



OCEAN explorer

For the Young Associates of

Woods Hole Oceanographic Institution Vol. 3 No. 2 DECEMBER, 1993

During her 33 years of service to WHOI, *Atlantis* (right) logged nearly 500,000 nautical miles at sea.

DOWN TO THE SEA IN SHIPS

Since 1931, when Research Vessel *Atlantis* was launched, ships bearing the Woods Hole Oceanographic Institution insignia have been on more than 13,000 cruises, logging millions of nautical miles. Along the way, many important deep-sea discoveries have been made.

According to pioneering oceanographer and former WHOI director Columbus Iselin, the ideal scientific research vessel has characteristics of a submarine, a North Sea trawler, a Coast Guard cutter, a pilot boat ...and a house boat. In such a ship, he felt, efficiency was less important than sea-

worthiness, endurance, and maneuverability.

Atlantis was such a ship, the first ever built especially for research that combined marine biology, marine geology and physical oceanography. Before World War II, surveys conducted from her decks led to the discovery of deep-sea canyons. She was

also the first research vessel to explore the Mid-Atlantic Ridge, the most extensive mountain range on earth.

In this issue, you'll learn about the steps necessary to get ready for a cruise. You'll also see the layout of a research vessel, and read first-hand accounts of what it's like to go to sea.

CRUISE CONTROL:

What is it like to prepare for a deep-sea research cruise?
It's like nailing jellyfish to a wall.

PROPOSAL-WRITING

A scientist wants to take a cruise to the Mid-Atlantic Ridge, to pull up rocks and cores of mud from a certain interesting location. She applies to the National Science Foundation for a grant to pay for a research cruise. As she works on the proposal, she shows it to other scientists, for feedback. Heading up a cruise is a huge responsibility. Deep-sea research cruises are very expensive. The scientist is asking for a sizable amount of money. Running a successful cruise could advance the scientist's career. The opposite experience could damage her future opportunities. But to her, the challenge and excitement are worth the risk.

JELLYFISH-NAILING

Six months later, the scientist gets word: the cruise is funded! Now it must be scheduled. Like a piece in a jigsaw puzzle, it will be fitted into the UNOLS cruise schedule for the coming year. UNOLS stands for University-National Oceanographic Laboratory System, a group of ocean-research institutions that operates the 22 ships in the U.S. academic research fleet.

Matching the research requirements of hundreds of NSF-funded scientists with the capabilities and long-range destinations of the 22 ships in the UNOLS fleet is mind-boggling. Says Barbara Martineau, Marine Operations Administrator at WHOI, who has been part of this process, "It's like nailing jellyfish to the wall on roller skates."

The scientist's cruise is scheduled. It will take place in six months, on the *R/V* (which stands for Research Vessel) *Knorr*, operated by WHOI.



Hovey Clifford beside *R/V Knorr* on the WHOI dock (left). Hardhats load floats built to hold cables connected to underwater equipment (below). On *Knorr's* bridge (right).



MEET THE WHOI FLEET



R/V KNORR

This is WHOI's flagship, the leader of the fleet.
Length: 279 feet
Cruising range: 11,900 nautical miles, 45 days
Accommodations: 24 crew, 34 scientists



R/V ATLANTIS II

(with sub *Alvin* on A-frame, at left)
Length: 210 feet
Cruising Range: 9,000 nautical miles, 45 days
Accommodations: 27 crew, 19 scientists,
9 crew for *Alvin*

WHO WILL GO?

Juggling budgets and personalities, the scientist, who is now called the Chief Scientist, plans the cruise in detail. She is in frequent communication with the Marine Operations department at WHOI, specifying equipment and technicians who will be needed.

The Chief Scientist also has to assemble a scientific staff for the cruise. Several of the senior scientists have already been selected, since they were written into the proposal. But there are a number of open slots for both technical staff and junior scientists.

These choices must be very carefully made. A research vessel is like a little world unto itself. The personality of each person on board and the chemistry of the whole group can spell the difference between a cruise that is a delight and one that's a nightmare. If people don't get along, or don't cooperate, disaster can result.

At last, the personnel for the cruise is set. The Chief Scientist and her staff pack their equipment. They send vans filled with computers and lab gear to Iselin Dock at WHOI.

