

'Deep see' technology makes *Titanic* find

The search for the *Titanic* is over, but a new era in the scientific exploration of oceans and the seafloor is about to surface with the help of the sophisticated equipment that located and photographed the long-sought wreck.

Videotapes of the *Titanic*'s remains taken more than 13,000 feet below sea level are far from crystal clear, but for scientists "these are revolutionary images," according to marine geologist Robert D. Ballard, leader of the expedition that found the ship. The images demonstrate that technology used for the first time by the team of French and American scientists will be able to locate other "pieces of history" preserved deep in the sea, said Ballard last week at a press conference held at the National Geographic Society in Washington, D.C. The equipment also will radically improve studies of the thousands of miles of underwater mountain ranges, he noted.

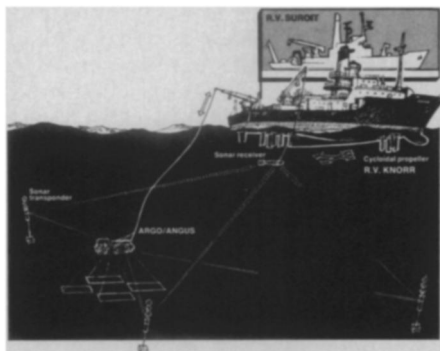


Diagram of the search team's sonar and camera systems.

Of more immediate interest, however, is the way in which the scientists discovered and visually "retrieved" the *Titanic*. Ballard, director of the Woods Hole (Mass.) Oceanographic Institution's Deep Submergence Laboratory, and his colleagues from the French Institute for the Research and Exploitation of the Sea (Ifremer) first mapped out a 100-square-mile search area about 500 miles east of Newfoundland. In July the scientists took the Ifremer vessel *Le Suroit* to the designated region, where they surveyed much of the ocean with high-resolution, French-developed sonar. The research vessel *Knorr*, owned by the U.S. Navy and chartered by Woods Hole, took over in late August and began to scan unexamined areas.

Tethered to the *Knorr* was *Argo*, a 16-foot-long cage containing powerful lights, side-scanning sonar and an array of cameras. The submersible "sled" can descend to depths of 20,000 feet. It transmits sonar data to the *Knorr*'s computer through a cable connected to a towing crane on the ship. Sound transmissions



Anchor chains, winches and capstans on the *Titanic*'s bow.

from *Argo* are also received by sonar "transponders" anchored on the ocean floor and then relayed to the computer. The *Knorr* tows the *Argo* in a precise path with the aid of propellers on its bottom, called "eggbeaters" by Ballard, that drive the ship in any direction and keep it stable in rough seas.

On Sept. 1, this conglomeration of fancy hardware and unique computer software struck paydirt. While patrolling an area of immense underwater sand dunes, *Argo* sent back pictures of a huge riveted metal cylinder that the scientists realized was a *Titanic* boiler. Ballard immediately pulled *Argo* to the surface before it could ram into any uncharted debris. Then the *Knorr*'s 25-year-old sonar system surveyed the depths around the boiler and ran across the *Titanic*'s hull. "We could have done [the sonar search] with a fishing boat," says Ballard.

Argo was again lowered and gingerly towed near the *Titanic*'s bow, bridge and forward stacks. On Sept. 5, the last day of the expedition, another camera-bearing sled — *Angus* — was used to take more detailed photographs of the remains.

Not until the *Knorr* began to head home did the scientists notice that *Angus* had taken pictures of debris a half-mile behind the hull that includes pieces of the *Titanic*'s stern. It is not known why the back end of the ship broke off and fell apart, says Ballard. The luxury liner made a surprisingly light landing on the ocean floor, he adds, only slightly denting the surface.

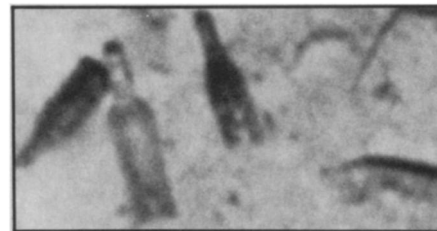
Ballard may return to the *Titanic* site next summer with the manned submarine *Alvin*. At this point, he says, "it's out of my hands."

Argo's first scientific application is well in hand, however. In December, Ballard

A deep-water rattail fish passes over the wooden deck of the Titanic's bow at a depth of more than 12,000 feet.

and his co-workers will tow the vehicle along a 120-mile stretch of the East Pacific Rise between San Diego and Manzanillo, Mexico. This underwater mountain range is part of the 40,000-mile mid-oceanic ridge. The *Argo* survey will cover as many miles of the ridge in 20 days as have been examined by researchers in the past 12 years.

Woods Hole director John H. Steele noted at the press conference that *Argo* will also provide scientists with a closer look at recently discovered hot vents on the bottom of the Pacific Ocean (SN: 12/12/81, p. 374).



Debris near the wreck includes wine bottles, mostly French Bordeaux.

Until December, Ballard plans to pore over data collected on the *Titanic* expedition. "We're still trying to understand what we found out there," he says. After a more complete analysis, he cautions, "I may end up eating my words." —B. Bower

