

## New Undersea Vent Suggests Snake-Headed Mythology

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The undersea robot Jason II examines the 'smoking' Medusa vent. Credit: Duke University

A new "black smoker" -- an undersea mineral chimney emitting hot, irondarkened water that attracts unusual marine life -- has been discovered at about 8,500 feet underwater by an expedition currently exploring a section of volcanic ridge along the Pacific Ocean floor off Costa Rica.

Expedition leaders from Duke University; the Universities of New Hampshire, South Carolina and Florida; and the Woods Hole Oceanographic Institution (WHOI) in Massachusetts have named their discovery the Medusa hydrothermal vent field. The researchers are working aboard WHOI's research vessel Atlantis, and the expedition is



funded by the National Science Foundation's Ridge 2000 program.

The researchers picked that name to highlight the presence of a pink form of the jellyfish order Stauromedusae as well as numerous spiky tubeworm casings that festoon the vent chimney and bring to mind "the serpent-haired Medusa of Greek myth," said expedition leader Emily Klein, a geology professor from Duke's Nicholas School of the Environment and Earth Sciences.

The bell-shaped jellyfish sighted near the vent "are really unusual, and the ones we found may be of a different species because nobody has seen types of this color before," added Karen Von Damm, an earth sciences professor and hydrothermal vent specialist on the expedition from the University of New Hampshire's Institute for the Study of Earth, Oceans and Space.

The scientists are exploring the ocean bottom with Jason II, a remotely controlled robotic vehicle operated by WHOI. Using Jason's mechanical arms and a temperature probe, they logged water temperatures of 335 degrees Celsius (635 degrees Fahrenheit) at the vent's opening.

"Despite the great temperature of the vent water, it doesn't boil until 390 C because pressures on the ocean floor are so great, about 200 times the pressure at sea level," Klein said. The tremendous pressures result from the weight of almost two miles of seawater pressing down from above.

"Frankly, it's astonishing that a rich ecology thrives in these extreme environments," Klein added. She noted, however, that while all the organisms near vents are adapted to the high pressures at these depths, not all experience extremely high temperatures.

"The temperature of the ocean floor is about 2 C (35 F) and there is a strong temperature gradient as you move away from the vent, so animals



living a few inches away may experience temperatures only a few degrees above normal for the ocean floor."

Von Damm said that the heat-tolerant tubeworms found living on Medusa's chimneys, a type known as Alvinellids, are commonplace on vents in the equatorial Pacific and thrive on high-iron fluids.

According to the expedition's website,

<u>www.nicholas.duke.edu/OSCexpedition/</u>, Jason has also retrieved two other types of tubeworms -- Tevnia and Riftia -- from the vent area for expedition scientists and graduate students to examine and preserve.

The researchers aboard Atlantis are on the scene principally to study the geology of a complex section of the East Pacific Rise, one of the "midocean ridge" systems where new crust is made as the earth spreads and releases molten lava.

According to Von Damm, scientists often have found mid-ocean ridges wherever there are geothermal vents warmed by heat energy from the underlying volcanic conduits. "Each new vent sighting sparks fresh excitement, because each one is different," she said.

"Every vent has a little different chemistry, and that helps us understand the processes going on in the ocean crust," she said. "Each one gives us a different piece of the puzzle. And biologists have found more than 500 new species at vents since they were first discovered."

The Medusa vent was discovered on Easter Sunday morning, right after the scientists aboard Atlantis had completed an Easter egg hunt. Scott White, a geology professor from the University of South Carolina, had just come on duty as the watch leader when Jason II found an area rich in the types of organisms typically found near vents.



"We all knew it would be special when we found all the creatures living there after looking at relatively barren lava flows for several days," White said. He diverted the robot to investigate the animals more closely and "within seconds there was a spire of a hydrothermal chimney looming out of the darkness at the edge of Jason's camera lights," he added.

Vent specialist Von Damm had just begun the watch shift when the first black smoker image appeared on a video screen in the Jason II control room. Since Jason's video output is also piped to screens elsewhere around Atlantis, Klein saw it at about the same time.

"Suddenly everybody came running from all over the ship to see what was going on," Von Damm recalled. "I was smiling a lot. I was very happy."

"I jumped out of my chair and went running up a deck to see it in person," added Duke's Klein. "I have been going to sea for 20 years and have been hoping to find my first hydrothermal vent site, and finally I have.

"And I'm ecstatic."

Source: Duke University

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