



NEWSLETTER

July - August 1986 WOODS HOLE OCEANOGRAPHIC INSTITUTION

LARGEST UNIVERSITY RESEARCH INITIATIVE AWARDED TO WHOI

On June 26, Secretary of Defense Caspar W. Weinberger announced selection of 86 research projects to be funded under a new Department of Defense (DoD) University Research Initiative (URI) program. The largest of these grants was awarded to WHOI -- a five-year, \$12,614,250 program in Remote Sensing and Modeling. This grant includes associated subcontracts with MIT and Harvard.

Approximately \$110 million has been appropriated for the 86 research programs at 70 institutions for fiscal year 86/87. The Office of Naval Research (ONR) selected 24 of the programs.

"DoD received almost 1,000 URI proposals from 175 universities," Secretary Weinberger reported. "These proposals requested nearly \$6 billion in research funding over the three-to-five-year duration of the proposed efforts. The URI selection process was highly competitive and I wish we were able to fund more of the many outstanding proposals that we received.

"This is the first year of the University Research Initiative," he added. "URI is designed to strengthen the ability of universities to conduct research and educate scientists and engineers in technologies important to national defense."

"Ours is a very solid group of people," said WHOI Associate Director for Research Derek Spencer. "The work is quite ambitious. It's the first time that data acquisition, data handling/telemetry and modeling will be so closely associated with an established feedback mechanism between all points."

The program is principally managed by the Physical Oceanography Department, but there will be a large Ocean Engineering involvement from instrument development and systems engineering. Robert Beardsley will

act as Overall Project Manager, and a joint committee from WHOI, MIT, Harvard and two Navy laboratories will supervise the project.

"Before submitting the proposal we asked ourselves what would we like to do if we could do something different, something not possible under normal funding practices," said Brech Owens, co-principal investigator along with Bob Beardsley. "It was a long shot and a wonderful surprise," he added. "There's a lot of work that has to be done and a large number of people involved."

The researchers report, "As we see it, any credible capability for observing and understanding the ocean demands several disparate elements." They list these elements as: large-scale continuous observations from space (which are restricted to the surface); at-sea observations; synthesizing tools that can assimilate and compare the data; "state-of-the-art" numerical models that incorporate the best physics covering a wide spectrum of processes on different scales; and finally, an immediate and continuous linkage between data acquisition, interpretation and model construction.

continued on next page

1986 TITANIC EXPEDITION BRINGS BACK IMAGES FROM WRECK'S INTERIOR see story on page 7



Jason Jr. leaves its ALVIN garage to explore the TITANIC's deck. A railing is visible in the background.

RESEARCH INITIATIVE continued from page 1

The proposals selected by DoD were principally for interdisciplinary research programs. According to DoD, this team approach to research with cross-fertilization among disciplines will stimulate the growth of newly emerging technologies which are based on more than one of the traditional academic disciplines. By including both scientific and engineering disciplines, URI programs should also smooth the transition of scientific research discoveries to their practical application in defense systems or commercial spinoffs.

KURZ RECEIVES CLARKE MEDAL

Assistant Scientist Mark Kurz in the Chemistry Department has been selected by the Geochemical Society to receive its F. W. Clarke Medal for 1986. The award is for a "single outstanding contribution to geochemistry or cosmochemistry published as a single paper or series of papers on a single topic." The award must be made no later than the year of the recipient's 35th birthday.

The citation reads: "Your papers that have been so recognized are: The distribution of helium in oceanic basalt glasses (1981); Helium isotopic systematics of oceanic islands and mantle heterogeneity (1982); and Cosmogenic helium in a terrestrial igneous rock (1986). These papers together form a truly major contribution to our understanding of the isotope relationships in terrestrial rocks."

The award consists of a silver medal, a certificate, and a one-year subscription to Geochimica et Cosmochimica Acta. The award will be presented to him during the annual meeting of the Geological Society of America to be held in San Antonio, Texas, in November 1986.

Mark received his Bachelor's degree in Chemistry from the University of Wisconsin in 1976 and his doctorate from the MIT/WHOI Joint Program in 1982. He was appointed an assistant scientist in 1983 after spending a year in Paris as a NATO Postdoctoral Fellow and as a visiting professor at the Universite Paris VII.

Congratulations, Mark!



Kathryn Ann Kelly

KELLY APPOINTED TO P. O. STAFF

Kathryn Ann Kelly, a postdoctoral investigator in the P.O. Department from 1984 through 1986, was named an assistant scientist on July 1. Kathie is the first woman to join the P.O. Department scientific staff.

Kathie received her Bachelor's degree from the University of California, Berkeley, in 1977 in engineering mathematics and mathematical statistics. She was awarded a Ph.D. in Physical Oceanography from Scripps in 1983; from there she came to WHOI as a Postdoctoral Scholar.

In September 1985, Kathie's husband Peter Shaw was appointed assistant scientist in G&G. By reason of the very competitive nature of the appointments, very few couples in WHOI's history have ever held scientific staff appointments at the same time.

An interest in analysis of remote sensing data has led Kathie into a cooperative research program with the O.E. scatterometer team. Her particular specializations are numerical modeling of wind-driven coastal currents and developing statistical methodology for analyzing satellite imagery. In keeping with these interests, Kathie will be teaching a class this fall with Hans Graber and Jules Jaffe entitled "Introduction to Satellite Oceanography."

The recently approved five-year ONR University Research Initiative Program entitled "Data Telemetry, Assimilation, and Ocean Modelling" will also call upon Kathie's expertise.

BUTMAN NAMED NAVY YOUNG INVESTIGATOR

The Office of Naval Research has announced that Cheryl Ann Butman, recently appointed assistant scientist in O.E., has been awarded a "Young Investigator Award" (YIA). This three-year grant will support about 25 percent of her research per year. Of the 400 applicants, only 12 scientists were chosen for these prestigious grants, and Cheryl Ann was the only recipient from the field of oceanography.

The purpose of the YIAs is to acknowledge and support outstanding young scientists with research programs that address fundamental scientific issues and are relevant to the Navy. The scientists must have received their doctoral degrees within five years of the application date.

Cheryl Ann's project involves flume and field experiments to determine biological effects on sediment transport, effects on model parameters, the magnitude of these effects and how they can be incorporated into existing models. For example, animals living on or in the seabed can significantly affect the surface sediment grain size distribution by vertically mixing physically layered sediments or by packaging the individual grains into fecal pellets that are orders of magnitude greater in size.

Results, thus far, indicate that without the inclusion of biological effects, the sediment transport model would probably overestimate the material that can be eroded from the bed. These findings are important to the Navy since accurate sediment transport predictions are needed to estimate scattering of acoustic signals due to suspended sediments, especially in shallow, coastal regions.