ON THE WATERFRONT

Knorr will be in port for just three days before the cruise begins. In that time, all the equipment that has been sent must be installed and operational. In addition, a number of complex coring devices that belong to WHOI must be installed and tested.

Supervising the frenzy of preparations is Hovey Clifford, who acts as the dockside liaison between scientists undertaking cruises and WHOI. Through the flurry that leads to this or any cruise's departure, Hovey patiently supervises the installation of the shipboard labs, sees that the vans are properly deployed on *Knorr's* fantail (the rear deck), and makes sure all the coring devices are ready to go.

ANCHORS AWEIGH

At 0800 on a beautiful winter morning, *R/V Knorr* sets sail. Some friends and family of the Chief Scientist are on the dock to see her off. She waves, and watches the busy dockside workers begin their day. They have another cruise to prepare for, on *Oceanus*.

The scientist walks to the bow and looks out at the blue expanse, hoping for fair weather and good seas. Years of her hard work have lead up to this moment. In large measure, her future rides on the outcome of this endeavor. She is determined to succeed.



R/V OCEANUS

Length: 177 feet
Cruising Range: 7,000 nautical miles, 30 days
Accommodations: 12 crew and 12 scientists



R/V ASTERIAS

Length: 46 feet
Cruising Range: 500 nautical miles, 50 hours
Accommodations: 1 crew, 4 scientists

HOT SPOT:

A Chief Scientist's Challenges



Charley Hollister (right) on a cruise.

"Everybody on a cruise is there for the same reason," says WHOI Vice-President Charles Hollister, who has spent a total of 2 1/2 years at sea as Chief Scientist over the last thirty years. "They are there to solve a problem that the Chief Scientist has cooked up in his or her own brain." Charley says that being a Chief Scientist takes a lot of

patience, and very good people skills. The Chief Scientist's task is to motivate a group so that they're ready, willing and able to spend 16 hours a day, day after day, collecting information, in spite of discomfort, in spite of equipment failure, in spite of mood swings.

"It's a true team spirit," says Charley. "You look for people you know can work well together when things start to go sideways. It's those people who maintain a sense of humor when they've been up for 18 to 20 hours, working on a deck in wet, nasty weather." People who can keep a sense of humor in those circumstances are worth their weight in gold.

The Chief Scientist has to be aware of the mental and physical state of the crew at all times. "If somebody's not feeling well, they're going to be a little blue," says Charley. "When people come in for breakfast in the morning, I look in their eyes really closely to see how they're feeling." He needs to know this not just because he likes them, but also because if they're not feeling well and they're about to launch a big piece of equipment, he may decide to postpone that activity and let somebody else launch their equipment instead.

Charley uses a big blackboard on which he writes each day's events, and the times at which the events are scheduled to take place. The items on the board change constantly, as Charley juggles factors such as conditions at sea, and the states of mind of the scientists and technicians who are scheduled to perform various tasks.

"People really don't like surprises," says Charley. "Particularly when they've been up for fourteen hours and two hours later you have to wake them up again." Techniques like the blackboard help everyone on the ship stay informed.

Being at sea is no cakewalk, Charley is quick to point out. There is discomfort, tension, and danger. Many things can go wrong. People can get hurt. Costly equipment can be lost. A Chief Scientist is under great pressure to get results, or his or her reputation and future opportunities come into question.

But discoveries great and small keep everyone energized. "I'll always remember when we first realized that what we were seeing was a deep ocean storm. It was tearing the bottom of the ocean apart. The excitement of that discovery permeated the whole ship."

Being a Chief Scientist is a tremendous undertaking. "If you're really excited about challenge, this is the ultimate," says Charley. "I find it totally exhilarating. There are long periods of absolute drudgery and misery. You forget those. Your psyche is wonderful at erasing misery, hunger, pain. What you remember most are the friends you've made and the fun things you do at sea when you finally pull something off and take Mother Nature by surprise."

ONE FINE DAY IN THE MIDDLE OF THE SEA

WAYNE MOULDERMAN ILLUSTRATION. SPECIAL THANKS TO MONY COLLEN



This busy ship is the 274-foot R/V *Thomas G. Thompson*, one of the newest members of the UNOLS fleet, based at the University of Washington in Seattle. This ship is similar in size to the R/V *Knorr* of WHOI's fleet (see pages 2-3). The ship is a permanent home to its crew of 22. It is also a temporary home (for a few weeks at a time) to a series of scientific and technical parties of 27. What's going on here? Let's study

the ship, level by level, from the top down.

