The Discovery of Hydrothermal Vents

25th Anniversary CD-ROM

Amazing Voyage: Probing Underwater Mysteries

Reprinted from the San Francisco Chronicle
March 7, 1977

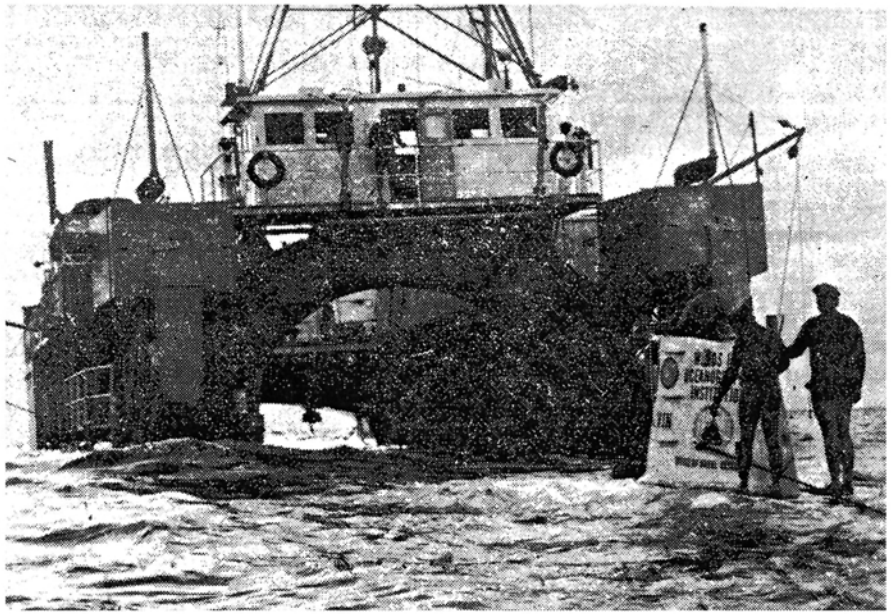
by

David Perlman, Science Editor

Printed from "The Discovery of Hydrothermal Vents - 25th Anniversary CD-ROM"

San Francisco Chronicle
The Largest Daily Circulation in Northern California
113th Year No. 43 ★★★ MONDAY, MARCH 7, 1977 777-1111 20 CENTS

Amazing Voyage



Woods Hole Oceanographic Institution photo

Two divers aboard the submarine Alvin approached the sub's twin-hulled mother ship, Lulu

Probing Underwater Mysteries

By David Perlman
Science Correspondent

Academy Bay, Galapagos Islands

Thirty scientists and a flotilla of three research vessels are in the midst of an extraordinary deep sea expedition near here.

They are probing nearly two miles down to the rocky bed of the Pacific ocean, where over the ages undersea geysers have spurted, valuable metals have enriched the sediments, volcanoes have erupted, and the earth has trembled as its crust split asunder.

The ships and the crews have just paused — as whaling vessels and pirate craft did in past centuries — to take on fresh fuel and food among Darwin's famed Galapagos Islands.

Now the modern scientific Argonauts are returning to their lonely survey site 250 miles

Back Page Col. 3

VOYAGE

From Page 1

east of the Galapagos and 400 miles west of the coast of Ecuador.

They have been at their hazardous work for nearly a month now,another three weeks of deep-water oceanography is still to come.

This expedition is truly a voyage to the bottom of the sea, for six of the scientists are underwater explorers, and one of the three ships in the flotilla is the tiny, deep-diving submarine called Alvin.

Almost every day the 23-foot, 15-ton craft has been carrying two scientists and their pilot nearly 9000 feet down to the floor of a mysterious region knowwn as the Galapagos Spreading Center.

This is the heart of a great undersea rift zone that runs from west to east across the for nearly 1000 miles just north of the equator, and Alvin has been studying its many puzzling geologic phenomena:

The submarine's outboard sensors have measured the temperature of abnormally warm sea water that rises from fissures cleaving the bottom. Grappling gear, maneuvered like a "slave" claw by the scientists crowded inside Alvin's sturdy titanium capsule, has collected previous samples of rock and mud. An elaborate filter system has sucked in ocean water to measure its varying salt content and its complex chemistry.

The two ships accompanying Alvin are the submarine's twin-hulled tender, named Lulu; and the more majestic research vessel Knorr, which houses an elaborate array of oceanographic laboratories, underwater samplers and dredges, and a complete computer center.

Dr. John B. Corliss, assistant professor of oceanography at Oregon State University in Corvallis, Ore., is the coordinator of this expedition, and a dozen of his Oregon colleagues are with him.

The three ships, and many of the other scientists, hail from the Woods Hole Oceanographic Institution on Cape Cod. Still other expedition members are from Stanford University, the University of California's Scripps Institution of Oceanography at La Jolla, the U.S. Geological Survey and the Massachusetts Institute of Technology. The National Science Foundation is financing the project.

Dr. Robert D. Ballard of Woods Hole is chief scientist of the mission.

The group's major mission is to study the little-known mechanisms — called hydrothermal processes — by which metal-rich ores are deposited in marine sediments all over the world and heat from the earth's deep interior is transferred into the oceans.

The Galapagos rift zone and its spreading center mark one of many regions of the globe where great plates of the earth's crust are on the move. In these regions the 40-mile-thick crust fractures and spreads apart, permitting the semi-molten mantle rock of the deep interior to well upward.

Sea water flowing down through the crustal fracture cracks is super-heated — probably to 400 degrees or more — and kept from boiling by the intense pressure of the ocean depths.

The hot, salty water is believed to leach metals like copper, manganese, iron, zinc, tin and even gold from the crustal rock in abundant quantities — and deposit the metals in the layers of sediment on the ocean floor.

Alvin's precise on-the-spot measurements of the rate at which heat flows from the interior of the earth to the sea may confirm the possibility that the world's network of mid-ocean ridges and rifts could be a potentially enormous resource of geothermal energy as well as minerals.

Last summer a preliminary oceanographic survey of the area by the research vessel Melville from the Scripps Institution disclosed a most unusual topography along the Galapagos spreading center.

The bottom proved to be relatively flat, but the flanks of the rift were studded with parallel rows of crust-covered mounds up to 30 feet high — mud volcanoes that may even now be erupting from time to time.

Fissures on the sea floor, probed with heat-measuring devices suspended from the Melville by cables, were shooting up jets of hot water. Underwater cameras and dredges discovered bright red and yellow sediments near the fissures. Swarms of tiny earthquakes indicated the crust of the rift zone is still fracturing.

One of the two prime dive sites is located near a striking fissure where the jets of unusually hot water were detected; the other is among a row of mounds encrusted with manganese and iron.

Now that the Galapagos expedition has finished its brief rest and refueling stop, the diving program will soon begin again and exploration of the rift zone's undersea mysteries will continue.