"People in the O.E. Department have laid the groundwork for people like me," says Cheryl Ann, particularly pointing out the contributions and assistance of associate scientist Bill Grant. "My research is in the transition zone between biology and ocean engineering. This department believes in the importance of a multi-disciplinary approach to the study of boundary-layer processes."

She notes that the possible role of biology in physical processes occurring near the seabed has received increasing attention through exposure from large, Navy-funded field programs, such as HEBBLE



Cheryl Ann Butman

and the proposed new program STRESS (Sediment Transport Events on Shelves and Slopes), a spin-off from CODE (Coastal Ocean Dynamics Experiment).

"This YIA support indicates the increasing appreciation of the Navy and the oceanographic community, in general, for the field of organism/flow interaction," says Cheryl Ann. "In many ways, I am simply profiting from the diligent long-term efforts of people like Bill Grant, who have validated and made visible this line of research."

STOCKROOM NOTICE -- New items on sale at the stockroom include 5-7/8" yellow, waterproof shipping logo decals for packages and Permatex color guard rubber coatings.

WANTED -- HIGH SCHOOL STUDENTS

Part-time helpers are needed throughout the Institution to work after school in our laboratories and offices.

Duties could vary from photocopying, processing reprints and cleaning glassware in Biology, to answering phones, typing and greeting visitors in the Computer Center, to data processing, creating 3-D maps, contouring and programming in O.E.

The immediate reward is \$4.00 per hour in earnings for the student. The long-term reward can be the foundation for a career in science.

Contact Julie Andrade, ext. 2210, to obtain employment application forms or for more information about these positions.

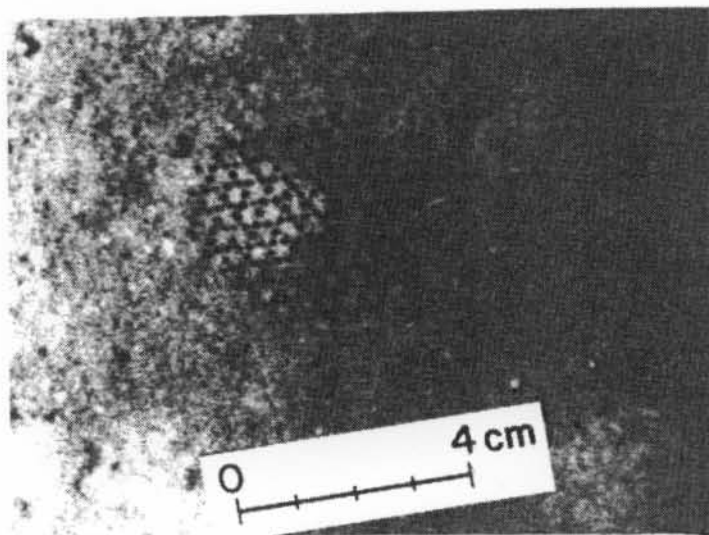
Science Report

WOODS HOLE SCIENTISTS EXPLORE HOT WATER VENTS ALONG THE MID-ATLANTIC RIDGE

Hot water vents in the Atlantic Ocean, much deeper than their counterparts in the Pacific and spewing waters with temperatures up to 350°C (660°F), were explored during May and June by a team of NSF and NOAA-sponsored scientists using ALVIN. WHOI participants were Geoff Thompson, Susan Humphris and Margaret Sulanowska.

The vents are deeper by about 1,000 to 2,000 meters (they're located at almost 4,000 meters depth) and more extensive than Pacific hydrothermal complexes, although the waters at the black and white smokers are probably quite similar in composition. Blue-white smokers were also observed although their exact chemical nature is unknown as yet.

One of the major differences between the Atlantic and Pacific vents, however, is the composition of the complex biological communities living around the vents. Many more free-swimming animals were observed in the Atlantic, in particular thousands of eyeless shrimp (found to be composed of two previously unknown species) and numerous large flat eel-like swimmers. Because of the latter, the name "the snake-pit hydrothermal area" was originally given to the site when it was photographed by unmanned camera tows late last year during deep-sea scientific drilling operations.



This six-sided creature, photographed by NOAA several years ago by an unmanned camera tow, was captured in a sediment core near the Mid-Atlantic vents.

While most creatures survive on the chemosynthetic bacteria which thrive on the sulfides at the vents (there is no sunlight for photosynthesis at this depth), biologists question whether the shrimp use this food source. Water samples will be studied for evidence of some intermediary animal. The dissected shrimp show elemental sulfur in their guts -- but whether this is a food source or a by-product has not been established yet.

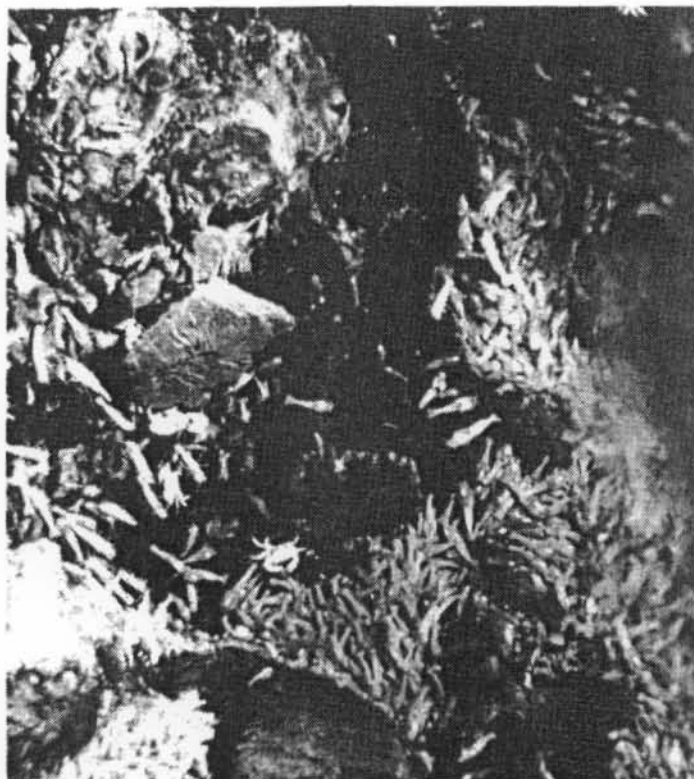
Other life forms in the vent area include numerous anemones, at least two types of snail-like gastropods (not found in the Pacific), two types of crabs, some sediment-dwelling worms and a few white-bodied clams.

Also found near the vents was a six-sided animal that may be a member of what was thought to be a long-extinct species. This benthic invertebrate known as *Paleodictyon nodosum* had previously only been found in Eocene Age (40 million years ago) oceanic sediments in the Alps; however, evidence that it still existed was first obtained from unmanned camera tows a few years ago. Two of these creatures were captured in sediment cores -- one sample frozen and the other preserved in a gluteraldehyde solution -- to be studied later this year by Fred Grassle's lab. Research will show if the creature is a surface dweller or extends deeper into the sediment.