THE MAST

At the top of the mast are wind-measuring instruments. Below these are warning lights, electronic and satellite navigation antennae, and the ship's primary and backup radars. The egg-shaped object on the roof of the ship's top level is a satellite communications antenna used for voice, fax, and high-speed data communications.

SQUARE KNOT



Used largely for package-tying, or wherever a simple knot is needed to join two ropes of equal size.



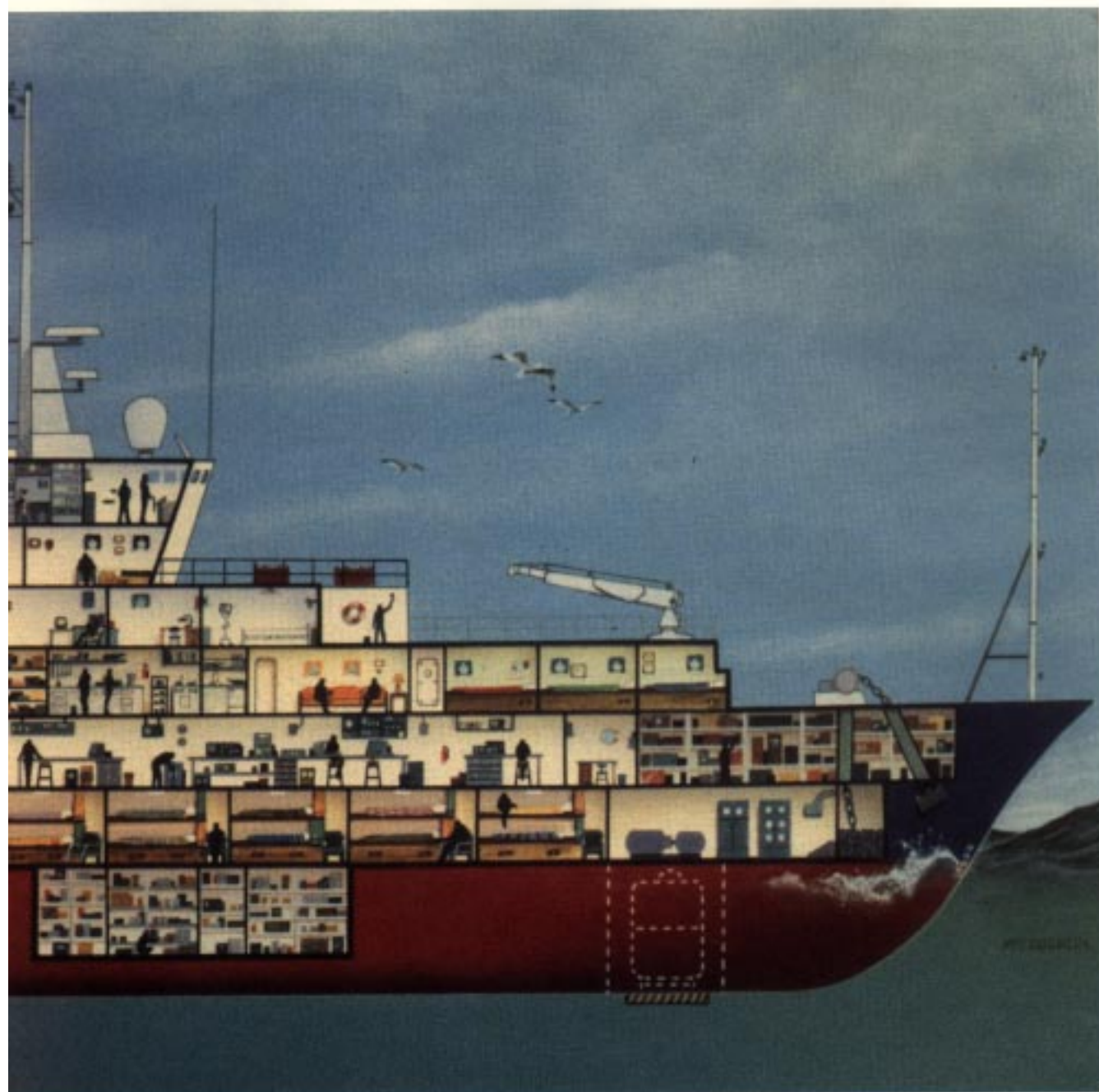
Not this! This is a granny knot.

