inside the Kealahou High School library, Kelley recently discussed the deepwater animals living around the Hawaiian Islands and the environmental conditions. More than 60 people attended the ReefTalk, sponsored by the University of Hawaii Sea Grant College Program and Malama Kai Foundation.

Established by UH and the National Oceanic and Atmospheric Administration, the laboratory investigates deepwater for the purpose

of discovery and advancement of knowledge. It also recovers lost scientific instruments. The laboratory uses the research vessel Kaimika-o-Kanaloa, a remotely operated vehicle, and two occupied submersibles, Pisces IV and V.

The three-man, battery-powered submersibles have a maximum depth of 2,000 meters. These vehicles allow scientists to observe the deep sea through multiple view ports, video records, instrument placement, sample collecting and environmental monitoring. Pisces IV and V can maneuver through a site at speeds up to 2 knots, depending on current flow. The ROV has a maximum depth of 800 meters, Kelley said.

There is a transition zone, about 200 to 300 meters, between the shallow and deep fish families. From approximately 350 to 500 meters, light tapers to complete darkness.

Despite financial limitations, the laboratory explores the deep sea several times annually, often bringing back photographs and information about astonishing, otherworldly landscapes. Kelley and his colleagues usually find new species of fish or invertebrates in the largely unknown ocean. He estimated less than 1 percent of the sea floor has been mapped and studied.

In 2003, while studying the deep sea corals, submarine canyons, ridges and seamounts of Northwestern Hawaiian Islands, the laboratory produced at least 20 new records to Hawaii, including discoveries of species of corals, sponges and a crinoid (sea lily).

Each stunning revelation further dismisses the once common view of the sea bottom as a vast, featureless, largely lifeless, measureless, not worth mentioning place. Still questions remain about behaviors, threats, reproduction, life history, population size and the purpose of color. Kelley could not say why some crinoids have long stalks or why gold coral sends out blue light pulse and spirals in different directions when touched.

The laboratory's active dive season is from August to November. The average daily cost per dive is \$30,000. Scientists have researched the deep depths around American Samoa, New Zealand and Loihi. A team embarked this week on a nearly monthlong expedition to the Northwestern Hawaiian Islands.

The laboratory has more than 1,500 photos, which will eventually be placed in an online deepwater gallery. Among the untold and least known are an octopus, dubbed "Dumbo," because of the fins on the side of its head; a sea star that can flip its arms up to filter the current; translucent swimming sea cucumbers that resemble jellyfish; a sponge called "Skeleton" because of its skeleton-like form; rat tail fish that drum their swim bladders; and decorator crabs that possess "decidedly different tastes," as evident in their choice of trim: coral or sponge. For certain organisms, these are their first-ever photographs. However, common names or identifications do not always exist.

One of his most memorable finds happened during the 2003 Northwestern Hawaiian Islands expedition. At

the 4,000-foot depth, Kelley came upon a field of sponges, possessing 2- to 3-foot balls atop of 3-foot stalks, which looked like "giant lemon yellow lollipops." His initial thoughts: "What planet am I on?" Kelley said the strange-looking geography made him feel for the first time like he was in an alien world.

The laboratory has managed to capture the eerie beauty of bioluminescence as well as the curiously colored corals and creatures. Many deepwater fish have long bodies resembling eels. Kelley said much of what is found deserves a closer look and may have significant value. He spoke of Caribbean sponges being researched for antibiotic properties.

Kelley also said he has never done a submersible dive without seeing human trash -- beer and soda cans, plastics, fishing line, military debris, a refrigerator and even a lawn chair that landed upright. As far for trash, he says depth does not matter.

Kelley is hopeful that someday a deepwater animal exhibit in Hawaii would be created. The Natural Energy Laboratory of Hawaii Authority is working toward establishing a more formal sampling program to search for deepwater creatures, which do get caught in its pipelines. So-called octosquid and microshark were the latest published denizens brought up from the abyss off Keahole Point.

The goal is to continually sample the captured animals, study them in captivity and eventually display them for the public, said Jan War, operations manager at NELHA.

Prior to the ReefTalk, Hawaii Undersea Research Laboratory and Waikiki Aquarium taught eight West Hawaii Explorations Academy students how to properly handle, care, preserve, label and photograph the samples. The UH Sea Grant College Program is involved in NELHA's Deep Sea Critter Program. Deepwater shrimp are now on display at West Hawaii Explorations Academy, War said.

"NELHA is a unique facility that can bring specimens to the surface relatively gently. The pipes keep the temperature and some of those caught will tolerate the pressure," Kelley said. "They have a great opportunity to collect very rare species, most of which are swimming, drifting animals 20 feet above the bottom."

For more information, visit <http://www.soest.hawaii.edu/HURL>.