In contrast, the Pacific vents host a vast predominance of sessile creatures, including fields of red-bodied worms, giant clams and mussels.

This cruise (May 5 - June 9) was composed of two separate projects -- the first a joint National Oceanic and Atmospheric Administration (NOAA)/National Science Foundation (NSF)-sponsored program to study a hydrothermal site on the Mid-Atlantic Ridge at 26°N (Chief Scientist Dr. Peter Rona of NOAA, NSF Principal Investigator Dr. Geoffrey Thompson of WHOI), the second an NSF-sponsored program of geological studies along the Ridge between 22° and 23°N (Co-Principal Investigators were Geoff and Dr. Jeffrey Karson of Duke University).

The Atlantic Ocean is spreading apart along the Mid-Atlantic Ridge at a



Blind shrimp swarm around and through the black smokers at the Mid-Atlantic Ridge.

speed of less than one inch a year -- about one-tenth the speed of Pacific ridges (i.e., East Pacific Rise off of Mexico). Scientists had thought that smokers would only be found at the quick-spreading regions. Instead, the Atlantic vents are approximately 20 times thicker and 20 times wider with complex chimney structures and mineral fields that were seen to be 50-60 meters thick and 200 meters across.

"What makes these deposits interesting is that they are comparable to the size (hundreds of tons) of deposits that are mined on land. By understanding how and where they form, we might better predict where to look on land for similarly-formed deposits that were once underwater," said Geoff. "We now believe that these vents and their associated mineral deposits will be found in all oceans of the world, wherever crustal plates are spreading apart," he added.

Additionally, seafloor hot vents have been recognized as a significant source of chemicals and minerals in the ocean's waters.

Twenty-three ALVIN dives were made during the course of the five-week cruise,

as well as a number of ANGUS camera lowerings. In addition to obtaining literally thousands of photographs of 100 kilometers (62 miles) of the Mid-Atlantic Ridge median valley, the scientists collected over 400 rock samples (almost a ton in total weight) using ALVIN's sampling arms and separately deployed rock dredges.

OCEANOGRAPHIC SHIP NOTES

After being greeted by crowds on their arrival to Woods Hole on July 28, ATLANTIS II and ALVIN personnel soon began preparations for Voyage #116 under somewhat quieter circumstances. The crowds thinned out, but their celebrity status insured a steady stream of onlookers at the gate, checking each movement of ship, sub and crew. An ALVIN test dive in the harbor with A-II steward John Lobo as observer (he won the seat in a shipboard lottery) also had a loyal audience throughout the afternoon-long procedure.

On August 2 A-II and ALVIN departed for a two-week cruise that brought them back to Woods Hole on August 15. The purpose of the voyage was to investigate the influence of the 1929 Grand Banks Earthquake on the eastern valley of the Laurentian Submarine Fan. The objectives were all related to understanding the nature, size and geologic consequences of the turbidity current generated by the earthquake.

KNORR left Tampa on August 8 for a three-week cruise to the Florida Escarpment. Scripps scientists will be studying the steep limestone cliff which separates the Florida platform from the abyssal Gulf of Mexico, trying to understand the processes which formed and subsequently modified the cliffs and to determine the frequency and distribution of chemosynthetic communities along the escarpment. KNORR will return to Tampa on August 23.

OCEANUS left Woods Hole on July 28 for two two-week cruises into the North Atlantic for studies of gelatinous zooplankton, microzooplankton and marine snow in the Gulf Stream (Voyage #177, Legs I and II). She arrived in Norfolk, Virginia, on August 11 for a one-day port call to change scientific personnel. OCEANUS is due back in Woods Hole on August 26.

TRICENTENNIAL QUILT DISPLAY IN CLARK LOBBY

An exhibit on the making of the Falmouth Tricentennial quilt will be on display in the Clark Lobby for the next month. Included in the display, designed by B.L. Owens and Millie Teal, are some of the paintings, tracing papers, swatches of material and samples of stitches used along with a step-by-step description of the making of the quilt.

The result of many months of work by some 90 local artisans, the quilt shows scenes from the Tricentennial history book, The Book of Falmouth. Many of the quilters are members of the WHOI community.

The quilt was officially donated to the town on June 15, the 300th birthday of the signing of the town charter. Now on display at the Bradley House, it will be moved to a permanent display in the Public Library this fall.

Terry McKee reports that she has notecards and posters of the quilt available for sale (notecards are \$1.50 each and posters are \$9). Proceeds of the sale go toward the production of the Tricentennial book.



George A. Smith

SMITH APPOINTED CONTROLLER

George A. Smith has been appointed Controller, beginning September 2, 1986.

His responsibilities will include administering all accounting functions, travel, property management, sponsored research, budget development and cash management.

George received his Bachelor's degree in accounting from the Wharton School of the University of Pennsylvania and is a certified public accountant. He has held financial positions with the Woods Hole, Martha's Vineyard and Nantucket Steamship Authority; Brown University; and Boston University. Most recently, he served as Controller of Dartmouth College in Hanover, N.H.

Old Town Hall Falmouth Terry McKee Claudine Marquet Page 29	R/V Knorr Woods Hole Kate Madin Page 183	Menahant Hotel Menahant Pat Black Page 283	The Casino Falmouth Heights Annette Fierra Page 272	Sankaty Ferry Woods Hole Sarah Allen Page 77	Woods Hole School Woods Hole Elizabeth Stommel Page 288
The Grain Mill Falmouth Debbie Eldridge-Hunter Page 78	Green-Tripp House Marilyn Brooks Page 36	Crosby/Turner House Maureen Keele Page 28	Hewins House Mildred Teal Page 36	Old Water Pump Na. Falmouth Karen Joyce Page 291	Man whittling a duck decoy Daviesville Marion Smith Page 175
Indian Woman (Mrs. Amos) Falmouth Ema Chalmers Page 427	Wiswall/Holmes House Lynne Goslee Page 44	Historical Society Cynthia Stimpson		Quaker Meetinghouse W. Falmouth Jeanne Shinkle Page 411	
Cranberry Bog E. Falmouth Maureen Keele Page 180	St. Barnabas Church Elizabeth Owens Page 44	Congregational Church Patricia Connell Page 25		Washburn's Island Waquolt Elizabeth Page Page 419	
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GUIDE TO THE FALMOUTH TRICENTENNIAL QUILT

SAFETY NOTICE

We need your help! More and more bicycles are being carried inside the buildings and stored in offices and hallways. In the event of an emergency, the bikes may block paths to safety. Please store your bikes outside the buildings at the appropriate bike racks. Enjoy the summer and thank you for your support.