TOP TWO LEVELS

Moving from forward to rear are the pilot house (from where the ship is steered) the radio room, and the aft control/chart room (charts are maps that describe specific areas of the ocean in great detail). Just below those rooms is the captain's stateroom.

THIRD LEVEL

Beginning forward you can see a member of the crew painting near a life ring. Behind the crew member are



officers' staterooms, winches and a workboat. There is a crane on the port side of the boat, the top of which can be seen in this picture.

CATSPAW

Used to hitch a sling or other continuous rope to a hook.



FOURTH LEVEL

Forward are three staterooms, next the library (in this room you can see people sitting on a couch), then the scullery (where dishes are washed), and then the galley (the ship's kitchen).

FIFTH LEVEL

Forward on the next deck is storage. Behind that is an office, then a large laboratory, the diving locker (holding scuba gear), a wet lab with running seawater (for work-

ing with samples), and then a staging bay, a room in which a remotely-operated vehicle and a water sampler are being worked on. Behind that is a van that may be used as a laboratory. Aft are large and small cranes, and a camera sled that will be raised and lowered by the trawl wire that is threaded on the aft A-frame.

SIXTH LEVEL

Starting at the left and moving to the right, you can see

the propulsion system, the trawl winch (this is a wire that raises and lowers the trawl shown on level five), storage, the engine room, several staterooms, a bow thruster apparatus and anchor chain storage.

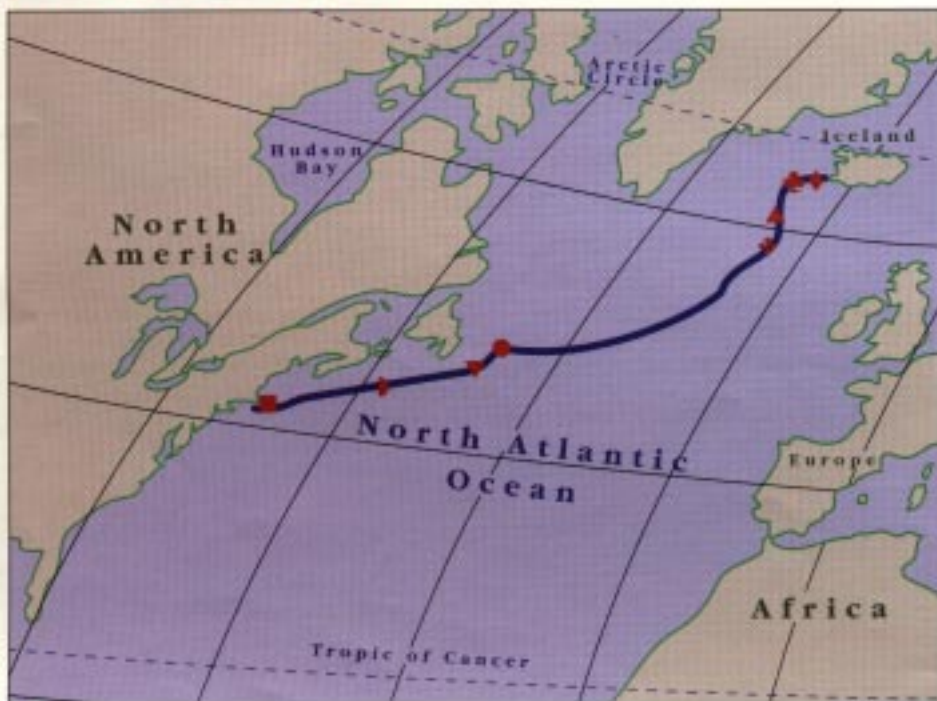
WHAT YOU DON'T SEE

On the port side are several laboratories, the mess (the dining room), a darkroom, a workshop, the laundry, an exercise room, more storage, and more staterooms.

DEEP SEA JOURNAL

Chris Zafiriou skipped his June, 1993 high school graduation in favor of a stint at sea aboard *R/V Ewing*, a member of the UNOLS fleet operated by Lamont-Doherty Laboratory in New York. At sea, Chris kept a diary. He also kept in touch with his parents (his father, Ollie, is a WHOI scientist with access to the same electronic mail system as Chris). They have shared this material with *Ocean Explorer* to offer a behind-the-scenes look at life on a research cruise.