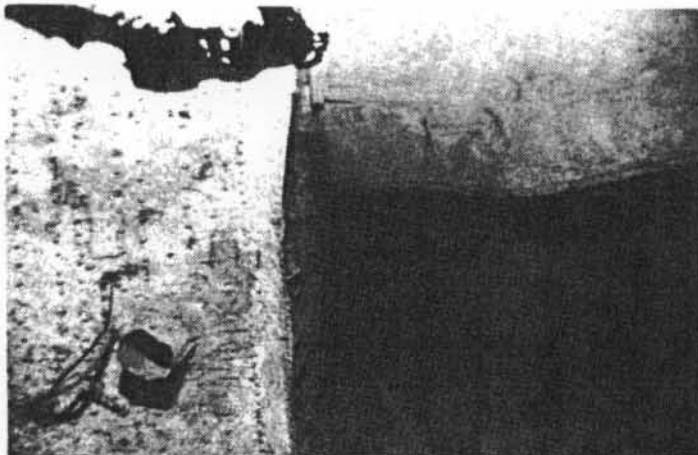
1986 TITANIC EXPEDITION EXPLORES WRECK

The TITANIC expedition of 1986 left Woods Hole on a rainy Wednesday morning, July 9, and returned home as scheduled on July 28 to great fanfare as TV crews, reporters, WHOI employees, families and guests crowded the Iselin pier.

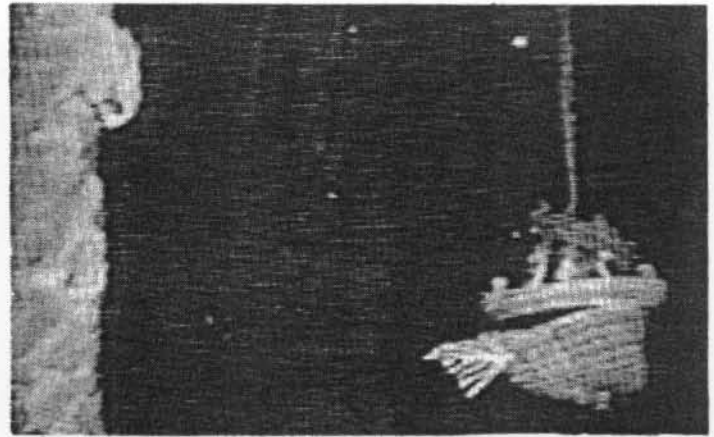
Throughout the course of the cruise international attention focused on the day-to-day events at sea. The switchboard and Public Information Office were running non-stop, often for 14-18 hours a day, while the facilities, security and services groups gracefully handled the hordes of media representatives, tourists and TITANIC buffs who wanted to get a look at the place from which the expedition was mounted.

The stars of the expedition were the vehicles -- Jason Junior, ALVIN and ANGUS. ALVIN even had her portrait on the cover of TIME Magazine for the week of August 11. The cruise, which was intended as a test of the maneuvering and imaging capabilities of J.J., proved successful as the robot vehicle, guided by the skilled hands of Martin Bowen, travelled into the ship and sent back video pictures of such items as a chandelier and encrusted marble column.

Dr. Robert Ballard, chief scientist on the expedition and head of the Deep Submergence Laboratory, reported to a standing room only crowd of over 400 reporters in Washington, D.C. on July 30 and to WHOI employees on August 1, that no evidence of a gash was found on the starboard hull. Instead, he speculates that the force of



An ANGUS camera looks directly down the grand staircase opening into which Jason Jr. was later sent.



J.J. descended four decks to photograph a chandelier.

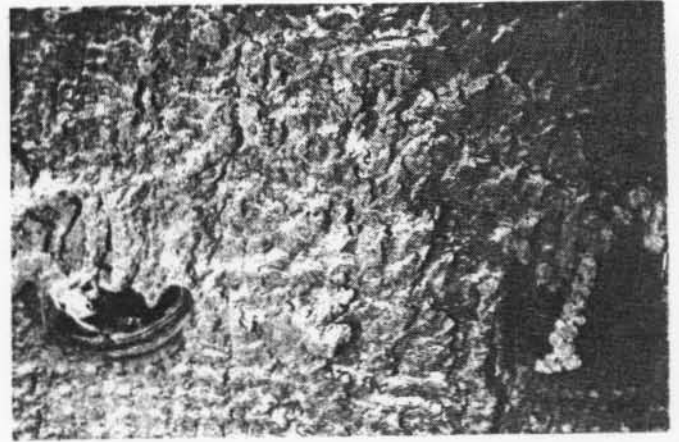
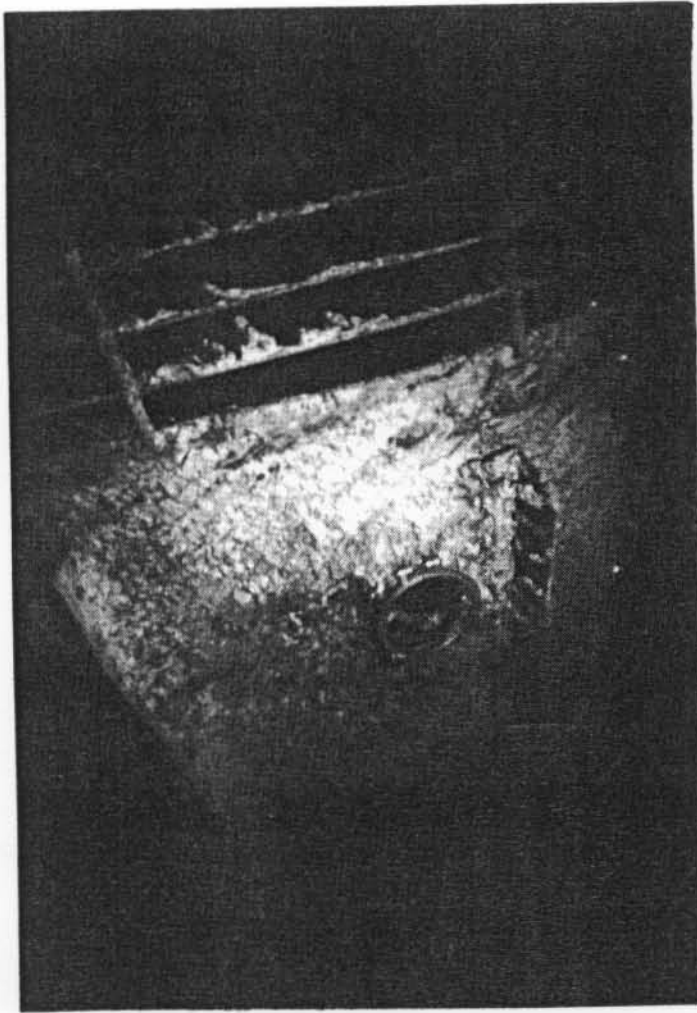
the collision with the iceberg caused the hull's steel plates to buckle and the rivets to pop, allowing water to seep in between adjoining plates. This theory fits with accounts from survivors who reported hearing very little noise during the collision.

Bob also reported that the stern section probably broke off at or near the surface, then turned 180° before hitting the bottom about 600 meters (2,000 feet) from the bow. The propellers, if still attached, are buried deep in the mud, but the rudder is still visible.

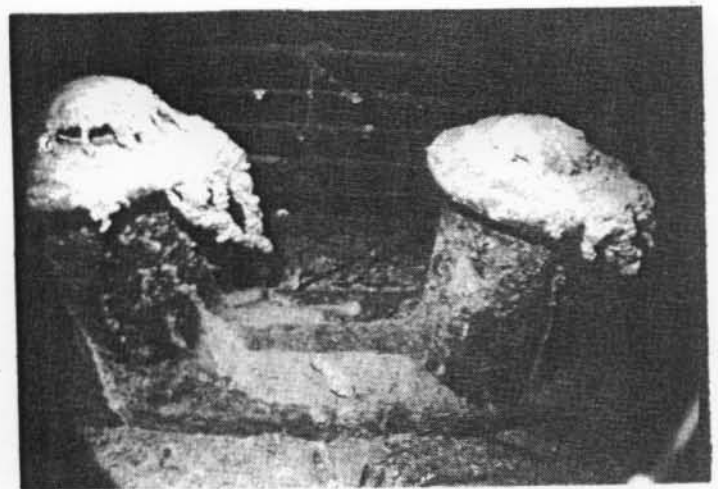
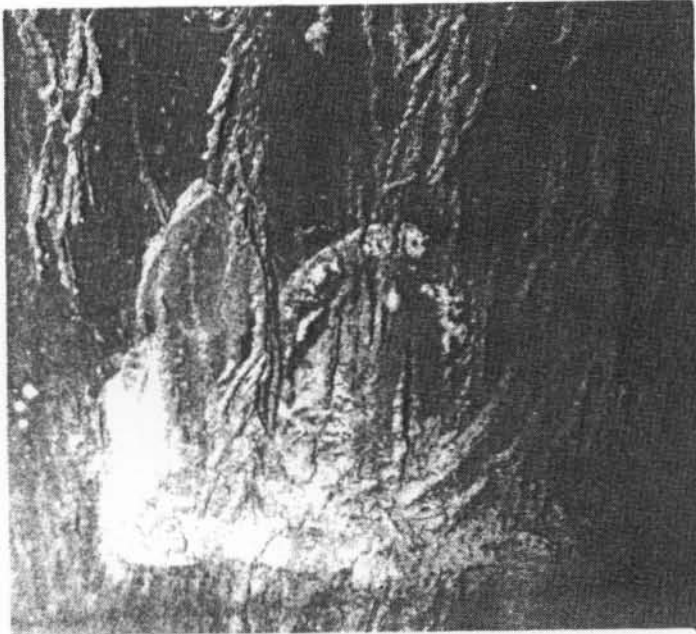
Any names painted on the ship have long since disappeared from the action of the water, the organisms and the enveloping rust. Wood-boring molluscs have eaten all of the elaborate woodwork, leaving a metal hulk -- still impressive for its size, but no longer the vision of luxury.

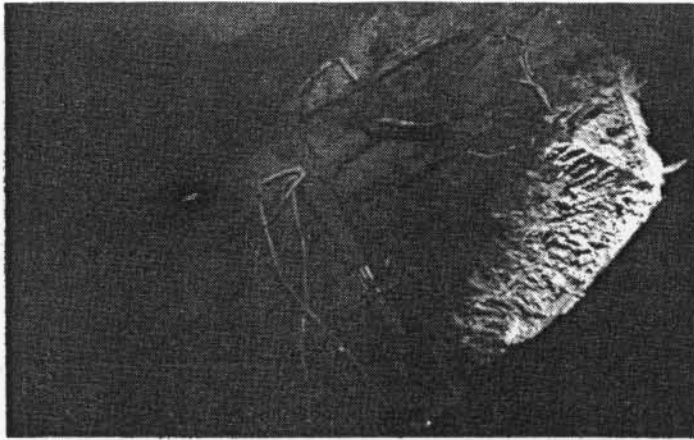
The photos and video pictures show many scenes of destruction -- twisted metal, the hull peeled back and decks collapsed upon themselves at the tear area between the bow and stern. "Rustcicles" hang from the ceilings inside the ship and from the lifeboat davits outside. Yet brass, copper and silver items on the ship and in the debris field remain polished and look almost brand new. These items, however, are all ship's artifacts; the only personal effects found were a patent leather shoe and a ceramic doll's head.

Bob reports that he hopes to have a mosaic of the 882-foot-long TITANIC assembled using about 100 photographs. His plans include a National Geographic article scheduled for publication later this year as well as a television documentary.

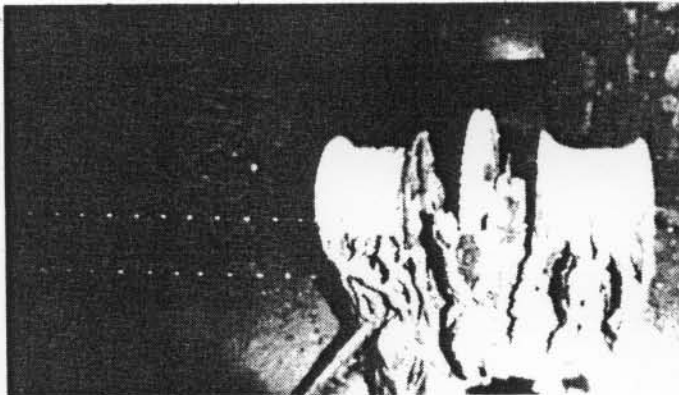


(Clockwise from bottom right) -- ALVIN photographed two bollards, used to secure mooring lines, and a railing on the starboard side of the TITANIC's bow; an anchor hangs off the starboard side; looking outward from the TITANIC, ALVIN photographed a piece of the ship's ribbing, a railing and porthole; like the brass porthole, a copper kettle remains shiny -- polished by the currents and particles in the water; rusticles hang from the ship, including here over the portholes.





(Clockwise from bottom right) -- An ANGUS camera looks directly down at the tear near the base of the No. 3 stack. The bow and stern separated at this expansion seam; Jason Jr. photographed an electric winch on the boat deck; debris litters a section of the hull of TITANIC's stern, peeled outward by the force of the great ship's destruction. The 200-foot stern section rotated 180° during the descent.



TITANIC EVENTS ON SHORE

The Public Information Office was perhaps the busiest place ashore during the three-week TITANIC cruise, receiving 600-800 calls per day. Often all four lines were busy, with calls waiting at the switchboard and reporters crowding the office.

Bob Ballard called the PIO each evening with a daily dive report. This two to five minute call was taped and then rushed across the street to the Smith Conference Room, which served as the media center for the month of July. There, assembled reporters, computer terminals primed and ready for action, taped their own copies of the call and began writing (the reporters most in evidence represented AP, Boston Globe, New York Times, USA Today and Cape Cod Times). On July 16 a speakerphone allowed Bob to hold a press conference from sea. About 75 newspeople filled the room, including three TV crews who filmed the speakerphone as Bob spoke!