Match the symbols on the map below to the corresponding symbols in the journal to find the location for that date.



■ *R/V Ewing* departed from Ilesin dock at WHOI on May 27, 1993. For the first few days of the cruise, Chris got used to shipboard routine. He had a four-hour watch every day in the Geophysics lab, where he recorded the course settings, depth, latitude, longitude, and the distance travelled from WHOI.

DIARY ENTRY MAY 28

► The boat is nice. I'm slow getting to know people. I figure there is no rush. My finals are all done. In some ways, for the first time in my life, I'm free.

The ship steamed across the North Atlantic in rough weather. Chris had a lot of adjustments to make.

E-MAIL JUNE 1 7:45 PM

▼ Hi, Dad + Mom,
We are coming out of the tail end of a storm. The last few days have been kinda miserable; however, we are due on station in five hours. I ate for the first time in a day today. The food is quite good. Haven't puked yet.
Love, Chris



Recovering a core.

When the ship arrived at a scheduled stop ("got on station"), Chris' routine changed. Now, besides being on watch, he worked on deck helping collect samples of deep-sea mud (coring) and samples of water (hydrocasting). The new work was exciting.

DIARY ENTRY JUNE 3

● I just noticed it is June. Like the phoenix or something, after bad movies and days of sleeping and headaches and a determined effort to keep my food down, I have adapted. I have cored. I have hydrocasted. I have seen the light at the Flemish Cap.

In spite of the thrill of challenges and hard work, life at sea can sometimes be...boring.

E-MAIL JUNE 7 8:16 PM

◆ Hi Dad,
We have about a day's worth of steaming until we will be on station, to take 4-5 JPC cores. Right now, we are all incredibly bored. I've never seen a group of such intelligent people go so completely stir-crazy.
Love, Chris

JPC stands for jumbo piston core, a device weighing thousands of pounds that is lowered overboard by a wire attached to a winch. At the seafloor, the piston plunges a twenty-foot

tube into the mud, to collect samples. Launching a JPC is tricky and dangerous in the turbulent North Atlantic.

E-MAIL JUNE 13 9:40 PM

▲ Hi Mom + Dad,

It's a beautiful day in the North Atlantic. A little cold, but what can you expect? This is my first chance to write you a real message in a while. We are supposed to be coring right now. However, while the JPC was on its way down, the hydraulics failed and it started to freefall. I happened to be very close to the winch at that time and it was kind of intimidating.

When we're not coring, I sample the cores and describe them. I find the fact they assigned me core description enormously amusing. I've never even taken a geology course....

Love, Chris

The JPC continued to cause problems. Finally, it was lost overboard.

DIARY ENTRY JUNE 16

▲ It is 3:30 am. Foggy outside. A person needs to have a sign up when things are going well saying, "A falling-through is imminent...." The JPC was lost tonight. I hope we can still be productive without it.

Losing important pieces of equipment is an unfortunate reality of oceanographic research. Without the JPC, the cruise's focus shifted to taking smaller cores, called GGC's (Giant Gravity Cores), and water samples.

By now, the cruise was winding down. After several weeks at sea, everyone was looking forward to land.

E-MAIL JUNE 18 9:27 PM

♣ Hi Dad,

I got mad this morning. We have a hero's platform we work off of. In case you don't know what one is, it is a meter-squared grid that is



Chris (right) and cruismates.

held out over the side for access to the ship's frame. It has only one railing, so two sides are clear to the ocean.

We were doing a hydrocast and I became increasingly annoyed at the person I was working with. I'm usually very mellow. But as long as I am hanging out over water without a railing I'm going to be particular that the operation is done safely and efficiently.... Goodbye from the N-Atlantic.

Love, Chris

E-MAIL JUNE 21 9:16 AM

♦ Chris—

I've spent lots of time on hero's platforms. At the end of cruises, people get careless sometimes, and easily angry too.... See you soon.

Love, Dad

Chris on hero's platform.



WIKI PHOTOGRAPH



R/V Ewing, docked in Iceland at the end of the cruise.



Chris in a shipboard lab, sampling a core.

JAMES COLLIN

CHRIS ZARROU

JAMES COLLIN