Daily taped messages were played over the phone for radio and television stations that called in for the updates. At one time, all four lines at the PIO



Lewis Greene manned the Smith Lot gate throughout the A-11's stay in Woods Hole.

Calendar of Events

SUMMER PICNIC -- AUGUST 24

The annual WHOI summer family picnic is scheduled for Sunday, August 24, rain date Sunday, August 31. This year the picnic features the reggae music of "Arise." Soda, beer, popcorn, corn and watermelon, as well as a limited number of hot dogs and hamburgers will be available for consumption by WHOI employees and their families. For more information or offers of assistance please contact one of the picnic committee members: Ellen Levy, chairperson, ext. 2542; Alexander Fedotowsky, ext. 2803; Erik Zettler, ext. 2565; Sean Kery, ext. 2703; Arthur Newhall, ext. 2433; or David Dubois, ext. 2586.

TYPESETTING SOFTWARE CLASS SCHEDULED

IPCL is arranging a week-long class in early September for LATEX typesetting software. This program, which runs on many microcomputers and the VAX systems, allows you to typeset your own documents in-house and can save you money in printing costs. It is especially good for writing equations, but is appropriate for any documents.

Cost for the class will be between \$400 and \$200, depending on the number of students. Contact Chris Lynch, ext. 2417, if you are interested in attending the class.

PALEOCEANOGRAPHY CONFERENCE SEPT. 6-13

The Second International Conference on Paleoceanography (ICP 2) will be held in Woods Hole from the 6th to the 13th of September. For this occasion two special events are being organized: a concert and a moonlight cruise.

Frank Manheim is organizing the "Paleomusicology" concert, which will be presented on Wednesday, September 10, at 8 pm in Lillie Auditorium. Professional and local amateur musicians will present unusual classical and traditional Cape Cod music. Tickets are \$3 at the Market Bookstores, Harmony Hut and All Star Music in Falmouth.

On Thursday, September 11, the ISLAND QUEEN has been reserved for a three-hour moonlight cruise with buffet supper. Tickets (\$15 each) are on sale at WHOI (Emily Evans, ext. 2854), MBL Library and the Woods Hole Market Bookshop. Both events are open to the public.

STANDARD FIRST AID CLASS OFFERED

A course in Standard First Aid will be offered by WHOI in September. Classes will be held Monday, September 8 and Thursday, September 11, in Smith Conference Room and September 15, 18 and 22 in Redfield Auditorium, at 1 pm each day. Please call the Safety Office, ext. 2242, if you plan to attend.

were busy with Australian media. Other countries expressing great interest in the events were Canada, England, New Zealand and France. Even TASS called -- the reporter reached Anne Rabushka ("Yes, it's a Russian name and no, I don't speak the language"). Connie Brackett, working full-time in PIO for the TITANIC cruise, became the Canadian connection.

The press conference at Washington, D.C.'s National Geographic Society attracted over 400 news people as well as Secretary of the Navy John Lehman, Assistant Secretary Melvin Paisley, Rear Admiral Brad Mooney, and a host of Navy personnel. Sec. Lehman named Bob the Navy's first "Bottom

Gun" and presented him with a baseball cap.

When the ATLANTIS II docked, tourists assumed it was a great big floating museum. Lewis Greene spent much of his days from July 28 until A-II sailed on August 2 guarding the Smith gate. At one point he had to escort a whole family off the ship -- they had just made themselves comfortable in the scientists' mess and were starting to open sandwiches from their picnic basket!

Reports of shipwrecks and lost treasures are now coming in to PIO on a regular basis. Most of the callers are looking for financial backing and technical assistance in salvaging their wrecks.

SEVEN WHO SAW THE TITANIC -- THE ALVIN PILOTS

Sentiments range from enthusiasm to slight cynicism, but for the most part, the ALVIN pilots have looked at their dives on the TITANIC as once-in-a-lifetime chances.

At times the dives were relatively relaxing. "When we sat the sub on the ship to deploy Jason Junior, I could sit back and enjoy my lunch instead of eating on the run and dropping crumbs all over the control panel," said Will Sellers, pilot on dives 4 and 11. But at other times, the stiff currents and ragged debris created an obstacle course. "The potential for entrapment was quite high," noted Paul Tibbetts, who piloted dives 5 and 10.

Of course, no dive is ever easy. "Once you get down a few feet, you can't open the hatch. A problem at 10 feet can be as lethal as one at 12,500," says Ralph Hollis, chief pilot in the ALVIN group and pilot for dives 1, 2 and 8. "But at two and a half miles down, there are very few vehicles that can come to your rescue," he adds. "That's why as pilots we're constantly monitoring all systems, including atmospheric O₂ and CO₂, power consumption, leaks and electric grounds."

As chief pilot with hundreds of dives to his credit, Ralph was the obvious choice to pilot the first dive. Along with Dudley Foster, next senior pilot, and Bob Ballard, Ralph took ALVIN down on



Paul Tibbetts works on ALVIN electronics in preparation for a dive series to look at mudslides at the Laurentian Fan, completed August 15.



Jim Hardiman bleeds sail lines during routine ALVIN maintenance procedures.

Sunday, July 13, to locate the wreck and survey the diving conditions. After descending and searching for some time, ALVIN came upon a large sediment mound. A navigational fix was taken. "Rising up in front of us was the hull," said Ralph. But low battery power readings necessitated an immediate return to the surface.

On the next dive, Ralph, Bob and J.J. pilot Martin Bowen completed the reconnaissance of the wreck. "The TITANIC is no longer a luxury ship, the ocean has taken her," Ralph noted. "She has a graveyard look to her, like pictures of the FLYING DUTCHMAN. It's about as dark as it can get down there and it's close to freezing." He noted that "most of the windows are still closed with glass still in place, as if hiding all the ship's secrets."

While desolate and rusting, the TITANIC did offer several large landing sites on the bow and stern sections -- and the debris field, which held large chunks of twisted metal, did not appear to be any

more dangerous than crustal spreading centers studied in the Pacific and earlier this year in the Atlantic.

Jim Aguiar took ALVIN on photo runs around the bow section on a day with a half-knot current, dodging railings that had been ripped off the sides of the deck, as well as equally dangerous cables and life-boat davits. But after the initial awe of seeing the ship, Jim reports that "it was pretty much business as usual driving the sub." ALVIN served many purposes on these dives -- as mothership, tender, camera sled and all-around workhorse.

One role she did not play was sampler or "souvenir collector;" "something that we as ALVIN pilots do best -- besides being the most fun of all ALVIN tasks," says Jim Hardiman, who has made some 70 dives over the past three years as an ALVIN pilot. Pulling rocks off a shear wall, where every action produces an equal and opposite reaction, or gently capturing delicate biological specimens, requires an expertise and finesse in handling the sub.

On this dive series, sampling was strictly prohibited -- the only items brought back from the TITANIC were images. However, during Jim's dive with John Salzig

as copilot (dive number 6), ALVIN came upon the purser's safe. The sub's lights gleamed off the still shiny tumblers and crest. "By using ALVIN's mechanical arm we were able to grasp and actually turn the handle," said Jim, but the corrosive powers of the ocean had welded the safe's door shut with rust.

With half the working day spent in commuting (about two and a half hours each way), only about three to five hours could be spent at the actual job of testing Jason Junior and the imaging systems. On days when J.J. could not be deployed, the pilots were busy maneuvering the sub around the wreck, testing the capabilities of the low-light S.I.T. (silicon intensified target) cameras mounted on ALVIN's brow and J.J.'s garage and the C.C.D. (charge coupled device) video camera on ALVIN's arm -- moving the arm into openings in the ship, pointing the camera into windows and recording artifacts in the debris field.

The "rusticles" hanging all over the ship were a major problem to both the ALVIN and J.J. pilots. "We had to get close enough for imaging but not so close that we would come in contact with the wreck. Any disturbance of the rust stalagmites or sediment on the deck would create clouds of particles that made picture-taking impossible," said Dudley Foster, who added TITANIC dives 1, 3 and 9 to his almost 300-dive ALVIN career.

ALVIN pilots report that all the hard work to change the propulsion system, completed earlier this year, has proven worthwhile. "It's a real winner," says Will in describing the new system of six thrusters with joystick controls and the increased maneuverability they produce. "By getting on site quicker, we now have more time to concentrate on tasks for the scientific observers," he added.

Despite a one-day battery problem, the ALVIN pilots (who also serve as the sub's maintenance crew -- working 12 to 14 hours a day) were extremely pleased with the operation of their vehicle. "It was a chance in a lifetime," said John Salzig. "I can't imagine anything that will top this," added Dudley, "but there's a lot of the world that we still haven't seen."



Will Sellers displays his collection of shrunken cups. Styrofoam coffee cups attached to ALVIN during each TITANIC dive were reduced to miniature size by the tremendous pressures at those great depths.

Science Report

R.M.S. TITANIC AND WOOD-BORING MOLLUSCS A NATURAL PROGRESSION

What looked like wood in last year's photographs of the R.M.S. TITANIC has proven to be an illusion. Dr. Robert Ballard, expedition leader again for the 1986 cruise, reports that most of the ship's elaborate woodwork is gone and what remains, for the most part, is the caulking between the planks or a spongy mass filled with bore holes.

What seems to be an unfortunate development to the state of the TITANIC is actually a natural and orderly process in the ocean. Wood-boring molluscs, bivalves related to clams and scallops, keep the ocean bottom free from accumulations of natural as well as man-formed wood products. By breaking down the wood, they increase nutrient cycling in the ocean, leading to more productive environments.

Three genera of the Family Pholadidae (Subfamily Xylophaginae) are probably active in the area of the TITANIC, reports Dr. Ruth Turner, a professor at Harvard University, adjunct scientist at WHOI, and world-renowned specialist on these animals. Experiments at depths close to that of the TITANIC and not too far distant have been designed by Dr. Turner, a veteran of almost 50 ALVIN dives. She has shown the Pholads can destroy a two-foot-long by six-inch-wide by one-inch-thick block of wood in as short a time as only one year.

Xylophaga seem to attack first, followed by Xyloreda and Xylopholas. But Dr. Turner cautions that not enough research has been done to document this progression.

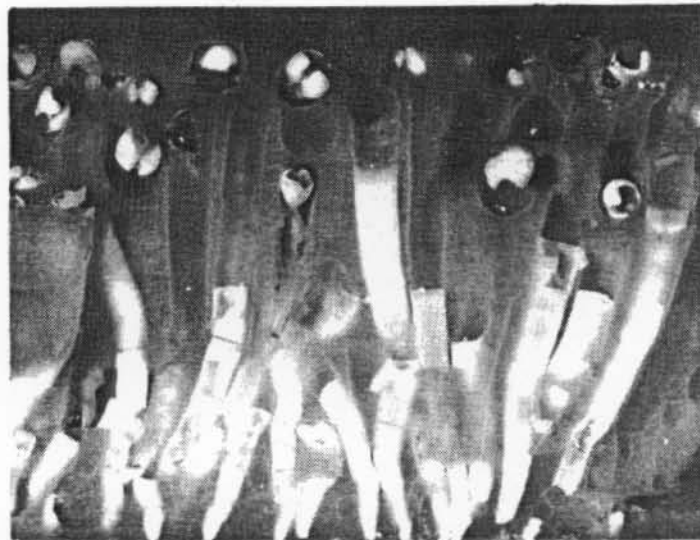
Of these three genera, only the Xyloreda leave calcareous tubes. Since Dr. Ballard reported seeing massive numbers of these features, Dr. Turner assumes that the Xyloreda have played a major role in the history of the TITANIC.

"The ship would have been a great big good experiment 50 or 25 years ago -- we know when it went down and what was there. Now we're a bit too late," notes Dr. Turner in describing the scientific value of the ship to biologists. "But we can use what has been observed to design

new experiments to answer the questions being raised." These questions include how the animals reached the upper decks, what woods were attacked and in what order, and which species were involved.

Early experiments led scientists to believe larvae stayed close to the sediment -- since most wood comes to the bottom in relatively small pieces, not as part of an entire ship. Samples of wood suspended on lines 20 meters above the bottom were not attacked in a short experiment. But 74 years and many molluscan generations after it went down, the TITANIC has been eaten. Currents reported around the wreck may have played a role in transporting the larvae to new wood sources on the ship.

Pholads use the wood for shelter and food -- storing the wood in their cecums (a lobe of the digestive tract). Microbiologists here at the Institution have shown that microbial decomposers, except for those that occur in the gut of invertebrates such as Pholads, exhibit little activity at great depths. But in the Xylophaginae, symbiotic bacteria, identified under the microscope but not yet cultured in the laboratory, probably break down the cellulose and fix nitrogen. This would provide the needed nutrients for the molluscs and other animals in the food chain.



Xyloreda bore into a one-inch thick wood panel submerged for almost a year at Deep Ocean Station-2 (located about 700 miles east of New Jersey and at 3,644 meters depth). Shells and calcareous burrow linings are visible.

NEW FACES



James E. Bird
Research Assistant
Biology
Shiverick/x2571
W. Watkins



Jeffrey W. Campbell
J. P. Student
Physical Oceanography
Clark 350/x2800
M. Briscoe



David B. Chester
J. P. Student
Physical Oceanography
Clark 349/x2544
P. Rizzoli



Deborah Collinson
Secretary
Development
Clark 215/x2760
P. Dudley Hart



Clark B. Freise
J. P. Student
Ocean Engineering
Clark 339/x2798
H. Graber



Sarah A. Green
J. P. Student
Chemistry
Redfield 3-16/x2754
O. Zafiriu



Wendy B. Lawrence
J. P. Student
Ocean Engineering
Bigelow 309/x2887
J. Spiesberger



Richard C. Lovering
Stockroom Clerk
Purchasing
Smith 114/x2282
M. Moniz



John W. Nicholson
J. P. Student
Ocean Engineering
Bigelow 309/x2887
Y. Agrawal/
A. Williams



Elizabeth A. Semcken
J. P. Student
Ocean Engineering
Bigelow G-7A/x2422
J. Lynch



Jonathan E. Snow
J. P. Student
Geology & Geophysics
McLean 214/x2829
H. Dick



Dajun Tang
J. P. Student
Ocean Engineering
Bigelow G-15/x2437
G. Frisk/J. Lynch

PROMOTIONS AND OTHER PERSONNEL CHANGES

Recent promotions include:

- JAMES H. CHURCHILL - P.O. - from Research Associate to Research Specialist.
KATHRYN KELLY - P.O. - from Postdoctoral Investigator to Assistant Scientist.
DAVID WALSH - P.O. - from Research Assistant to Joint Program Student.

Recent transfers include:

- CONSTANCE B. BRACKETT - from Personnel to Publications & Information.

Recent reclassifications include:

- LINDA BENWAY - Facilities - from Sr. Switchboard Operator/Receptionist to Staff Assistant II.
KAREN P. RAUSS - Personnel - from Manager of Benefits to Manager of Benefits and Affirmative Action.



LuAnne Thompson
J. P. Student
Physical Oceanography
Clark 358A/x2533
W. Young



Debra Colodner
J. P. Student
Geology & Geophysics
McLean 205/x2513
G. Jones



Kathryn Fitzpatrick
Staff Assistant
Controller
GEOSECS/x2410
R. Masse



Michael J. O'Neil
Asst. Plant Mechanic
Facilities
Smith 113/x2701
M. Field

LIBRARY ACCESSION LIST UPDATED

Have you been dropped from the distribution of the document library's monthly accession list? If so, the questionnaire in the April 1986 issue (listing #248) should be returned in order to place your name back on the mailing list. If you have never received this Document Library publication but would like to receive it or if you have any questions, please call Susan Putnam at ext. 2269.

FRIEMAN APPOINTED SCRIPPS DIRECTOR

Dr. Edward Allan Frieman, former executive vice president of Science Applications International Corporation in La Jolla, California, was appointed July 1 as the eighth director of Scripps Institution of Oceanography, as well as vice chancellor of marine science, dean of the Scripps graduate program and a professor of oceanography.

Dr. Frieman replaces Dr. William A. Nirenberg who had served as director since 1965. Dr. Nirenberg will continue as a professor emeritus of oceanography at Scripps.

A plasma physicist, Dr. Frieman's research interests include hydromagnetics, hydrodynamics and astrophysics. He received his bachelor's degree in engineering in 1946 from Columbia University, his master's degree in physics in 1948 and his doctoral degree in physics in 1951 from Polytechnic Institute of Brooklyn. He was a professor at Princeton University for more than 25 years and held a federal government position before joining SAIC in 1981.

Dr. Frieman's memberships include the National Academy of Sciences, American Association for the Advancement of Science, the White House Science Council, the Defense Science Board and the Planning and Steering Advisory Group of the Advanced Technology Panel for the Vice Chief of Naval Operations. He previously served on the President's Science Advisory Group.

Chairman of the UCSD search committee to recommend a new director was Dr. Walter Munk.

OCEANUS MAGAZINE SELECTED FIRST
AUSTRALIAN BICENTENNIAL FOUNDATION PROJECT

The summer '86 issue of Oceanus magazine, covering science and management issues of the Great Barrier Reef, has been selected as the first commemorative project of the American-Australian Bicentennial Foundation in Washington, D.C.

The U.S. Department of State recently endorsed the creation of the American-Australian Bicentennial Foundation and directed it "to develop a series of commemorative projects worthy of America's close relationship with Australia."

The Oceanus issue contains 34 articles written by leading Australian scientists on the latest research efforts and management programs connected with the Great Barrier Reef. This unique ecosystem stretches for some 1,700 miles along the Australian Pacific coast.

There are 64 color photos in the issue, marking the first time that Oceanus has used color in the interior of the magazine. The use of color was made possible by grants from the Australian Marine Research Allocations Advisory Committee and the Great Barrier Reef Marine Park Authority.

Institution Director John Steele and Oceanus Editor Paul Ryan attended a reception officially marking publication of the issue at the Australian Embassy in Washington July 30. They received a special recognition award (a watercolor rendition of a coral community) at the event.

TRAVEL NEWS

Hertz has established new rates effective August 1, 1986.

<u>Car Class</u>	<u>Rate</u>
A	\$35.00
B	36.00
C	37.00
D	38.00
F	39.00

In addition, surcharges will be added to many of the larger cities, including \$5.00 per day in the Boston area. There is no drop charge in either direction, Boston-Falmouth.

To help ensure that your project is not overcharged, send a copy of each rental agreement to the Travel Office when you return to Woods Hole. It is not necessary to wait until you submit your travel expense voucher to send the rental agreement unless you have paid for the rental by a personal credit card/cash.

BULLETIN - Arthur Forrester from ONR has notified the Institution that all authorizations for approval of foreign travel must be in Washington, D.C., 60 days prior to trip date or the travel may not be approved. The Travel Office needs 30 days to complete the required forms, forward them to Boston and have the Boston office forward the authorizations to Washington. Don't jeopardize your funding -- please submit your authorization forms to the Travel Office 90 days prior to departure.

INTERVIEWEES NEEDED

Woods Hole author Lois McCoy, who has written 12 books and numerous periodical pieces, is now researching a forthcoming book titled THESIS -- Trials and Tribulations of Obtaining the Doctorate. She wishes to interview grad students, spouses, professors, etc. on the experiences, euphoria and/or trauma involved in obtaining the degree. Call 548-7640 for an appointment.

NEWSLETTER NOTICES -- Send items of interest to the oceanographic community to Anne Rabushka, editor, Co-op, ext. 2271.

DISCOUNT AT THE WOODS HOLE PHARMACY

Effective August 1, 1986 with the presentation of a WHOI employee's identification card, the Woods Hole Pharmacy, Inc., 38 Main St., will give a ten percent discount on any purchase (including prescriptions) except the following: food, soda, alcohol, magazines, newspapers and cigarettes. You must present your ID card to the clerk and request the discount at the time of purchase.

Monday, September 1, is Labor Day. Enjoy the long weekend!
